The 8th Academic Conference on Natural Science for Young Scientists, Master & PhD Students from ASEAN Countries

August 27-30, 2023

ABSTRACTS & PROGRAM

Vinh City, Vietnam

THE 8th ACADEMIC CONFERENCE ON NATURAL SCIENCE FOR YOUNG SCIENTISTS, MASTER AND PHD STUDENTS FROM ASEAN COUNTRIES

(CASEAN - 8)

Vinh City, Vietnam. 27-30 August 2023

ABSTRACTS & PROGRAM

https://iop.vast.vn/casean/2023/

CASEAN - 2023

CONTENTS

THE 8th ACADEMIC CONFERENCE ON NATURAL SCIENCE FOR YOUNG SCIENTISTS, MASTER AND PHD STUDENTS FROM ASEAN COUNTRIES

(CASEAN - 8)

ORGANIZERS

Vietnam Physical Society (VPS), Vietnam

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University of Yangon, Myanmar

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Mapua University, Philippines

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King Mongkut's University of Technology North Bangkok, Thailand

Center for Young Scientists (CYS), Indonesia

Vietnam National University, Ho Chi Minh (VNU HCM), Vietnam

Vietnam Academy of Science and Technology (VAST), Vietnam

Graduate University of Science and Technology (GUST-VAST), Vietnam

Institute of Physics (IOP-VAST), Vietnam

International Centre of Physics (ICP), Vietnam

THE 8th ACADEMIC CONFERENCE ON NATURAL SCIENCE FOR YOUNG SCIENTISTS, MASTER AND PHD STUDENTS FROM ASEAN COUNTRIES

(CASEAN - 8)

ORGANIZING COMMITTEE

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THE 8th ACADEMIC CONFERENCE ON NATURAL SCIENCE FOR YOUNG SCIENTISTS, MASTER AND PHD STUDENTS FROM ASEAN COUNTRIES

(CASEAN - 8)

CO-SPONSORS

Asia Pacific Center for Theoretical Physics (APCTP, Korea)

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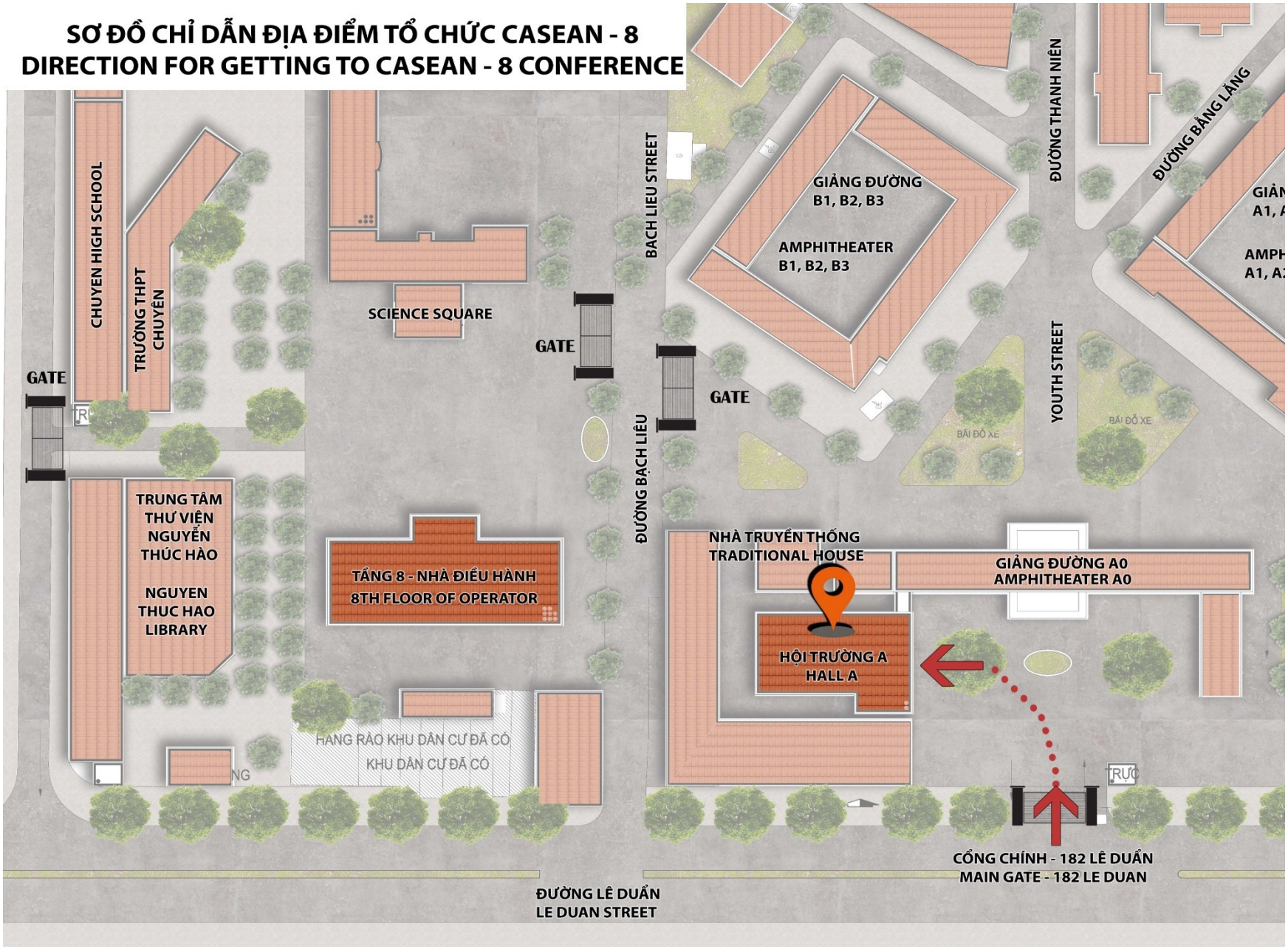
Tran Thi Viet Anh (Vinh University)
Phan The Hoa (Vinh University)

PROGRAM

Date / *Time*	**SUNDAY** *27 August 2023*	**MONDAY** *28 August 2023*	**TUESDAY** *29 August 2023*	**WEDNESDAY** *30 August 2023*
8:30 - 12:00		**(Hall A)** - ***REGISTRATION*** - **OFFICIAL OPENING** - **PLENARY SESSION**	**(Operator building)** - **SESSION A** - **SESSION B**	
		LUNCH		
13:30 - 17:30	- ***REGISTRATION*** **(Hall A)**	**(Operator building)** - **SESSION A** - **POSTER SESSION I**	**(Operator building)** - **SESSION A** - **SESSION B** - **POSTER SESSION II** - **PLENARY SESSION** (***OFFICIAL CLOSING***)	***Social Program***
18:00 - 20:00		**Welcome Party** **Offered by Vinh University**	**Conference Party**	

SƠ ĐỒ CHỈ DẪN ĐỊA ĐIỂM TỔ CHỨC CASEAN - 8
DIRECTION FOR GETTING TO CASEAN - 8 CONFERENCE



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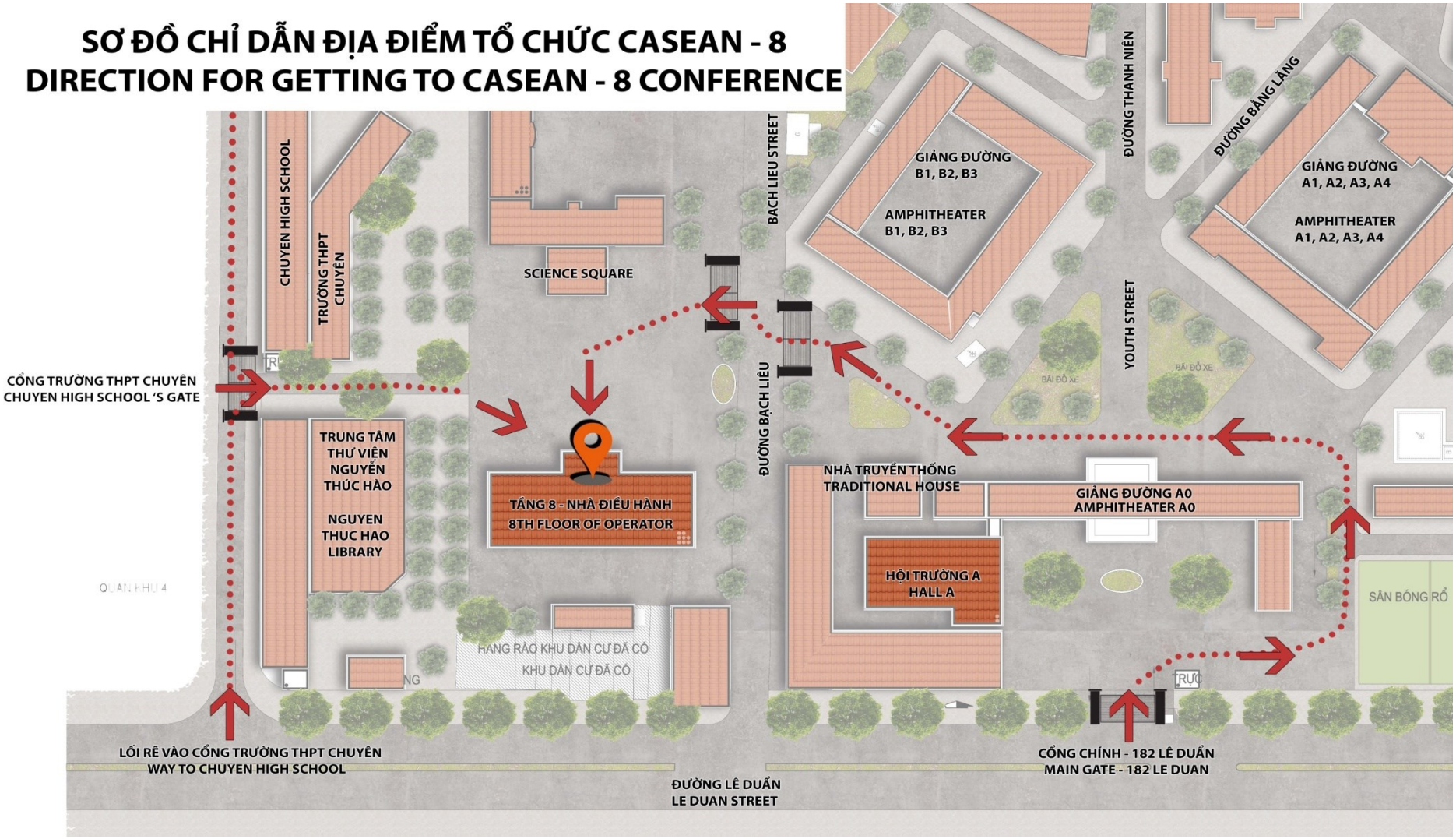

PROGRAM

PROGRAM

August 28, 2023 (Monday)

HALL A

07:30 - 08:00 **Registration**

08:00 – 08:30 **Music performance**

08:30 - 09:00 **Official Opening** *(Dr. Do Mai Trang & Dr. Do Hoang Tung)*

Prof. Nguyen Dai Hung (*Conference President*)

Dr. Le Quynh Lien (*Diector of Foreign Relation Department, VAST and Chairwomen of The Governing Board ICP*)

Prof. Nguyen Huy Bang (*Vinh University, Vietnam*)

Prof. Lemthong Lathdavong (*National University of Laos*)

Prof. Jakrapong Kaewkhao (*Nakhon Pathom Rajabhat University, Thailand*)

Prof. Elmer Estacio (*University of the Philippines, Philippines*)

Prof. Meng-Hock Koh (*Universiti Teknologi Malaysia, Malaysia*)

Prof. Yin Maung Maung (*University of Yangon, Myanmar)*

Prof. Dinh Van Trung (*Institute of Physics, VAST, Vietnam*)

PLENARY SESSION

Chairperson:

Prof. Masahiko Tani *(FIR-UF, Japan)*
Prof. Dinh Van Trung *(IOP, Vietnam)*

PL-01 **09:00 – 09:25** **QUANTUM INTERFERENCES IN ATOMIC SYSTEMS AND THEIR PROSPECTIVE APPLICATIONS**

Nguyen Huy Bang
Vinh University, 182 Le Duan Street, Vinh City, Vietnam.

PL-02 **09:25 – 09:50** **Ln^{3+} DOPED GLASS FOR SCINTILLATION MATERIAL AND ITS APPLICATIONS**

Jakrapong Kaewkhao
Center of Excellence in Glass Technology and Materials Science (CEGM), Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand

PL-03 **EXPLORING CURRENT TERAHERTZ RESEARCH**
09:50 – 10:15 **COLLABORATION IDEAS BETWEEN PHILIPPINES AND VIETNAM**

Elmer Estacio, Hannah Bardolaza, Armando Somintac, Arnel Salvador, Alvin Karlo Tapia, Arvin Lester Jusi, Jose Rene Micor, Christopher Que, and Gil Nonato Santos
National Institute of Physics, University of the Philippines Diliman, Quezon City, Philippines

10:15 – 10:45 **CONFERENCE PHOTOGRAPH/ COFFEE BREAK**

Chairperson:

Prof. Jakrapong Kaewkhao *(NPRU, Thailand)*
Prof. Nguyen Huy Bang *(Vinh University, Vietnam)*

PL-04 **ENHANCEMENT OF TERAHERTZ SPINTRONIC EMISSION**
10:45 – 11:10 **BY ANTENNA STRUCTURES**

Masahiko Tani
Research Center for Development of Far-Infrared Region, University of Fukui, Japan

PL-05 **ESTIMATION OF PAIRING STRENGTHS BASED ON AVERAGE**
11:10 – 11:35 **SINGLE-PARTICLE LEVEL DENSITY WITHIN THE SKYRME MEAN-FIELD-PLUS-BCS APPROACH**

Meng-Hock Koh* and Philippe Quentin
Department of Physics, Faculty of Science, Universiti Teknologi Malaysia, 813100 Johor Bahru, Malaysia.
Université de Bordeaux, CNRS, LP2I, UMR 5797, F- 33170 Gradignan, France

PL-06 **JINR – A WORLD SCIENTIFIC CENTER FOR FUNDAMENTAL**
11:35 – 12:00 **THEORETICAL AND EXPERIMENTAL RESEARCH, APPLICATIONS OF THE CUTTING EDGE TECHNOLOGIES AND UNIVERSITY EDUCATION**

Boris Sharkov
Joint Institute for Nuclear Research, Dubna, Moscow Region, 141980 Russia
National Research Nuclear University MEPhI, 115409, Moscow, Kashirskoe shosse, 31.

12:00 – 13:30 **LUNCH**

SESSION A

SESSION A:

*August 28, 2023 (*Monday*)*

(8th floor, Operator building)

Chairperson:

Prof. Andrey Denikin (*JINR, Dubna*)
Prof. Luu Tien Hung (*Vinh University, Vietnam)*

A-01 **13:30 – 13:50** **NANOSPECTROSCOPY & SENSING VIA PLASMONIC RESONANCE**

Invited Talk

Norihiko Hayazawa
Surface and Interface Science Laboratory, RIKEN, Japan
Innovative Photon Manipulation Research Team, RIKEN, Japan

A-02 **13:50 – 14:10** **EXPLORING BINARY NANOCLUSTERS: INSIGHTS FROM FIRST-PRINCIPLE CALCULATIONS & GAS - PHASE EXPERIMENTS**

Invited Talk

Nguyen Thanh Tung
Institute of Materials Science, Vietnam Academy of Science and Technology, Vietnam

A-03 **14:10 – 14:30** **GEOMAGNETIC FIELD EFFECTS OVER THE PHILIPPINES DURING STRONG SOLAR FLARE EVENTS IN APRIL 2022**

Invited Talk

Ernest P. Macalalad, Zane Domingo
Department of Physics, Mapua University, Muralla St., Intramuros, Manila, Philippines

A-04 **14:30 – 14:45** **INTERPTRETATION OF GEOLOGICAL MAP BY RADIOMETRIC SURVEYS: A CASE STUDY AT NAMBAK DISTRICT, LUANG PRABANG PROVINCE**

Chansamonemahaxay, Somsavath.Leuangtakoun, Sounthone Singsoupho, Sackxay Sompaserth
Department of Geology and Mineral, Ministry of Energy and Mines, Laos
Department of Physics, Faculty of Natural Science, National University of Laos

A-05
14:45 – 15:00 **RAMAN SPECTROMETRY: SENSITIVE TOOL FOR SAMPLE MAPPING?**

Tycova Anna, Jonas Vladimir, Kovarova Zuzana, Blatna Karolina, Prikryl Jan, Kotzianova Adela
Institute of Analytical Chemistry of the CAS, Veveri 967/97, Brno, Czech Republic
Faculty of Science, Masaryk University, Kotlářská 2, Brno, Czech Republic Contipro a.s., R&D Dept., Dolni Dobrouc, Czech Republic

A-06
15:00- 15:15 **NATURAL SUNLIGHT-DRIVEN PHOTOCATALYTIC REMOVAL OF TOXIC TEXTILE DYES IN WATER USING TITANIUM DIOXIDE (TiO_2) NANOMATERIALS**

Dinh Quang Ho, The Tam Le, Hoa Du Nguyen, Thi Thu Hiep Le, Hoang Hao Nguyen, Thi Thanh Lam Chu, Thi Kim Chung Nguyen, Thi Nga Vu, Le Khanh Huyen Nguyen
School of Chemistry, Biology and Environment, Vinh University, 182 Le Duan Street, Vinh City, Nghe An Province, Vietnam
Department of Chemistry, College of Education, Vinh University, 182 Le Duan Street, Vinh City, Nghe An Province, Vietnam
Centre for Practice and Experiment, Vinh University, 182 Le Duan Street, Vinh City, Nghe An Province, Vietnam
Phan Boi Chau High School for Gifted, Nghe An, 119 Le Hong Phong Street, Vinh City, Nghe An Province, Vietnam

A-07
15:15 – 15:30 **OPTICAL, LUMINESCENCE AND SCINTILLATION PROPERTIES OF $LaCl_3:Yb^{2+}$ CRYSTAL**

Nuanthip Wantana, Phan Quoc Vuong, Nguyen Thanh Luan, Nguyen Duy Quang, Hong Joo Kim, and Jakrapong Kaewkhao
General science, Faculty of Science and Technology, Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand Center of Excellence in Glass Technology and Materials Science (CEGM), Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand 3 Department of Physics, Kyungpook National University, Daegu, 41566, South Korea 4Physics Program, Faculty of Science and Technology, Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand

15:30 – 15:45 **COFFEE BREAKS**

Chairperson:

Prof. Tae Joong Eom (*PNU, Republic of Korea*)
Prof. Nguyen Thanh Tung *(IMS, VAST*)

A-08 **ADVANCED NUCLEAR PHYSICS AND ENGINEERING**
15:45 – 16:05 ACADEMIC PROGRAMS AT DUBNA STATE UNIVERSITY

Invited Talk

A. S. Denikin
Dubna State University, 141982, 19 Universitetskaya, Dubna, Russian Federation
Joint Institute for Nuclear Research, 141980, 6 Joliot-Courier, Dubna, Russian Federation

A-09 **BIOIMAGING AND BIOSENSING STRUCTURAL DEVICES**
16:05 – 16:25 USING NEAR-INFRARED PLASMONIC METASURFACES: DESIGN, SIMULATION, AND FABRICATION

Invited Talk

Huu Tu Nguyen, Thu Trang Hoang, Xuan Bach Nguyen, Thanh Son Pham, and Quang Minh Ngo
Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam
Graduate University of Science and Technology, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam
University of Science and Technology of Hanoi, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam

A-10 **HIGHLY STABLE PEROVSKITE QUANTUM DOTS FOR**
16:25 – 16:45 LIGHT-EMITTING DIODE APPLICATIONS

Invited Talk

Chang-Lyoul Lee
Advanced Photonics Research Institute (APRI), Gwangju Institute of Science and Technology (GIST), 123 Cheomdan-gwagiro, Buk-gu, Gwangju 61005, Republic of Korea

A-11 **A NON-ENZYMATIC GLUCOSE SENSOR BASED ON MoS_2**
16:45 – 17:00 NANOFLAKES/POLYANILINE (PANI)

Vu Van Thu, Nguyen Dac Dien, Phuong Dinh Tam, Hoang Lan, Nguyen Thi Nguyet, Nguyen Thi Thuy, Vu Thi Phuong Thuy, Le Thi Oanh
Faculty of Occupational Safety and Health, Vietnam Trade Union University, 169 Tay Son street, Dong Da district, Hanoi city, Vietnam
Faculty of Material Science and Engineering, Phenikaa University, Nguyen Trac street, Ha Dong district, Hanoi city, Vietnam
Faculty of Chemistry and Environment, Hung Yen University of Technology and Education, Hung Yen province, Vietnam
Electric Power University, 235 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam

A-12 **17:00 - 17:15** **MICROFLUIDIC PLATFORM FOR CELL LYSIS: TOWARDS SINGLE-MOLECULE ANALYSIS IN A FREE SOLUTION**

Jana Krivankova, Antonin Hlavacek
Institute of Analytical Chemistry of the Czech Academy of Sciences, Department of Bioanalytical Instrumentation, Veveri 97, 602 00 Brno, Czech Republic

A-13 **17:15 - 17:30** **MANIPULATING OF PULSE PROPAGATION WITH QUANTUM COHERENT IN A FOUR-LEVEL TRIPOD-TYPE ATOMIC SYSTEM**

Nguyen Thi Thu Hien, Nguyen Tuan Anh, Thai Doan Thanh, Le Van Doai, Dinh Xuan Khoa, Hoang Minh Dong, Nguyen Huy Bang
Ho Chi Minh City University of Industry and Trade, Ho Chi Minh City, Vietnam
Vinh University, 182 Le Duan Street, Vinh City, Vietnam

A-14 **17:30 - 17:45** **CONTROL OF GROUP VELOCITY VIA AN EXTERNAL MAGNETIC FIELD AND KERR NONLINEARITY IN DEGENERATE V-TYPE ATOMIC MEDIUM**

Luong Thi Yen Nga, Nguyen Huy Bang, Dinh Xuan Khoa, Le Van Doai, Nguyen Thi Thu Hien, Nguyen Tuan Anh, Thai Doan Thanh, Hoang Minh Dong
Vinh University, 182 Le Duan Street, Vinh City, Vietnam
Ho Chi Minh City University of Industry and Trade, Ho Chi Minh City, Vietnam.

13:30- 17:45

POSTER PRESENTATION I

(8th floor, Operator building)

Chairperson:

Prof. Mai Van Chung (*Vinh University, Vietnam*)
Prof. Pham Hong Minh (*IOP, VAST*)
Prof. Nguyen Tien Dung (*Vinh University, Vietnam*)

SESSION A:

*August 29, 2023 (*Tuesday*)*

(8th floor, Operator building)

Chairperson:

Prof. Meng-Hock Koh (*UTM, Malaysia*)
Prof. Mai Hong Hanh (*VNU, Vietnam)*

A-15 **THZ MOLECULAR SCIENCE IN CONDENSED PHASES**
08:30 - 08:50

Invited Talk

Keisuke Tominaga*
Molecular Photoscience Research Center, Kobe University, Nada, Kobe, 657-8501 Japan

A-16 **HORIZONTAL AND VERTICAL AXES WIND TURBINE FOR**
08:50 - 09:10 **RURAL AREA HOME APPLICATION IN MYANMAR**

Invited Talk

Hla Toe
Department of Physics, Yangon University of Education, Myanmar

A-17 **ULTRA-HIGH SENSITIVE NON-ENZYMATIC OPTICAL**
09:10 - 09:30 **SENSORS FOR GLUCOSE DETECTION**

Invited Talk

Quang Khai Dao, Thuy Quynh Mai, Hanh Hong Mai*
Department of Quantum Optics, VNU University of Science, 334 Nguyen Trai, Thanh Xuan, Ha Noi, Vietnam

A-18 **ROLE OF Eu^{3+} CONCENTRATIONS DOPED ALUMINIUM**
09:30 - 09:45 **SODIUM CALCIUM BORATE GLASS ON LUMINESCENCE PROPERTIES FOR CALIBRATING MATERIAL**

N. Jarucha*, Y. Ruangtaweep, P. Meejitpaisan, J. Kaewkhao
Physics Program, Faculty of Science and Technology, Nakhon Pathom Rajabhat University, Nakhon Pathom 73000, Thailand 2Center of Excellence in Glass Technology and Materials Science (CEGM), Nakhon Pathom Rajabhat University, Nakhon Pathom 73000, Thailand

A-19
09:45 - 10:00 **QUANTUM COMPUTING OF NUCLEAR PAIRING CORRELATION INTERACTION USING VARIATIONAL APPROACH ON BERYLLIUM ISOTOPES**

Ching-Hwa Wee, Yung Szen Yap, and Meng-Hock Koh*
Department of Physics, Faculty of Science, Universiti Teknologi Malaysia, Malaysia
Centre for Quantum Tech., National University of Singapore, 3 Science Drive 2, Singapore 117543, Singapore
Graduate School of Engineering Science, Osaka University, Toyonaka, Osaka 560-8531, Japan
UTM Centre for Industrial and Applied Mathematics, 81310 Johor Bahru, Johor, Malaysia

A-20
10:00- 10:15 **RAMAN STUDY OF 4D TRANSITION-METAL OXIDE COMPOUND Sr_2RhO_4**

Thi Huyen Nguyen*, Thi Minh Hien Nguyen, Duc Huy Le, Van Minh Nguyen, Xuan Nghia Nguyen, C. H. Kim
Institute of Physics, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Hanoi, Viet Nam.
Faculty of Physics, Hanoi National University of Education, 136 Xuan Thuy, Cau Giay, Hanoi, Viet Nam
Center for Correlated Electron Systems, IBS and Seoul National University, Korea

A-21
10:15- 10:30 **MANIPULATION OF SOLID-STATE SINGLE-PHOTON SOURCES BY DETERMINISTIC COUPLING INTO POLYMER-BASED PHOTONIC STRUCTURES**

Gia Long Ngo*, Jean-Pierre Hermier and Ngoc Diep Lai
1Université Paris-Saclay, ENS Paris-Saclay, CNRS, LuMIn, 91190, Gif-sur-Yvette, France
Université Paris-Saclay, UVSQ, CNRS, GEMaC, 78000, Versailles, France

10:30 – 10:45 **COFFEE BREAKS**

Chairperson:

Prof. Hla Toe ***(YUOE, Myanmar)***
Prof. Ngo Quang Minh ***(USTH, Vietnam)***

A-22 **10:45 - 11:05** **SINGLE LASER SCANNING FOR FUNCTIONAL PHOTOACOUSTIC MICROSCOPY: REAL TIME BLOOD OXYGEN SATURATION AND MOLECULAR DYNAMICS MONITORING**

Invited Talk

Yong-Jae Lee, Changho Lee, Tae Joong Eom*
Color-Modulated Extra-Sensory Perception Technology Engineering Research Center, Pusan National University, Busan, Republic of Korea
Department of Artificial Intelligence Convergence, Chonnam National University, Gwangju, Republic of Korea
Department of Nuclear Medicine, Chonnam National University Medical School & Hwasun Hospital, Gwangju, Republic of Korea
Dep. of Optics and Mechatronics Engineering, Pusan National University Busan, Republic of Korea

A-23 **11:05 - 11:20** **INCREASED TERAHERTZ EMISSION FROM A SPINTRONIC NI/PT BILAYER FILM WITH PLASMONIC METAL LINE ARRAY**

Invited Talk

Hannah R. Bardolaza*, John Paul R. Ferrolino, Ivan Cedrick M. Verona, Vince Paul P. Juguilon, Lourdes Nicole F. Dela Rosa, Miezel L. Talara, Hideaki Kitahara, Armando S. Somintac, Arnel A. Salvador, Neil Irvin F. Cabello, Alexander E. De Los Reyes, Masahiko Tani and Elmer S. Estacio
National Institute of Physics, College of Science, University of the Philippines, Diliman, Quezon City 1101, Philippines
Materials Science and Engineering Program, College of Science, University of the Philippines, Diliman, Quezon City 1101, Philippines
Research Center for Development of Far-Infrared Region, University of Fukui, Japan
Laser Science Laboratory, Toyota Technological Institute, Japan
Tera-Photonics Research Team, RIKEN Center for Advanced Photonics, Japan

A-24 **11:20 - 11:40** **START YOUR CAREER IN DUBNA! OVERVIEW OF JINR OPPORTUNITIES FOR STUDENTS AND YOUNG RESEARCHERS**

Invited Talk

O. A. Culicov
Head of JINR International Cooperation Department, Joint Institute for Nuclear Research, Dubna, Russian Federation

A-25 **RACE TO THE BEGINNING WITH THE JAMES WEBB SPACE**
11:40 - 12:00 **TELESCOPE**

Invited Talk

Jeremy Lim
Department Of Physics, Faculty Of Science, Hong Kong University

A-26 **HUMAN EMOTION RECOGNITION BASED ON FACIAL**
12:00 - 12:15 **EXPRESSIONS AND DEEP LEARNING FOR IVASBOT HUMANOID ROBOT**

Ngo Manh Duy*, Ha Thi Kim Duyen, Tang Xuan Bien, Ngo Manh Tien
Faculty of Electrical and Electronic Engineering, Phenikaa University, Hanoi, Vietnam
Faculty of Electronic Engineering, Hanoi University of Industry, Hanoi
Institute of Physics, Vietnam Academy of Science and Technology, Hanoi, Vietnam.

12:15 - 13:30 **LUNCH**

Chairperson:

Prof. Norihiko Hayazawa *(RIKEN, Japan)*
Prof. Le Duc Giang *(Vinh University, Vietnam)*

A-27 **DEEP LEARNING-BASED QUALITY IMPROVEMENT OF**
13:30 - 13:50 **BIOPHOTONIC IMAGING**

Invited Talk

Thran Dat Le, Changho Lee*
Department Department of Artificial Intelligence Convergence, Chonnam National University, 2Department of Nuclear Medicine, Chonnam National University Medical School & Hwasun Hosptial, 3Interdisciplinary Program of Biomedical Engineering, Chonnam National University, Gwangju, Republic of Korea

A-28 **THE EFFECT OF MGO ON Ga_2O_3-Lu_2O_3-Al_2O_3-Y_2O_3-B_2O_3-CeF_3**
13:50 - 14:10 **GLASS FOR PHOTONICS APPLICATIONS**

Invited Talk

E. Kaewnuam, P. Borisut, W. Chaipaksa, J. Kaewkhao
Physics Program, Faculty of Science and Technology, Muban Chombueng Rajabhat University, Ratchaburi, Thailand
Physics Program, Faculty of Science and Technology, Nakhon Pathom Rajabhat University, Nakhon Pathom, Thailand

Center of Excellence in Glass Technology and Materials Science (CEGM), Nakhon Pathom Rajabhat University, Nakhon Pathom, Thailand

A-29 **14:10 - 14:30**

GRAPHENE BASED ELECTROCHEMICAL SENSORS FOR BIOMEDICAL APPLICATIONS

Invited Talk

Vu Thi Thu, Nguyen Thi Thanh Ngan, Nguyen Tien Dat, Nguyen Dieu Linh, Bui Duy Hai, Vu Minh Thu, Nguyen Ngoc Tien
University of Science and Technology of Hanoi, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi

A-30 **14:30 - 14:45**

METAL ORGANIC FRAMEWORK BASED ON BIMETALLIC STRUCTURE (Cu-Ni/BTC) AND CARBONNANOTUBE (CNT) FOR ELECTROCHEMICAL DETECTION OF BISPHENOL A

Nguyen Tien Dat, Tran Thi Tram, Tran Thi Thuy, Vu Thi Thu*
Hanoi University of Science and Technology, 1 Dai Co Viet, Hanoi, Vietnam
University of Science and Technology of Hanoi (USTH), Vietnam Academy of Science and Technology (VAST), 18 Hoang Quoc Viet, Hanoi, Vietnam

A-31 **14:45 - 15:00**

DIMENSIONAL DEPENDENCE OF THERMAL CONDUCTIVITY IN MULTI-LAYERED GRAPHENE

Althea Marie M. Dacanay*, Rayda P. Gammag
Department of Physics, Mapúa University, Muralla St., Intramuros, Manila, Philippines

A-32 **15:00- 15:15**

STUDY LUMINESCENCE PROPERTIES ENHANCE OF Tb-DOPED Au CO-DOPED GLASSES FOR GREEN OPTICAL APPLICATION

P. Mangthong, N. Srisittipokakun*, R. Rajaramakrishna, J. Kaewkhao
Physics Program, Faculty of Science and Technology, Nakhon Pathom Rajabhat University, 73000, Thailand
Center of Excellence in Glass Technology and Materials Science (CEGM), Nakhon Pathom Rajabhat University, Nakhon Pathom 73000, Thailand

A-33 **PHOTOCATALYTIC ACTIVITY OF p-Si/p-CuO/n-ZnO**
15:15 - 15:30 **NANOSTRUCTURED HETEROJUNCTION**

Nguyen Van Thang, Hoang Van Thanh, Nguyen Duc Chung, Han Thi Thu, Le Thi Minh Tram, Nguyen Dinh Lam*
Faculty of Engineering Physics and Nanotechnology, VNU University of Engineering and Technology, Vietnam National University, Hanoi, Vietnam
Phenikaa University Nano Institute, Phenikaa University, Hanoi, Vietnam
Hanoi National University of Education, Hanoi, Vietnam

15:30 – 15:45 **COFFEE BREAKS**

Chairperson:

Prof. Boris Sharkov (*JINR, Russian*)
Dr. Vu Thi Thu (*USTH, Vietnam)*

A-34 **OPTICAL APPROACHES FOR HIGHLY SENSITIVE AND**
15:45 - 16:05 **ACCURATE POINT-OF-CARE BIOSENSORS**

Invited Talk

Kihyeun Kim*
Advanced Photonics Research Institute (APRI), Gwangju Institute of Science and Technology (GIST), 123 Cheomdan-gwagiro, Buk-gu, Gwangju 61005, Republic of Korea

A-35 **INTERNSHIP AND PH.D. RESEARCH OPPORTUNITIES AT**
16:05 - 16:25 **SOKENDAI AND INTER-UNIVERSITY RESEARCH INSTITUTES IN JAPAN**

Invited Talk

Satoshi Mayama*
The Graduate University for Advanced Studies, SOKENDAI, Shonan Village, Hayama, Miura, Kanagawa 240-0193, JAPAN

A-36 **GRAPHENE-BASED FIELD EFFECT TRANSISTOR**
16:25 - 16:40 **DECORATED BY METAL OXIDE NANOPARTICLES FOR NON-ENZYMATIC GLUCOSE SENSOR**

Bui Duy Hai*, Le Thai Hoang Nhi, Vu Thi Thu, Nguyen Thi Thanh Ngan
University of Science and Technology of Hanoi, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam

A-37 **16:40 - 16:55**

COMPARING THE TERAHERTZ EMISSION FROM SEMI-INSULATING AND LOW-TEMPERATURE GROWN GALLIUM ARSENIDE PHOTOCONDUCTIVE ANTENNA DEVICES OPTICALLY EXCITED AT 1550 NM AND 780 NM

L. N. F. Dela Rosa, J. B. Publico, V. P. B. Juguilon, I. C. M. Verona, J. P. Ferrolino, N. I. F. Cabello, A. A. Somintac1, A. A. Salvador, A. E. De Los Reyes, H. R. Bardolaza1, and E. S. Estacio

National Institute of Physics, College of Science, University of the Philippines Diliman, Quezon City 1101, Philippines

Materials Science and Engineering Program, College of Science, University of the Philippines Diliman, Quezon City 1101, Philippines

A-38 **16:55 - 17:10**

ASSESSMENT OF STORAGE-INDUCED FERMENTATION IN STINGLESS BEE HONEY BY COMBINING MICROBIAL ANALYSIS AND GAS RELEASED USING FTIR COUPLED WITH A GAS CELL

Khairiah Nur Ain Mohammed Hassan, Raja Kamarulzaman Raja Ibrahim

Department of Physics, Faculty of Science, University Teknologi Malaysia

13:30 - 17:10

POSTER PRESENTATION II

(8th floor, Operator building)

Chairperson:

Prof. Le Thi Nhi Cong (*IBT, VAST*)
Dr. Le Canh Trung *(Vinh University, Vietnam)*
Dr. Pham Van Duong *(IOP, VAST)*

17:10 – 18:00

OFFICIAL CLOSING

(8th floor, Operator building)

SESSION B:

*August 29, 2023 (*Tuesday*)*

(6th floor, Operator building)

Chairperson:

Prof. Lemthong Lathdavong (*NUOL, Laos*)
Prof. Pham Van Hoi (*IMS, VAST)*

B-01 **08:30 - 08:50** **A DFT STUDY ON 2D JANUS QUINTUPLE-LAYER ATOMIC STRUCTURES $XCrSiN_2$ (X= S, Se AND Te)**

Invited Talk

Tran P. T. Linh*, Nguyen V. Hieu, Bui D. Hoi, Nguyen Q. Cuong and Nguyen N. Hieu
Faculty of Physics, Hanoi National University of Education, Hanoi Vietnam
Physics Department, The University of Danang-University of Science and Education, Da Nang, Vietnam
Faculty of Physics, University of Education, Hue University, Hue, Vietnam
Institute of Research and Development, Duy Tan University, Da Nang, Vietnam
Faculty of Natural Sciences, DuyTan University, Danang, Vietnam

B-02 **08:50 - 09:10** **FABRICATION OF SURFACE-ENHANCED RAMAN SCATTERING (SERS) SUBSTRATES FOR PROTEIN DETECTION**

Invited Talk

Liyana Shatar, Fariza Hanim Suhailin*
Universiti Teknologi Malaysia, Malaysia

B-03 **09:10 - 09:25** **BUILDING A NATURAL LANGUAGE PROCESSING MODEL FOR VIETNAMESE COMMUNICATION WITH HUMANOID ROBOT IVASTBOT**

Ha Thi Kim Duyen, Tang Xuan Bien, Dam Ngoc Quang, Bui Dinh Duy*, Ngo Manh Tien, Ngo Manh Duy
Faculty of Electronic Engineering, Hanoi University of Industry, Hanoi
Institute of Physics, Vietnam Academy of Science and Technology, Hanoi, Vietnam
Faculty of Electrical and Electronic Engineering, Phenikaa University, Hanoi, Vietnam.

B-04
09:25 - 09:40

DETECTING AND QUANTIFYING MICROPLASTICS USING A DSLR-LENS BASED UV IMAGING SYSTEM

Reine Amabel J. Jaruda*, Jacque Lynn F. Gabayno
Department of Physics, Mapúa University, Intramuros, Manila, Philippines

B-05
09:40 - 09:55

A COMPARATIVE STUDY BETWEEN XFEM AND PHASE-FIELD MODELING IN SIMULATION OF FRACTURE BEHAVIOR

Anh Tu Tran*, Minh Quan Thai
Department of Aeronautics, University of Science and Technology of Hanoi, Hanoi, Vietnam
Faculty of Construction Engineering, University of Transport and Communications, Hanoi, Vietnam

B-06
09:55- 10:10

INVESTIGATION OF PHOTOCARRIER DYNAMICS IN INAS/GAAS SELF-ASSEMBLED QUANTUM DOTS VIA OPTICAL PUMP-TERAHERTZ PROBE SPECTROSCOPY

V. P. Juguilon*, D. A. Lumantas-Colades, K. Omambac, N. I. Cabello, I. Maeng, C. Kang, A. Somintac, A. Salvador, A. De Los Reyes, C. S. Kee, and E. S. Estacio
National Institute of Physics, University of the Philippines Diliman, Philippines
University of Duisberg-Essen, Duisburg, North Rhine-Westphalia, Germany
YUHS-KRIBB Medical Convergence Research Institute, Yonsei University, Republic of Korea
Advanced Photonics Research Institute, Gwangju Institute of Science and Technology, Republic of Korea

B-07
10:10- 10:25

INVESTIGATING THE PHOTOCATALYSIS EFFICIENCY OF TiO_2/PHOSPHORENE HYBRID COMPOUND BASED ON THE CACBON DIOXIDE CONCENTRATION

Nguyen Thanh Danh, Tran Quang Nguyen, Huynh Van Giang, Nguyen Thi Phuong Thanh, Pham Manh Hieu, Tran Kim Chi, Le Thuy Thanh Giang, Tran Quang Trung
Department of IC Design and Hardware, University of Information Technology, VNU-HCM, Linh Trung Ward, Thu Duc District, Ho Chi Minh City 70000, Vietnam
Department of Solid State Physics, Faculty of Physics, University of Science, VNU-HCM, 227 Nguyen Van Cu, District 5, Ho Chi Minh City 70000, Vietnam

10:25 – 10:40 **COFFEE BREAKS**

Chairperson:

Prof. Changho Lee (*CNU, Republic of Korea*)
Dr. Le Quang Vuong (*Vinh University, Vietnam)*

B-08 **10:40 - 11:00** **VARIATIONS IN AIR AND LAND SURFACE TEMPERATURES IN URBAN AREAS OF VIETNAM BEFORE, DURING AND AFTER THE COVID-19 PANDEMIC**

Invited Talk

Bijeesh Kozhikkodan Veettil*, Juliana Costi, Tran Xuan Linh
Laboratory of Ecology and Environmental Management, Science and Technology Advanced Institute, Van Lang University, Ho Chi Minh City, Vietnam
Faculty of Applied Technology, School of Technology, Van Lang University, Ho Chi Minh City, Vietnam
Laboratoire Environnements et Paléoenvironnements Océaniques et Continentaux (EPOC)-UMR CNRS 5805, Université de Bordeaux, Pessac, France
Institute of Research and Development, Duy Tan University, Da Nang, Vietnam
Faculty of Civil Engineering, Duy Tan University, Da Nang, Vietnam

B-09 **11:00 - 11:20** **BIODEGRADATION ANALYSIS ON THE SILICATE GLASS CERAMICS USING RICE HUSK ASH AS SILICA SOURCE**

Invited Talk

Min Maung Maung*, Kham Kham Saing and Khin Khin Win
Department of Physics, University of Yangon, University Avenue Road, Yangon, Myanmar, 11041

B-10 **11:20 - 11:35** **HISTORICAL PROFILE OF POLYCHLORINATED BIPHENYLS AND ORGANOCHLORINE PESTICIDES IN SEDIMENT CORES FROM DAY RIVER, VIETNAM**

Linh Nguyen Khanh*, Tham Trinh Thi, Hai Luu Duc, Trinh Le Thi
Faculty of Environment, Hanoi University of Natural Resources and Environment, Hanoi City, Viet Nam
PhD candidate at VNU University of Science
Vietnam Association for Environmental Economics - VIASEE

B-11 **11:35 - 11:50** **CLIMATE CHANGE IMPACT ON DROUGHTS IN VIETNAM: A PERSPECTIVE FROM THE CMIP6-VN DATASET**

Tran Anh Quan*, Nguyen Thi Hong Ngoc
Faculty of Environment, Hanoi University of Mining and Geology
Faculty of Natural Resources and Environment, Vietnam National University of Agriculture

B-12 **11:50 - 12:05** **COMPOSITE BASED ON NICKEL NANOPARTICLES AND 3D CARBON FOAM TOWARDS ENERGY STORAGE APPLICATION**

Vu Minh Thu, Pham Truong Thuan Nguyen, Vu Thi Thu*
University of Science and Technology of Hanoi, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam
CY Cergy Paris Université, LPPI, F-95000 Cergy, France

12:10 - 13:30 **LUNCH**

Chairperson:

Prof. Keisuke Tominaga (*Kobe University, Japan)*
Prof. Jacque Lynn F. Gabayno (*Mapua University, Philippines*)

B-13 **13:30 - 13:50** **HIGHLY SENSITIVE PORTABLE SENSOR FOR GASTRIC CARCINOMA DIAGNOSIS**

Invited Talk

Saw Lin Oo*, Yin Maung Maung, Vaithinathan Karthikeyan, Vellaisamy A. L. Roy
Department of Physics & Universities' Research Centre, University of Yangon, Myanmar
Department of Physics, University of Yangon, Myanmar
Department of Materials Science and Engineering, City University of Hong Kong, Hong Kong

B-14 **13:50 - 14:10** **DEVELOPMENT OF POLYMER ELECTROLYTE MEMBRANES FOR FUEL CELL**

Invited Talk

Lan Thi Phan
Division of Advanced materials and devices, Institute name Viet Nam-Korea institute of science and technology, Hoa lac High-tech Park, km29 Thang Long Boulevard, Hanoi

B-15 **14:10 - 14:25** **STRUCTURAL ANALYSIS AND SENSORY EVALUATION OF WHEY PROTEIN CONCENTRATE AS AN EGG-SUBSTITUTED IN SPONGE CAKE PRODUCT**

Phan The Duy*, Le Nguyen Doan Duy, Nguyen Thi Kim Chi, Tran Minh Hau
Faculty of Food Science and Technology, Ho Chi Minh City University of Industry and Trade, 140 Le Trong Tan, Tay Thanh Ward, Tan Phu District, Ho Chi Minh City

B-16 **IRREVERSIBLE DECOHERENCE OF A QUBIT IMMERSED IN**
14:25 - 14:40 **AN N-QUBIT ENVIRONMENT**

Lemuel John F. Sese*, Eric A. Galapon
Department of Physics, Mapúa University, Intramuros Manila, Philippines 1002
National Institute of Physics, University of the Philippines Diliman, Quezon City, Philippines 1101

B-17 **REDUCING THE SPHERICAL ABERRATION OF LENSES**
14:40 - 14:55 **BASED ON CONTROL LIGHT TRAJECTORY**

Thi Phuong Anh Nguyen, Le Phuong Hoang, Xuan Binh Cao*
School of Mechanical Engineering, Hanoi University of Science and Technology, Hanoi 100000, Viet Nam
Square Lab, Hanoi University of Science and Technology, Hanoi 100000, Viet Nam

B-18 **FEEDING BEHAVIOUR AND REPRODUCTION OF**
14:55- 15:10 **ELONGATED TORTOISE INDOTESTUDO ELONGATA (BLYTH, 1853) IN CATIVITY AT PHIALAT VILLAGE SANGTHONG DISTRICT VIENTAINE CAPITAL**

Somchit SUDAVANH
National University of Lao, Faculty of Natural sciences, Department of Biology

B-19 **BIODEGRADATION OF OIL AND IRON POLLUTED WATER**
15:10 - 15:25 **IN NHA TRANG, KHANH HOA**

Dao Ngoc Nam, Tran Xuan Manh, Nguyen Trang Anh, Nguyen Ngoc Khanh Van, Cung Thi Ngoc Mai, Le Thi Nhi Cong*
Bio-Redsun Company
AnViet Group
University of British Columbia, USA
Ha Noi-Amsterdam High School for Gifted, Hoang Minh Giam, Cau Giay, Hanoi, Vietnam
Institute of Biotechnology, VAST

15:25 – 15:40 **COFFEE BREAKS**

Chairperson:

Prof. Elmer Estacio (NIP, *UP Diliman, Philippines*)
Prof. Nguyen Thanh Binh (*IOP, VAST*)

B-20 **BIAS FIELD CORRECTION BASED ON B-SPLINE BASIS**

15:40 - 16:00

Invited Talk

Silu Chen, Kokhaur Ong, Seepheng Hang*

Department of Mathematical Sciences, Faculty of Science, Universiti Teknologi Malaysia, UTM Skudai, 81310 Johor, Malaysia

*Bioinformatics Institute, A*STAR , Singapore, Singapore*

*Institute of Molecular and Cell Biology, A*STAR, Singapore, Singapore*

B-21 **STUDY OF 2D GAP PLASMON RESONATOR ON ORDERED**

16:00 - 16:20 **SILVER STRUCTURE**

Invited Talk

Xuan-Bach Nguyen*, Anh-Tu Tran, Phuoc-Thanh-Binh Tong, Quang-Minh Ngo

University of Science and Technology of Hanoi, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Ha Noi

B-22 **INKJET-PRINTING OF AMINATED GRAPHENE-BASED INK**

16:20 - 16:35 **ON SOFT SUBSTRATE FOR BIOSENSING APPLICATIONS**

Nguyen Thi Thanh Ngan*, Truong Hien Anh, Benoit Piro, Vu Thi Thu

University of Science and Technology of Hanoi, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam

Laboratory ITODYS UMR 7086, Université Paris Cité, 15 Rue Jean Antoine de Baïf, 75013 Paris

B-23 **QUANTITATIVE OF HEAVY METALS, ORGANOCHLORINE**

16:35 - 16:50 **AND ORGANOPHOSPHATE PESTICIDE GROUPS IN SOIL AT BANANA PLANTATION, SANGTHONG DISTRICT, VIENTIANE CAPITAL**

Aphisid Chandavong*, Kesiny Phomkeona, Phengxay Deevanhxay, Vanpaseuth Phoutthavong, Boudda Sengthongsa

Chemistry Dep., Faculty of Natural Science, National University of Laos

B-24 **IN VITRO NEUROPROTECTIVE EFFECT OF**

16:50 - 17:05 **NANOASTAXANTHIN**

Do Bich Hoa, Ngo Thi Hoai Thu, Nguyen Van Tru, Ho Thi Oanh, Hoang Mai Ha, Hoang Thi Minh Hien*

Graduate University of Science and Technology, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, 10072, Hanoi, Vietnam

Institute of Biotechnology, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, 10072, Hanoi, Vietnam

Institute of Chemistry, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, 10072, Hanoi, Vietnam)

13:30 - 17:10

POSTER PRESENTATION II

(8th floor, Operator building)

<u>Chairperson:</u>

Prof. Le Thi Nhi Cong (*IBT, VAST*)
Dr. Le Canh Trung *(Vinh University, Vietnam)*
Dr. Pham Van Duong *(IOP, VAST)*

17:10 – 18:00

OFFICIAL CLOSING

(8th floor, Operator building)

POSTER SESSION I

13:30 - 17:45, 28 August 2023, 2023 (Monday)

(8th floor, Operator building)

Chairperson:

Prof. Mai Van Chung (*Vinh University, Vietnam*)
Prof. Pham Hong Minh (*IOP, VAST*)
Prof. Nguyen Tien Dung (*Vinh University, Vietnam*)

PI-01 MEASUREMENT OF NATURAL RADIOACTIVTY AND RADIATION HAZARD ASSESSMENT IN THE SOIL SAMPLES GOLD MINING VILABULY DISTRIC SAVANNAKHET PROVINCE

Lamthong Latdavong*, Chansamone Mahaxay, Somsavath.Leuangtakoun, Sounthone Singsoupho, Sonxay Xayheungxy
1National University of Lao, Faculty of Natural Science, Department of Physics

PI-02 ENHANCING THE PERFORMANCE OF POLYMER BINARY BLEND SOLAR CELLS BY POST-TREATING THE PEDOT:PSS SURFACE WITH HYDROQUINONE POWDER

Yin Maung Maung*, Zin Thu Hlaing, Ratchatee Techapiesancharoenkij, Saw Lin Oo and Than Than Win
Department of Physics, University of Yangon, University Avenue Rd 11041 Yangon, Myanmar
Department of Materials Engineering, Faculty of Engineering, Kasetsart University, 50 Ngam Wong Wan Rd, Ladyao Chatuchak Bangkok 10900
Monywa University, Kyaukka Rd 02301 Monywa, Myanmar

PI-03 ENHANCED NEAR-INFRARED FLUORESCENT SENSING USING TRUNCATED-PYRAMID BASED PLASMONIC METASURFACES

Thu Trang Hoang*, Thanh Son Pham, Xuan Bach Nguyen, Quang Minh Ngo
Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi
University of Science and Technology of Hanoi, Vietnam Academy of Science and Techology, 18 Hoang Quoc Viet, Cau Giay, Hanoi

PI-04 GREEN SYNTHESIS AND OPTICAL PROPERTIES OF STABILIZED SILVER NANOPARTICLES USING GUAVA TWIGS EXTRACT

Mone Phommahaxay, Pham Van Trinh, Nguyen Van Hao*
Institute of Science and Technology, TNU – University of Sciences, Tan Thinh ward, Thai Nguyen city, Vietnam
Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Str., Cau Giay Distr., Hanoi, Vietnam.

Graduated University of Science and Technology, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Str., Cau Giay Distr., Hanoi, Vietnam

PI-05 THEORETICAL INVESTIGATION OF ISOMERIC RATIOS FROM PHOTONUCLEAR REACTIONS ON NATURAL BA TARGET USING TALYS 1.96 AND GEANT4 SIMULATION

Bui Minh Hue*, Tran Duc Thiep
Institute of Physics, VAST, 10 Dao Tan St., Ba Dinh Dist., Hanoi, Vietnam

PI-06 EFFECT OF PRECUSOR CONCENTRATIONS ON THE PHOTOLUMINESCENT PROPERTIES OF ZINC IONS IMPLANTATION ON COMERCIAL PAPER

Thuy Quynh Mai, Quang Khai Dao, Hong Hanh Mai*
Department of Quantum Physic, Faculty of Physics, University of Science, Vietnam National University, Hanoi,334 Nguyen Trai str, Thanh Xuan Dist., Hanoi, Vietnam
Soft Matter andBiological Physics Center, Center for High Technology Development, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Hanoi 100000, Vietnam

PI-07 VARIATION IN EFFECTIVE MODE AREA AND NONLINEAR COEFFICIENT OF As_2S_3-BASED CIRCULAR-LATTICE PCF WITH CHANGE IN CORE DIAMETER

Bao Tran Le Tran, Tan Tran Duy, Mai Nguyen Thi Quynh, Sam Chu Thi Hoai, Anh Ta Tram, Thien Nguyen Minh, Luu Mai Van, Vinh Nguyen Thanh, Lanh Chu Van*
Department of Physics, Vinh University, 182 Le Duan, Vinh City, Vietnam
Truong Xuan High School, Thap Muoi District, Thap Muoi Province, Vietnam
Tan An High School, Long An, Vietnam
Vinh Medical University, Vinh City, Nghe An Province, Vietnam
Hanoi Open University, Nguyen Hien Str., Bach Khoa, Hai Ba Trung Dist., Ha Noi City, Vietnam

PI-08 STUDY OF THE THERMODYNAMIC PROPERTIES OF $BaTiO_3$ PEROVSKITE BY THE STATISTICAL MOMENT METHOD

Cao Huy Phuong*
Faculty of Natural Sciences, Hung Vuong University, Nguyen Tat Thanh Street, Viet tri City, Phu Tho province, Vietnam

PI-09 SPECTRAL-LUMINESCENT PROPERTIES OF HYBRID PLASMON NANOSTRUCTURES Ag-DEGRADATION EVOLUTION OF MINI-SOLAR MODULES DUE TO ENVIRONMENTAL IMPACT

Noe Noe Honey*, Htet Yadanar Soe, Saw Lin Oo, Ratchatee Techapiesancharoenkij Than Than Win 4 and Yin Maung Maung

Department of Physics, University of Yangon, University Avenue Rd 11041 Yangon, Myanmar
Faculty of Natural Science, University of Computer Studies (Loikaw), Myanmar
Department of Materials Engineering, Faculty of Engineering, Kasetsart University, 50 Ngam Wong Wan Rd, Ladyao Chatuchak Bangkok 10900
Monywa University, Kyaukka Rd 02301 Monywa, Myanmar

PI-10 USING SEMI-AUTOMATIC PROGRAMS AND REFERENCE CHARTS IN EARTHQUAKE FORECASTING

Duy Dang Hoang*, Nhung Khuong Hong, Nghia Huu Pham
Faculty Geophysical, University of Science, Ho Chi Minh City, Vietnam
Vietnam National University, Ho Chi Minh City, Vietnam
Loc Ninh High School, Binh Phuoc Province, Vietnam
Long An College, Long An Province, Vietnam

PI-11 DESIGN AND SIMULATION OF A SUSPENDING SYSTEM FOR Z-AXIS DISPLACEMENT ACTUATOR

Dang Van Hieu*, Nguyen Thanh Huong and Chu Manh Hoang
FPT University, Hoa Lac High Tech Park, Hanoi, Vietnam
International Training Institute for Materials Science, Hanoi University of Science and Technology, No. 1, Dai Co Viet, Hai Ba Trung, Hanoi, Viet Nam
School of Information Technology and Digital Economics, National Economics University, Vietnam

PI-12 THE PHOTOCATALYTIC PROPERTIES OF MnO_2/ZnO COMPOSITES

Do Duc Tho*, Phan Dinh Cuong, Luu Thi Lan Anh, Pham Van Thang, Nguyen Thi Thuy
Hanoi University of Science and Technology, Hanoi 112400, Vietnam
Hung Yen University of Technology and Education, Hung Yen 17817, Vietnam

PI-13 TREATMENT OF DYEING WASTEWATER BY PHOTOCATALYTIC EFFECT OF SYNTHESIZED SILVER NANOPARTICLES USING SALIX BABYLONICA

Hue Do Thi*, Nguyet Nguyen Thi Minh, Hieu Doan Duc, Nguyet Chu Anh
Thai Nguyen University of Education, No. 20, Luong Ngoc Quyen Street, Quang Trung Ward, Thai Nguyen City, 25000, Viet Nam

PI-14 MAPPING PLASTIC-COVERED GREENHOUSE FARMING AREAS IN VIETNAM USING HIGH-RESOLUTION SATELLITE IMAGERY

Bijeesh Kozhikkodan Veettil*, Siham Acharki, Tran Xuan Linh
Laboratory of Ecology and Environmental Management, Science and Technology Advanced Institute, Van Lang University, Ho Chi Minh City, Vietnam
Faculty of Applied Technology, School of Technology, Van Lang University, Ho Chi Minh City, Vietnam
Department of Earth Sciences, Faculty of Sciences and Techniques of Tangier, Abdelmalek Essaadi University, Tetouan, Morocco

Institute of Research and Development, Duy Tan University, Da Nang, Vietnam
Faculty of Civil Engineering, Duy Tan University, Da Nang, Vietnam

PI-15 AN EXPERIMENTAL PROCESS OF SYNTHESIS AND THE CHARACTERISTICS OF ETHYLENE GLYCOL-N-NITRAMINE DINITRATE

Khai Doan Minh*, Tuan Nguyen Duy, Anh Nguyen Tuan, Nhan Phan Duc
Faculty of Special Equipment, Le Quy Don Technical University, 236 Hoang Quoc Viet, Hanoi

PI-16 THE DEPENDENCE ENERGY RELAXATION OF ELECTRONS IN QUANTUM WELL GaAs/GaAlAs ON MAGNETIC FIELD

Doan The Ngo Vinh*
Department of Physics, Vinh University, 182 Le Duan, Vinh city, Vietnam

PI-17 COMPARISON THE SCOPE OF EMISSIONS BETWEEN EXPERIMENTS AND CALCULATION MODEL IN SOC SON WASTE INCINERATION PLANT

Khuat Thi Hong*, Ngo Tra Mai, Nguyen Thi Thuy Hang, Nguyen Hung Son, Nguyen Thi Hoa, Tran Hoang Anh, Nguyen Thanh Lam
Institute of Physic, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Nghia Do, Cau Giay, Ha Noi, Viet Nam
School of Interdisciplinary Studies, Vietnam National University, Hanoi,144 Xuan Thuy, Cau Giay, Ha Noi, Viet Nam
Graduate University of Science and Technology, Vietnam Academy of Science and Technology,18 Hoang Quoc Viet, Nghia Do, Cau Giay, Ha Noi, Viet Nam
Solid waste Treatment Area at Truong Tho, Truong Xuan, Thoi Lai, Can Tho, Vietnam
The Ministry of Natural Resources and Environment, 10 Ton That Thuyet, My Dinh, Nam Tu Liem, Ha Noi

PI-18 CHARACTERIZATIONS OF BETULIN EXTRACTED FROM BIRCK BARK (BETULA UTILIS) IN ITS RAW POWDER AND NANOEMULSION STATES

Le Thi Thu Huong*, Nguyen Thi Mai Huong, Phan Thi Thuy, Le Thi Huong, Bach Thanh Son, Nguyen Thanh Binh, Nguyen Trong Tinh
Institute of Physics, Vietnam Academy of Science & Technology, Hanoi, Vietnam

PI-19 EFFECT OF TEMPERATURE ON OPTICAL PROPETIES OF CS_2 LIQUID CRYSTAL OPTICAL FIBERS

Nguyen Tien Dung, Bui Dinh Thuan, Dinh Xuan Khoa, Luu Tien Hung, Pham Hong Minh, Le Canh Trung*
Lab for Photonic Crystal Fiber, Vinh University, 182 Le Duan Streer, Vinh City, Nghe An province, Viet Nam;
Institute of Physics, Vietnam Academy of Science and Technology, Viet Nam

PI-20 TEACHING PHYSICS WITH STEM EDUCATION ORIENTATION

Ho Xuan Huy
Faculty of Education, An Giang University, An Giang, Vietnam
Vietnam National University, Ho Chi Minh City, Vietnam

PI-21 FABRICATION OF SILICON TIP ARRAYS USING WET CHEMICAL ETCHING

Nguyen Van Duong*, Nguyen Quoc Chien, Nguyen Trung Dung, Vu Ngoc Hung, Chu Manh Hoang
International Training Institute for Materials Science, Hanoi University of Science and Technology, No. 1, Dai Co Viet, Hai Ba Trung, Hanoi, Viet Nam
FPT University, Hoa Lac High Tech Park, Hanoi, Vietnam
Hanoi Mechanical and Electrical College, No. 160 Mai Dich, Cau Giay, Hanoi

PI-22 CALCULATION OF THE FORMULATION FOR HIGH-ENERGY SPHERICAL PROPELLANT

Nguyen Tuan Anh*, Doan Minh Khai
Faculty of Special Equipments, Le Quy Don Technical University, 236 Hoang Quoc Viet, Hanoi

PI-23 ENHANCED OPTICAL ABSORPTION IN GALLIUM ARSENIDE SUBSTRATE WITH DESIGNED PLASMONIC NANODISK ARRAY THROUGH RCWA- AND FDTD-BASED SIMULATION

K. J. G. Alaba*, D. A. B. Batalla, L. N. F. Dela Rosa, V. P. P. Juguilon, I. C. M. Verona, N. I. F. Cabello, A. E. De Los Reyes, H. R. Bardolaza, and E. S. Estacio
National Institute of Physics, College of Science, University of the Philippines Diliman, Quezon City 1101, Philippines

PI-24 HIGH-RESOLUTION FOR WIDE FIELD MICROSCOPY BY DEEP LEARNING

VanNhu Le*, MinhNghia Pham, HoangOanh Le, KimThu Le, TrungThanh Nguyen
Le Quy Don Technical University
Hoa Binh University

PI-25 INVESTIGATION OF RANDOM LASING EMISSION FROM CARBOXYMETHYL CELLULOSE AND ZnO NANOCOMPOSITE MATERIALS

Minh Nguyet Nguyen, Khanh Huyen Dinh, Hanh Hong Mai*
Department of Quantum Optics, Faculty of Physics, University of Science, Vietnam National University, 334 Nguyen Trai, Thanh Xuan, Ha Noi, Vietnam

PI-26 ELECTROMAGNETIC INDUCED TRANSPARENCY EFFECTS IN SEMICINDUCTOR QUANTUM WELL WITH V CONFIGURATION

Le Canh Trung, Dinh Xuan Khoa, Luu Tien Hung, Nguyen Tien Dung*
Lab for Photonic Crystal Fiber, Vinh University, 182 Le Duan Streer, Vinh City, Nghe An province, Viet Nam;
School of Engineering and Technology, Vinh University, 182 Le Duan street, Vinh City, Nghe An province, Viet nam

PI-27 COMPARISION OF EFFECTIVE REFRACTIVE INDEX AND DISPERSION CHARACTERISTICS OF CIRCULAR, HEXAGONAL LATTICES PCF WITH As2S3 SUBSTRATES

Trong Dang Van, Ngoan Le Thi, Duy Pham Dinh, Thuy Do Thanh, Vu Tran Quoc, Thuy Nguyen Thi, Luong Thi Tu Oanh, Lanh Chu Van*
Department of Physics, Vinh University, 182 Le Duan, Vinh City, Vietnam
Thu Khoa Nghia High School for The Gifted, Chau Doc City, Vietnam
Nghe An College of Education, Vinh City, Viet Nam
Hue University of Education, Hue University, 34 Le Loi Street, Hue City, Vietnam

PI-28 ACCURATE CONTROL OF HYSTERESIS NONLINEARITY IN OPEN-LOOP AND CLOSED-LOOP OF XMT PIEZOELECTRIC CERAMIC ACTUATORS

Vo Quang Sang, Yiting Duan
Department of Optical Engineering, Le Quy Don Technical University, Ha Noi, Viet Nam
Centre of Micro-Nano Manufacturing Technology, Tianjin University, Tianjin, China

PI-29 ANALYSIS OF ANTHOCYANIN COMPONENTS IN PURPLE SWEET POTATO POWDER SAMPLES CURRENTLY AVAILABLE ON THE VIETNAMESE MARKET BY UVVIS SPECTROPHOTOMETRIC METHOD

Le Mai Trinh*, Bui Quoc Trung, Dinh Thi Hai Thuan, Tran Thi Thu Huong, Nguyen Thi Thu Hien, Trang Huynh Dang Khoa, Duong Quoc Hung, Tran Boi An, Dinh Son Thach
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HCMC University of Technology
Institute of Chemmical Technology, Vietnam Academy of Science and Technology
Graduate University of Science and Technology, Vietnam Academy of Science and Technology

PI-30 MXene-$NiFe_2O_4$ COMPOSITE WITH BROADBAND ELECTRO-MAGNETIC WAVE ABSORPTION PERFORMANCE

Tran Quang Dat*, Tran Tuan Vu, Vu Hoang Ha, Nguyen Thi Thanh, Le Dinh Vi, Nguyen Van Tuan, Nguyen Vu Tung, Pham Van Thin
Faculty of Physical and Chemical Engineering, Le Quy Don Technical University

PI-31 THE PHASE TRANSITIONS IN KAGOME MAGNETS

Thanh-Mai Thi Tran, Minh-Tien Tran
Institute of Physics, Vietnam Academy of Science and Technology, Hanoi 10072, Vietnam

PI-32 WIDEBAND HIGH GAIN TRANS-IMPEDANCE AMPLIFIER FOR HIGH SENSITIVITY OPTICAL RECEIVER

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Institute of Electronics, Institute of Electronics Academy of Military Science and Technology, No. 17 Hoang Sam, Nghia Do, Cau Giay, Hanoi

PI-33 STUDY AND FABRICATION OF 300 NM SILICA NANOPARTICLE MONOLAYER ON SILICON SUBSTRATE BY SPINCOATING TECHNIQUE

Pham Nhat Minh, Nguyen Quoc Chien, Chu Manh Hoang
International Training Institute for Materials Science, School of Materials, Hanoi University of Science and Technology, No. 1 Dai Co Viet, Hai Ba Trung, Hanoi, Vietnam

PI-34 MEC SCHEDULING IN 5G NETWORKS WITH UFGC

H. H. Nguyen, T. P. Nguyen, K. T. Tran
Climate Change Institute, An Giang University, An Giang, Vietnam
Property Office, An Giang University, An Giang, Vietnam
Faculty of Education, An Giang University, An Giang, Vietnam
Vietnam National University, Ho Chi Minh City, Vietnam

PI-35 FABRICATION A SIMPLE AND PORTABLE FREESTANDING TRIBOELECTRIC-LAYER MODE NANOGENERATOR

Toan Van Nguyen*, Tam Nhan Dao, Thanh Nam Nguyen, Tien-Anh Nguyen
Department of Physics, Le Quy Don Technical University, Hanoi, Vietnam
Faculty of Mechanical Engineering, Le Quy Don Technical University, Hanoi, Vietnam

PI-36 EVALUATING GROWTH AND YIELD PARAMETERS OF TWENTY QUINOA GENOTYPES UNDER WINTER CROPPING SEASON IN GIA LAM – HA NOI

Nhan Hue Luu*, Loc Van Nguyen, Long Viet Nguyen, Nam Phuong Le, Tra Huong Thi Nguyen
Department of Production, Military Academy of Logistics, Ha noi, Viet Nam
Vietnam National University of Agriculture

PI-37 OPTICAL BISTABILITY AND MULTISTABILITY USING QUANTUM COHERENCE AND INTERFERENCE IN A DEGENERATE V-TYPE ATOMIC SYSTEM

Nguyen Tuan Anh, Nguyen Thi Thu Hien, Thai Doan Thanh, Le Thi Minh Phuong, Luong Thi Yen Nga, Nguyen Huy Bang, Le Van Doai, Thai Doan Thanh*

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Vinh University, 182 Le Duan Street, Vinh City, Vietnam.

PI-38 THE LASER-INDUCED DAMAGE THRESHOLD OF CMOS CAMERA SENSOR

Doan Cat Cong*, Nghiem Thi Ha Lien, Nguyen Trong Nghia, Nguyen Duc Toan, Nguyen Minh Hue, Nguyen Van Tien

Military Institute of Ship Design
Graduate University of Science and Technology
Institute of Physics
Military Technical Academy

PI-39 ORBITAL CLINGING CONTROL FOR FOUR - WHEELED SELF – PROPELLED VEHICLES CONSIDERING THE INFLUENCE OF MANY EXTERNAL NOISES

Dinh Thi Hang*, Ngo Manh Tien

University of Economics - Technology for Industries

PI-40 RESEARCH, BUILD MANUFACTURING EXECUTION SYSTEM IN SMART FACTORY MODEL FOR RESEARCH AND TRAINING

Do Quang Hiep*, Nguyen Minh Dong, Nguyen Thi Thanh Van, Ha Thi Kim Duyen, Nguyen Duc Duy, Ngo Manh Tien

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Faculty of Electrical and Electronic Engineering, Phenikaa University, Hanoi, Vietnam
Faculty of Electronic Engineering, Hanoi University of Industry, Hanoi
Institute of Physics, Vietnam Academy of Science and Technology, Hanoi, Vietnam

PI-41 GENOTYPING OF AVIAN INFECTIOUS BRONCHITIS VIRUS ISOLATED IN BAC GIANG PROVINCES FROM 2019 TO 2022

Do Thi Roan, Nguyen Thi Thu Hien, Luu Minh Duc, Phan Xuan Doc, Nguyen Thi Khue, Doan Thi Thanh Huong*

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Graduate University of Science and Technology, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Road, Cau Giay District, Hanoi, Vietnam

PI-42 DEVELOPING A NEW METHOD FOR RAPID SCREENING α-GLUCOSIDASE INHIBITORS AND APPLICATION TO ASPERGILLUS SP ISOLATED IN VIETNAM

Tran Thanh Tuan, Vu Thanh Tung, Nguyen Nhat Linh, Le Thanh Hoang, Lưu Minh Duc, Nguyen Thi Trung, Pham Duy Nam, Dao Thi Mai Anh, Tran Giai Nhan, Do Thi Tuyen

Vietnam-Russia Tropical Centre

Institute of Biotechnology, Vietnam Academy of Science and Technology

Graduate University of Science and Technology, Vietnam Academy of Science and Technology

Department of Biochemistry, Hanoi University of Pharmacy

Department of Science and Technology of Nam Dinh Province

PI-43 FAULT TOLERANT CONTROL FOR WHEELS MOBILE ROBOT WITH ACTUATOR FAULTS

Ho Sy Phuong*, Mai The Anh, Duong Dinh Tu, Le Van Chuong, Ta Hung Cuong

Institute of Technique and Technology, Vinh University

PI-44 INVESTIGATION OF AIRBORNE TRACE ELEMENT POLLUTION IN HAI PHONG CITY (VIETNAM) USING *BARBULA INDICA* MOSS AND NEUTRON ACTIVATION ANALYSIS

Le Dai Nam, Le Hong Khiem, Nguyen Ngoc Mai, Le Duc Huy, Marina Frontasyeva

Institue of Physics, VietNam academy of Science and Technology

Frank Laboratory of Neutron physics, Joint Institute for Nuclear research, Dubna, Russia

PI-45 A THEORETICAL STUDY OF THE BAND STRUCTURE, THERMOELECTRIC AND OPTICAL PROPERTIES OF BULK MOLYBDENUM CARBON MO2C-

Doan Thi Kieu Anh*, Pham Hong Minh, Nguyen Thanh Binh, Luu Thi Nhan, Nguyen Thi Hoan, Luong Viet Mui

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Centre for informatics and computing, Vietnam academy of Science and Technology

Graduate School of Engineering, Osaka University, 2-1 Yamadaoka, Suita, Osaka, 565-0871, Japan

PI-46 COMPARISON OF EFFECTIVE MODE AREA AND CONFINEMENT LOSS OF CIRCULAR AND SQUARE LATTICE PHOTONIC CRYSTAL FIBERS BASED ON GE-SB-SE

Ngoc Vo Thi Minh*, Danh Nguyen Thanh, Thuy Hoang Van, Lanh Chu Van, Phuong Nguyen Thi Hong, Hieu Van Le
Department of Physics, Vinh University, 182 Le Duan, Vinh City, Vietnam
A Sanh High School, Gia Lai Province, Viet Nam
Faculty of Natural Sciences, Hong Duc University, 565 Quang Trung Street, Thanh Hoa City, Vietnam

PI-47 NUMERICAL SIMULATION OF LIGHTNING BREAKDOWN IN A TRIPOLE ELECTRIC FIELD STRUCTURE OF THUNDERCLOUD

Emmanuel F. Delos Reyes, Christian Joseph M. Payag, Jacque Lynn F. Gabayno, Rayda P. Gammag, Nobuhiko Sarakura, Akira Sasaki, and Susumu Kato
Department of Physics, Mapua University, Manila, Philippines
Institute for Laser Engineering, Osaka University, Osaka, Japan
Kansai Photon Science Institute, National Institute for Quantum Science and Technology, Japan
National Ins. of Advanced Industrial Science and Tech., Ibaraki, Japan

PI-48 INFLUENCE OF VARYING AGEING TIME FOR ZINC OXIDE NANORODS BY CHEMICAL BATH DEPOSITION METHOD

Zin Min Myat*, Zin Min Tun, Khin Khin Win, Yin Maung Maung
Department of Physics, Sagaing University, Myanmar
Department of Physics, University of Yangon, Myanmar

PI-49 EFFECT OF SQUEEZE FILM AIR DAMPING ON THE SENSITIVITY OF ACCELEROMETER

Nguyen Van Cuong, Bui Manh Cuong, Chu Manh Hoang*
Military Technical Academy, No 236, Hoang Quoc Viet, Bac Tu Liem, Ha Noi, Viet Nam
International Training Institute for Materials Science, Hanoi University of Science and Technology, No. 1, Dai Co Viet, Hai Ba Trung, Hanoi, Viet Nam

PI-50 ISOLATION AND SELECTION OF SOME MICROBIAL STRAINS PRODUCING BIOSURFACTANT FOR DRILLING MUD TREATMENT IN THE PETROLEUM INDUSTRY

Tran Thi Thu Huong*
Faculty of Environment, Ha Noi University of Mining and geology

PI-51 FABRICATION AND ANALYSIS OF $CaTiO_3$ PHOTOANODE WITH DIFFERENT IMMERSED TIME FOR DYE-SENSITIZED SOLAR CELLS

Zin Min Tun*, Zin Min Myat, Khin Khin Win, Yin Maung Maung
Department Physics, Sagaing University, Myanmar
Department Physics, University of Yangon, Myanmar

POSTER PRESENTATION II

13:30 - 17:10, 29 August 2023 (Tuesday)

(8th floor, Operator building)

Chairperson:

Prof. Le Thi Nhi Cong (*IBT, VAST*)
Dr. Le Canh Trung (*Vinh University, Vietnam*)
Dr. Pham Van Duong (*IOP, VAST*)

PII-01 PRODUCTION OF FRESHWATER FROM SEAWATER BY PASSIVE TYPE SINGLE SLOPE SINGLE BASIN SOLAR STILL

Myint Kalyar*, Cho Mar Kyi, Moe Pwint Phyu, Amile Oo, Han Min Tun and Yin Mg Mg
Dep. of Physics, Dawei University, Launglone, Tanintharyi, Myanmar
Dep. of Physics, Dawei University, Launglone, Tanintharyi, Myanmar
Dep. of Physics, University of Yangon, Myanmar

PII-02 FAULT DECTECTION USING ELECTRICAL RESISTIVITY TOMOGRAPHY AND SEISMIC REFRACTION TOMOGRPHY (SRT) AT LUANG PRABANG, LAOS

Sackxay Sompaserth*, Sounthone Singsoupho, Thiengsamone Xuansuandao and Soulisack Vixayphone
Department of Physics, Faculty of Natural Science, National University of Laos
Department of Mining, Faculty of Engineering, National University of Laos

PII-03 EFFECT OF SURFACE PLASMONIC STRUCTURES ON THE TERAHERTZ EMISSION OF A DIPOLE PHOTOCONDUCTIVE ANTENNA

I. C. M. Verona, V. P. P. Juguilon, L. N. F. Dela Rosa1, J. P. R. Ferrolino, H. R. Bardolaza, A. E. Delos Reyes, N. I. F. Cabello, A. S. Somintac, A. A. Salvador, and E. S. Estacio
National Institute of Physics, College of Science, University of the Philippines Diliman, Quezon City 1101, Philippines
Materials Science and Engineering Program, College of Science, University of the Philippines Diliman, Quezon City 1101, Philippines

PII-04 INVESTIGATION OF THE TERAHERTZ EMISSION CHARACTERISTICS OF ZINC OXIDE AND LOW-TEMPERATURE GROWN GALLIUM ARSENIDE PHOTOCONDUCTIVE ANTENNAS VIA AN EQUIVALENT CIRCUIT MODEL

D. A.B. Batalla*, J.M.S.C. Arcilla, L.N.F. Dela Rosa, V.P.P. Juguilon, I.C.M. Verona, A.E. De Los Reyes, H.R. Bardolaza, and E.S. Estacio

National Institute of Physics, College of Science, University of the Philippines Diliman, Quezon City 1101, Philippines

PII-05 ELECTRICAL RESISTIVTY TOMOGRPHY (ERT) AND INDUCED POLARIZATION (IP) FOR DEFINING POTENTAL MINERALIZATION ZONE: A CASE STUDY OF KASI DISTRICT, LAOS

Sounthone Singsoupho*, Sackxay Sompaserth1 and Chanthala Keohavong
1Department of Physics, Faculty of Natural Science, National University of Laos
2Department of Mine Management, Ministry of Energy and Mines, Laos

PII-06 COMPARISON OF OPTICAL PROPERTIES OF SQUARE LATTICE PHOTONIC CRYSTAL FIBERS WITH $Ge_{20}Sb_5Se_{75}/As_2S_3$ CHALCOGENIDE GLASSES

Bao Tran Le Tran, Thien Nguyen Minh, Nam Nguyen Trong, Tuyet Dang Thi, Tan Tran Duy, Luu Mai Van, Vinh Nguyen Thanh, Lanh Chu Van*
Department of Physics, Vinh University, 182 Le Duan, Vinh City, Vietnam
Truong Xuan High School, Thap Muoi District, Thap Muoi Province, Vietnam
Hanoi Open University, Nguyen Hien Str., Bach Khoa, Hai Ba Trung Dist., Ha Noi City, Vietnam

PII-07 STUDY ON 3D CARBONACEOUS STRUCTURES FOR ELECTRO-CHEMICAL DETECTION OF NARROW THERAPY INDEX DRUGS

Nguyen Thai Thuy Linh, Vu Thi Thu, Pham Do Chung, Nguyen Dinh Hieu
Faculty of Physics, Hanoi National University of Education, 136 Xuan Thuy, Hanoi
University of Science and Technology of Hanoi, 18 Hoang Quoc Viet, Hanoi

PII-08 OPTO-INDUCED SURFACE OF NONLINEAR MEDIUM

Pham Thanh Quang*, Tran Quoc Tuan, Nguyen Thu Cam, Nguyen Manh Thang, Thai Doan Thanh, Ho Quang Quy, Bui Xuan Kien, Ho Dinh Quang
Academy of Military Science and Technology, 17. Hoang Sam, Ha Noi, Vietnam
HCM City University of Industry and Trade, 140. Le Trong Tan, Tan Phu, HCM, Vietnam
University of Electric Power, 130. Hoang Quoc Viet, Ha Noi, Vietnammy
Vinh University, 82. Le Duan, Tp Vinh, Nghe An, Vietnam

PII-09 STUDY ON FABRICATION OF PORPHYRIN@g-C3N4/Ag NANOCOMPOSITE FOR ENHANCE PHOTOCATALYTIC DEGRADATION OF COLARANTS IN WATER

Nguyen Thanh Tung*, Nguyen Thi Giang, Tran Van Chinh, La Duc Duong
Institute of Materials Science, Vietnam Academy of Science and Technology, Hanoi, Vietnam
Institute of Materials- Chemistry, Institute of Military Science and Technology, Hanoi, Vietnam

PII-10 A NEW DESIGN FOR A FLOWER-SHAPED HOLLOW-CORE PHOTONIC CRYSTAL FIBER INFILTRATED WITH CARBON TETRACHLORIDE WITH LOW CONFINEMENT LOSS

Nguyen Thi Thuy, Chu Van Lanh, Hoang Trong Duc
University of Education, Hue University, 34 Le Loi, Hue City, Viet Nam
Department of Physics, Vinh University, 182 Le Duan, Vinh City, Viet Nam

PII-11 NUMERICAL STUDY OF SPECTRAL SHAPING IN Ce:LiCAF MULTIPASS AMPLIFICATION BY CHROMATIC FRANTZ-NODVIK MODEL

Diep Van Nguyen*, Duong Van Pham, Tu Xuan Nguyen, Hieu Minh Do, Kieu Anh Thi Doan, Dang Hong Luu, Vui Thi Dang, Hoan Thi Nguyen, Marilou Cadatal-Raduban, Minh Hong Pham
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Tran Quoc Tuan University, Ha noi, Vietnam
Centre for informatics and computing, Vietnam Academy of Science and Technology, Ha noi, Vietnam
Centre for Theoretical Chemistry and Physics, School of Natural Sciences, Massey University, New Zealand

PII-12 HEALTH RISK ASSESSMENT OF INHALATION EXPOSURE TO GAS AT SOC SON MUNICIPAL SOLID WASTE INCINERATION PLANT AND SURROUNDING RESIDENTS

Khuat Thi Hong, Ngo Tra Mai, Vu Thi Mai*, Nguyen Thi Thuy Hang, Nguyen Hung Son, Nguyen Thi Hoa, Trinh Thi Tham, Phan The Tuan
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Hanoi University of Natural Resources and Environment, 41A Phu Dien, Bac Tu Liem, Ha Noi, Viet Nam
Department of Climate Change, The Ministry of Natural Resources and Environment, 10 Ton That Thuyet, My Đinh, Nam Tu Liem, Ha Noi, Viet Nam

PII-13 SYNERGISTIC EFFECT OF $CuFe_2O_4$ AND NON-THERMAL PLASMA FOR EFFICIENT DEGRADATION OF RHODAMINE B

Nguyen Minh Thu, Nguyen Thi Giang, Nguyen Nhat Linh, Nguyen Thanh Tung*
Institute of Materials Science, Vietnam Academy of Science and Technology, Hanoi, Vietnam

PII-14 DESIGN AND FABRICATION OF MULTIPLE BANDPASS OPTICAL FILTERS FOR LASER WARNING SYSTEM

Bui Dinh Bao*, Phan Nguyen Nhue, Duong Chi Dung, Nguyen Minh Hue
Department of Optical Engineering, Le Quy Don Technical University, Hanoi Vietnam
Department of Physics, Le Quy Don Technical University, Hanoi Vietnam

PII-15 EVALUATION OF CALIBRATION RESULTS FOR GAMMA AND X-RAY DOSE RATE MEASUREMENT DEVICES

L. H. Loi*, H. V. Doanh, O. Q. Son, N. H. Long, D. V. Hoang
Radiation protection and Enviroment, Center for Nuclear Technologies, 405-407 Cach Mang Thang 8 Street, Ward 12, District 10, Ho Chi Minh City, Vietnam

PII-16 MONTE CARLO SIMULATION ON THE PHASE TRANSITION OF NEMATIC PHASE

Phuong-Thuy T. Nguyen*, Van Anh T. Nguyen, V. Thanh Ngo
Institute of Physics, Vietnam Academy of Science and Technology
Graduate University of Science and Technology, Vietnam Academy of Science and Technology
Department of Application and Development of Technology, Vietnam Academy of Science and Technology

PII-17 GEOLOGICAL SURVEY IN SOME CONSTRUCTION WORKS USING GEOELECTRICAL EXPLORATION METHOD

Tin Duong Quoc Chanh*, Phuong Huynh Thi Tuyet, Dau Duong Hieu, Phuong Nguyen Le Hoai, Ngan Nguyen Nhat Kim, Linh Vo Quan
Can Tho University, Campus 2, 3/2, Ninh Kieu, Can Tho
Tay Do University, 68 Tran Chien, Cai Rang, Can Tho
University of Science, VNU Ho Chi Minh City, 227 Nguyen Van Cu, District 5, Ho Chi Minh

PII-18 HIGH CONTRAST AND SENSITIVE NEAR-INFRARED REFRACTIVE INDEX SENSORS BASED ON TRUNCATED PYRAMID PLASMONIC

Thu Trang Hoang*, Thanh Son Pham, Xuan Bach Nguyen, Quang Minh Ngo
Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi
University of Science and Technology of Hanoi, Vietnam Academy of Science and Techology, 18 Hoang Quoc Viet, Cau Giay, Hanoi

PII-19 FABRICATION OF MICROLASERS USING A STANDARD PRINTER

Hoang Thi Thuong, Nguyen Thanh Duy, Nguyen Minh Hoang, Nguyen Van Toan, Ta Van Duong*
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Institute for Biomedical Physics, Academy of Military Science and Technology, 109A Pasteur, Ho Chi Minh City, Viet Nam
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PII-20 SYNTHESIS AND PROPERTY OF GRAPHENE-BASED CONDUCTIVE NANO-INKS FOR 3D PRINTING

Nguyen Anh Duc*, Le Nguyen Chi Hieu, Phan Ngoc Hong
Center for High Technology Development, VAST
Hanoi Amsterdam School for the Grifted

PII-21 STUDY ON THE COMPOSITION OF METAL OXIDES IN FLY ASH OF WASTE-TO-ENERGY PLANTS FOR REUSE PURPOSES

Nguyen Thi Thuy Hang*, Ngo Tra Mai, Tran Quoc Cuong, Khuat Thi Hong, Nguyen Thi Hoa, Tran Hoang Anh, Nguyen Thanh Lam
Institute of Physic - Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Ha Noi, Viet Nam
Graduate University of Science and Technology, Vietnam Academy of Science and Technology,18 Hoang Quoc Viet, Cau Giay, Ha Noi, Viet Nam
Hanoi University of Natural Resources and Environment, 41A Phu Dien, Bac Tu Liem, Ha Noi, Viet Nam
School of Interdisciplinary Studies, Vietnam National University, Hanoi,144 Xuan Thuy, Cau Giay, Ha Noi, Viet Nam
Can Tho Power Generation Garbage Factory, Truong Tho, Truong Xuan, Thoi Lai, Can Tho, Viet Nam
The Ministry of Natural Resources and Environment, 10 Ton That Thuyet, My Dinh, Nam Tu Liem, Ha Noi, Viet Nam

PII-22 ESTIMATING 3D TOPOGRAPHY OF THE DEEP SOURCES BY PARKER – OLDENBURG AND BIDIMENSIONAL EMPIRICAL MODE DECOMPOSITION METHOD: A CASE STUDY OF THE SOUTHERN VIETNAM

Nguyen Hong Hai
Climate Change Institute, An Giang University, An Giang, Vietnam
Vietnam National University, Ho Chi Minh City, Vietnam

PII-23 CREATING METALLIC COATING LAYERS FROM THERMAL EXFOLIATED GRAPHITE MATERIALS

Huong Nguyen Thi Mai, Thien Phan Xuan, Binh Nguyen Thanh, Huong Le Thi Thu, Huong Le Thi, Son Bach Thanh, Thuy Phan Thi
Institute of Physics, Vietnam academy of science and technology, 10 Dao Tan, Thu Le, Ba Dinh, Ha Noi

PII-24 DETERMINING THE SIZE OF DROPLETS USING LASER INTERFEROMETRIC IMAGING TECHNIQUE

Van Thanh Hoang*, Van Hai Bui, Kim Oanh Vu Thi, Xuan Tu Nguyen, Viet Tiep Phung
VNU University of Science, Ha Noi, Viet Nam
Le Quy Don Technical University, Ha Noi, Viet Nam
Institute of Physics, VAST, Ha Noi, Viet Nam

PII-25 EFFECTS OF HYPERPARAMETERS AND MACHINE LEARNING APPROACHES IN FORECASTING ABSORPTION BEHAVIOR OF GHZ DISK-SHAPE METAMATERIALS

Nguyen Thanh Son, Nguyen Hoang Tung, Nguyen Thanh Tung1
Institute of Materials Science, 18 Hoang Quoc Viet, Ha Noi

PII-26 A FLEXIBLE ELECTROMAGNETIC NANOGENERATOR FOR VIBRATION ENERGY HARVESTING

Toan Van Nguyen*, Xuan Thau Nguyen, and Tien-Anh Nguyen
Department of Physics, Le Quy Don Technical University, Hanoi, Vietnam

PII-27 CHARACTERISTIC FACTORS AFFECTING SUPERCONTINUUM GENERATION PROCESS IN As_2S_3 LARGE-CORE PCFs WITH FOR SQUARE, CIRCULAR, AND HEXAGONAL LATTICES

Bao Tran Le Tran, Trong Dang Van, Thuy Tu Thi, Linh Cao Khanh, Linh Le Ai, Thuy Le Thi, Cuong Nguyen Quoc, Lanh Chu Van*
Department of Physics, Vinh University, 182 Le Duan, Vinh City, Vietnam

PII-28 STUDYING CHARACTERISTICS OF THE SINGLE BAR USED IN TOF DETECTOR OF THE T2K ND280 UPGRADED

Giang Thi Tra Ha, Dung Thi Nguyen*, Emanuele Villa, Stefania Bordoni, Mau Chung Nguyen, Anh Duc Nguyen, Hoa Thi Bui
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The particle Physics department, Geneva University, Switzerland

PII-29 IDENTIFY IMPLICIT OBJECTS BASED ON AMPLITUDE AND DISPLACEMENT PROPERTIES F-K IN GPR METHOD

Duy Dang Hoang*
Faculty Geophysical, University of Science, Ho Chi Minh City, Vietnam
Vietnam National University, Ho Chi Minh City, Vietnam
Loc Ninh High School, Binh Phuoc Province, Vietnam

PII-30 OPTIMIZING THE TRANSMISSION EFFICIENCY OF THE MAGNETIC RESONANCE WIRELESS POWER TRANSFER SYSTEM BY VARIABLE COUPLING METHODS

Xuan Thanh Pham, Manh Kha Hoang, Minh Quy Tran, Xuan Bach Nguyen, Quang Minh Ngo, Thu Trang Hoang, Thanh Son Pham*
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Faculty Physics, University of Science, Vietnam National University, Hanoi
University of Science and Technology of Hanoi, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam
Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam

PII-31 STORAGE AND RETRIEVAL OF ULTRASLOW WEAK-LIGHT SOLITONS IN A DEGENERATE V-TYPE ATOMIC MEDIUM

Hoang Minh Dong*, Nguyen Thi Thu Hien, Nguyen Tuan Anh, Thai Doan Thanh, Ta Thi Kim Tuyen, Le Thi Minh Phuong, Luong Thi Yen Nga, Nguyen Huy Bang, Dinh Xuan Khoa, Le Van Doai
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Saigon University, 273 An Duong Vuong Street, Ho Chi Minh City, Vietnam
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PII-32 BIO PLASTIC MADE FROM FISH SCALES

Tran Minh Thu*, Tran Thi Be Chinh, Tran Minh Anh Thu, Pham Vo Duyen Minh, Tran Quoc Vu
Thu Khoa Nghia High School for Gifted Students, Chau Doc City, An Giang Province, Vietnam

PII-33 A SOLUTION FOR THERMAL COMPENSATION OF APD USING IN RECEIVER OF LASER RANGEFINDER

Vu Quoc Thuy*, Hoang Anh Duc, Nguyen Van Thuong, Tran Xuan Tien
Institute of Technical Physics, No. 17 Hoang Sam, Nghia Do, Cau Giay, Hanoi
Military Institute of Science and Technology, No. 17 Hoang Sam, Nghia Do, Cau Giay, Hanoi

PII-34 EFFECT OF DRYING MODES ON ANTHOCYANIN CONTENT IN THE PRODUCTION PROCESS OF PURPLE SWEET POTATO POWDER

Tran Thi Thu Huong, Dinh Thi Hai Thuan, Thai Doan Thanh, Nguyen Thi Thu Hien*
Ho Chi Minh City University of Industry and Trade, Ho Chi Minh City, Vietnam

PII-35 CONFINEMENT LOSS CHARACTERISTICS OF SQUARE LATTICE PCFS WITH As_2S_3 SUBSTRATES FOR DIFFERENT NUMBERS OF AIR-HOLE RINGS

Ngoan Le Thi, Trong Dang Van, Danh Nguyen Thanh, Tan Tran Duy, Thien Nguyen Minh, Luu Mai Van, Bao Le Xuan, Vinh Nguyen Thanh, Lanh Chu Van*

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Hanoi open University, Nguyen Hien Str., Bach Khoa, Hai Ba Trung Dist., Ha Noi city, Viet Nam
Phan Boi Chau High School for The Gifted, 119 Le Hong Phong St., Vinh City, Vietnam

PII-36 STUDY ON THE THERMAL DECOMPOSITION PROCESS OF 2,4,6-TRINITRORESORCINOL USING NON-ISOTHERMAL METHODS

Trung Huu Hoang*, Van Tinh Nguyen, Trung Toan Nguyen
Department of explosive and propellant, LQD TU, 236 Hoang Quoc Viet, Viet Nam

PII-37 A STUDY ON THE COMBUSTION CHARACTERISTICS OF KNO_3-BASED MATERIALS CONTAINING PHENOL FORMALDEHYDE RESIN AND SORBITOL

Nguyen Duy Tuan*, Doan Minh Khai, Nguyen Tuan Anh, Tran Bao Trung, Vu Van Hieu
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PII-38 A REFLECTIVE STRUCTURAL EQUATION MODEL FOR ESTIMATING LEAF FUNCTIONAL TRAITS

Quang-Vuong Le*, Thi-Minh-Chau Dao, Thi-Xuyen-Trinh Dinh, Thi-Thuy-Dung Dang
Faculty of Biology, School of Education, Vinh University

PII-39 DISPERSION CHARACTERITIES OF THE DUAL –CORE-PHOTONIC CRYSTAL FIBER BASED ON FUSED SILICA GLASS

Phuong Nguyen Thi Hong*, Ngoc Vo Thi Minh, Lanh Chu Van, Quang Ho Dinh, Van Nguyen Thi Hai, Anh Nguyen Lan, Yen Le Thi Hai, Van Hieu Le
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PII-40 DEVELOPMENT OF AUTONOMOUS HARVESTING ROBOTS IN THE AGRICULTURE GREENHOUSE ENVIRONMENT BASED ON ROBOT OPERATING SYSTEM

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PII-41 TEMPERATURE TRANSFORMATION IN FIRE ZONES OF PROPELLANT ON NITRATE CELLULOSE AND NITROGLYXERIN WITH P/H=1

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PII-42 DETERMINATION OF LIQUID PROPERTIES BASED ON DYNAMICAL SURFACE REFLECTION

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PII-43 NiO - BASED SENSOR TOWARDS LACTATE DETECTION

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PII-45 DESIGN AND IMPLEMENTATION OF A LOW-COST CNC LASER ENGRAVING MACHINE FOR UNIVERSITY LABORATORIES

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PII-46 DESIGN AND IMPLEMENTATION OF REAL-TIME SELF-DRIVING CAR USING CONVOLUTIONAL NEURAL NETWORK AND IOT

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PII-47 CONTROLLING CROSS-KERR NONLINEARITY OF A DEGENERATE FOUR-LEVEL Y-TYPE ATOMIC SYSTEM BY AN EXTERNAL MAGNETIC FIELD

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PII-48 ELECTROMAGNETICALLY INDUCED GRATING IN A FOUR-LEVEL INVERTED-Y ATOMIC SYSTEM

Dinh Xuan Khoa, Le Van Doai, Nguyen Huy Bang, Nguyen Van Ai, Nguyen Van Phu and Ho Hai Quang
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PII-49 EXPERIMENTAL OBSERVATION OF EIA EFFECT IN ^{87}Rb FOUR-LEVEL V-TYPE ATOM

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PII-50 OPTICAL BISTABILITY IN A DEGENARATE FOUR-LEVEL ATOMIC SYSTEM WITH AN EXTERNAL MAGNETIC FIELD

Nguyen Huy Bang, Dinh Xuan Khoa, Le Van Doai, Nguyen Van Phu, Phan Van Thuan, Luong Thi Yen Nga, Hoang Minh Dong, Nguyen Tuan Anh and Nguyen Thi Thu Hien
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ABSTRACTS

PLENARY SESSION

PL-01

QUANTUM INTERFERENCES IN ATOMIC SYSTEMS AND THEIR PROSPECTIVE APPLICATIONS

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Abstract. Under the simultaneous excitations of coherent laser fields (one laser is called the probe field and the others are the coupling fields) into the transitions within an atomic system can lead to a quantum interference between transition probabilities in the atomic system. It also requires that the least excitation scheme of the atomic system being three-level configurations consisting of lambda-, V-, and ladder- type schemes. As a result the total probability can be completely suppressed or enhanced. At the spectral region corresponding to the suppressed probability, the probe field is completely transmitted through the atomic medium which is called electromagnetically induced transparency (EIT) [1], whereas in the spectral region corresponding to enhanced probability, the probe field is absorbed almost completely (called as electromagnetically induced absorption-EIA) [2]. In EIT, the coupling field is a traveling wave in the same propagation as the probe field, and it causes a dip in the probe absorption profile which is called the EIT window [3]. On the other hand, if the coupling field is a standing wave field, it will cause in space a periodic modulation of the transmitted spectrum of the probe field. That is, the probe field propagates through the atomic medium just as it passes through a diffraction grating. This diffraction is called as electromagnetically induced grating (EIG) [4]. Furthermore, by using four-, five-, or six-level atomic systems one is possible to generate multiple quantum interference channels within the atom and thus create multiple EIT windows, which is a very interesting topic today [3]. The medium under quantum interference can possess peculiar optical properties and can be controlled by external fields (electromagnetic or magnetic field) [3].

In this review, we first present simple quantum interference in a three-level atomic system that leads to the EIT effect and report an experimental setup to observe this quantum interference. Later, the model is developed for multi-channel quantum interference in multi-level atomic system. A theoretical model of the EIA effect is developed and experimental observation is also conducted in our laboratory. Next, we present a theoretical model of the diffraction of EIG under EIT condition. Finally, we introduce some typical applications of quantum interference such as slow light and fast light, giant Kerr nonlinearity, optical bistability and switching, optical soliton propagations, optical memory and storage, and negative index in optical region.

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PL-02

Ln^{3+} DOPED GLASS FOR SCINTILLATION MATERIAL AND ITS APPLICATIONS

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Abstract. Nowadays, glasses doped with lanthanide ions (Ln^{3+}) can be developed as scintillation material because of high emission efficiencies, corresponding to 4f–4f and 4f–5d electronic transitions of the Ln^{3+}. In this presentation, lanthanide +3 ions doped scintillating glasses have been reviewed. Scintillation and luminescence and properties of the glasses doped with several lanthanide ions have been explained. Unclear mechanism of scintillation property in glass is addressed and discussed. Moreover, the status of their potential applications for scintillation material from glasses are also given.

Keywords: *glass; luminescence; scintillation.*

PL-03

EXPLORING CURRENT TERAHERTZ RESEARCH COLLABORATION IDEAS BETWEEN PHILIPPINES AND VIETNAM

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Abstract. We present several ongoing terahertz (THz) research areas that are feasible avenues for collaboration and linkage between Vietnam and the Philippines, in particular, and between ASEAN and our colleagues from other Asian countries, in general. In the Philippines, THz optoelectronics and spectroscopy in-house research activities have flourished in three universities these past two years. We present our most current output from the performance enhancement in novel THz photoconductive antenna (PCA) designs, as well as THz spectroscopy results. This talk is expected to elicit interest and further collaborative research initiatives between Vietnam, Philippines, and possibly other countries.

Keywords: *terahertz, spectroscopy, optoelectronics.*

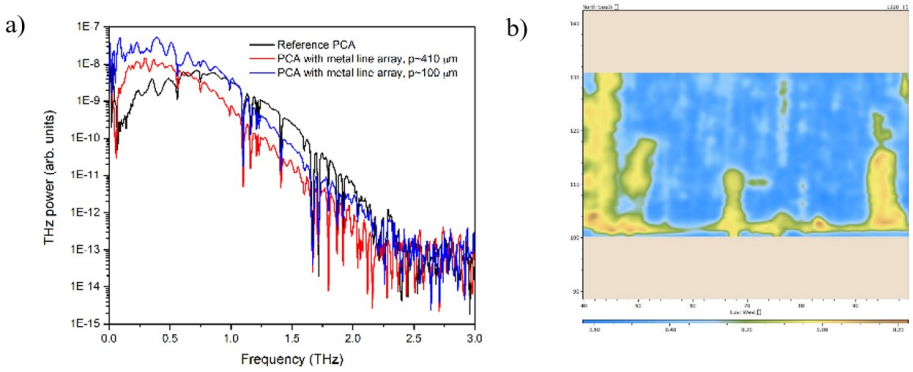

Fig. 1. (a) *THz emission performance of photoconductive antennas with plasmonic line arrays and (b) THz imaging data for a plywood material exhibiting (subsurface) cavities.*

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PL-04

ENHANCEMENT OF TERAHERTZ SPINTRONIC EMISSION BY ANTENNA STRUCTURES

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Abstract. Metallic spintronic terahertz (THz) emitters [1] are attracting much attention because of their unique properties. They can be excited with cost-effective femtosecond lasers, such as femtosecond fiber laser at communication wavelengths (~1560 nm) [2-3]. The emission bandwidth is only limited by the pump laser pulse width and free from optical phonon absorptions in the substrate material: Up to a 30-THz spectral distribution was observed for a W/CoFeB/Pt trilayer spintronic THz emitter [4]. However, their THz emission efficiency is low compared with photoconductive antennas, which are most popularly used for THz time-domain spectroscopy. Therefore, improvement of the THz emission efficiency of spintronic emitters is required for practical applications. Fe/Pt (ferromagnetic/(non-magnetic) heterostructure [5] is one of the most efficient spintronic THz emitters among those reported so far. In this paper, the author discusses the optimization of the Fe/Pt hetero-structures for efficient THz emission considering the following points: the ferromagnetic and non-magnetic layer thickness, the optical pump wavelength, the choice of the substrate, and the out-coupling efficiency to the free-space. To improve the out-coupling efficiency, we introduce antenna structures with various shapes [6]. It has been demonstrated that a well-designed antenna structure can enhance the THz emission efficiency by several times.

Keywords: *spintronic THz emitter, terahertz time-domain spectroscopy, photoconductive antenna.*

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PL-05

ESTIMATION OF PAIRING STRENGTHS BASED ON AVERAGE SINGLE-PARTICLE LEVEL DENSITY WITHIN THE SKYRME MEAN-FIELD-PLUS-BCS APPROACH

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Abstract. Nuclear pairing is an essential ingredient of all nuclear models. Pairing correlations was first described as a pair promotion of nucleons similar to electron superconductivity by Bohr, Mottelson and Pines. In microscopic nuclear models, the strength of the interaction which causes the promotion of nucleons to higher single-particle levels is an important variable to be determined. A slight variation of the pairing strength may produce significant effect on predicted observable quantities. One of the ways in which the pairing strength can be determined is through a fit on experimental odd-even mass staggering [1]. This entails varying the pairing strengths to reproduce experimental total binding energy difference for three neighbouring nuclei. Another approach is to vary pairing strengths in order to reproduce experimental moments of inertia. Both approaches have been employed for well-deformed nuclei in the rare earth region [2] yielding averaged proton and neutron pairing strengths for the given nuclear region. In the present work, we explored and revisited an approach to fit pairing strength based on the nuclear average single-particle level density [3]. A general outline of the approach will be introduced in the talk. Following that, quantities sensitive to nuclear pairing especially the moment of inertia calculated within the Inglis-Belyaev formula [4] will be presented for some selected well-deformed rare earth and actinide nuclei. Relation between the pairing matrix elements with average level density is attempted with the aim of arriving at a simple formula connecting pairing strengths or equivalently pairing matrix elements to the average single-particle level density.

Keywords: *mean-field, pairing strengths, pairing matrix elements, level density, odd-even mass staggering, moment of inertia.*

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PL-06

JINR - A WORLD SCIENTIFIC CENTER FOR FUNDAMENTAL THEORETICAL AND EXPERIMENTAL RESEARCH, APPLICATIONS OF THE CUTTING EDGE TECHNOLOGIES AND UNIVERSITY EDUCATION

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Abstract. Overview of the rapid progress in development of modern JINR research infrastructure is presented. Charged particle accelerators are one of the main tools for basic research into the modern nuclear and elementary particle physics. Dubna Accelerator technologies are progressing rapidly providing high-brightness beams with unprecedented parameters useful for large verity of practical applications. Construction of new generation of heavy ion accelerator facilities are under development in JINR for low energy as well as for relativistic heavy ion and proton beams.

The next generation of heavy ion collider – NICA - will provide worldwide unique accelerator and experimental facilities allowing for a large variety of unprecedented fore-front research in extreme state of matter physics and applied science.

Applications derived from basic Nuclear Physics Research have a large impact on many aspects of everyday life. Accelerator technologies are in the forefront of many applications which cover the range of the needs of Humanity in terms of energy, health, food and agriculture, environment, biology, medicine, forensics, stewardship and security, cultural heritage, materials science, and many other areas. This is due to the peculiar properties of charged particles interactions with matter but also to the developments and the expertise developed by Nuclear Physics groups in accelerator technology, radiation detector technologies, high-performance computing, event reconstruction and ‘big data’.

REFERENCE

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SESSION A

A-01

NANOSPECTROSCOPY & SENSING VIA PLASMONIC RESONANCE

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Abstract. Developing new instrumentation in nanospectroscopy and sensing via plasmonic resonance is what our team is currently innovating on. The advantage of applying plasmonic resonance originated from the "enhancement" and the "localization" of the electric field. These are of essential importance for nanospectroscopy and sensing because *localization* improves the spatial resolution while *enhancement* compensates for the subsequent small signal from the nanoscale (~smaller number of molecules). Such plasmonic resonance can be categorized into two, 1) localized surface plasmon resonance (LSPR) and 2) propagating surface plasmon resonance (SPR). In this seminar, I will introduce several nanospectroscopic [1~12] and sensing techniques [13,14] based on the LSPR and SPR, respectively. Specific emphasize will be given to the developments in multiple environments in order to expand the potential applications depending on the target materials.

Keywords: *Near-field optics, plasmonics, Raman, SPM, nanospectroscopy.*

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A-02

EXPLORING BINARY NANOCLUSTERS: INSIGHTS FROM FIRST-PRINCIPLE CALCULATIONS & GAS-PHASE EXPERIMENTS

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Abstract. The exploration of binary nanoclusters, specifically transition metal-doped noble metal clusters, holds great promise in the realm of magnetic superatoms [1]. In this study, we employed first-principle calculations, coupled with gas-phase experiments, to gain insights into the fascinating properties of these clusters. Through comprehensive density functional theory (DFT) calculations, we examined the structural evolution of these binary nanoclusters [2,3]. Furthermore, we elucidated the growth mechanism of their electronic shells, shedding light on their intricate atomic arrangements and bonding characteristics. Molecular diagrams were constructed to visualize the unique geometries and understand the electronic structure of these clusters. To validate our theoretical findings, gas-phase experiments were conducted using a dual-laser dual-target vaporization source, coupled with a high-resolution mass spectrometer [4]. This allowed us to produce gas-phase binary clusters for further analysis (see Fig. 1). Subsequently, a home-built Stern-Gerlach magnetic deflection setup enabled the detection of the magnetic moment of these clusters. Our results identified some potential superatoms, presenting exciting opportunities for the development of advanced nanostructured materials in electronic and spintronic devices.

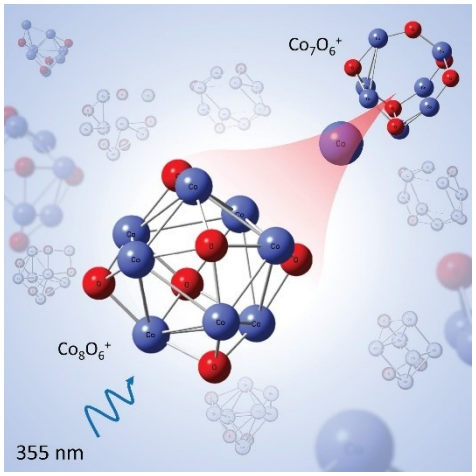

Figure 1. A cobalt atom evaporated from $Co_8O_6^+$ cation in gas-phas photofr agmentation experiments with 355 nm laser light (reprinted from the cover of JPCA volume 124 number 37 (2020)).

Keywords: *nanoclusters, binary clusters, gas-phase, DFT.*

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A-03

GEOMAGNETIC FIELD EFFECTS OVER THE PHILIPPINES DURING STRONG SOLAR FLARE EVENTS IN APRIL 2022

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Abstract. During solar storms, conductivities in Earth's ionospheric regions become more enhanced. This phenomenon produces effects on Earth's current systems to which emissions of solar radiation also largely contribute. Such radiations are analyzed in this study as short timescale variations of the X-ray, EUV, and radio fluxes. This was observed during the strong flare events in April 2022. An X1.1 flare was preceded by an M1.89 flare on April 17. Stronger flares occurred on April 20, where an M7.29 flare also preceded an X2.25 flare. Whereas the M9.7 flare on April 21 was the only eruption observed. The X-ray and Extreme Ultraviolet radiation were examined using Geostationary Operational Environmental Satellite archives data. The solar radio flux data accessed from the Australian Space Weather World Data Center were observed for frequencies 610, 1415, and 2695 Hz. With the immense release of energy, coexisting variations are observed with the geomagnetic fields. Solar radiation can then be related to the magnetic reconnection process during flares. The Kp and Hp (Hp30 and Hp60) and Disturbance time (Dst) indices were utilized to determine the current geomagnetic conditions. As reflected in the Kp, Hp, and Dst values, the flares occurred during geomagnetically quiet days. This ensures that geomagnetic drivers do not cause the observations. Moreover, magnetic responses were observed from ground-based magnetometers in the Philippines, located in the low-latitude Muntinlupa station (MUT) and near-equatorial Davao station (DAV). The quiet day average and standard deviation of the magnetometer data for April 2022 obtained from MAGDAS/CPMN were superimposed with the daily variations for days 17, 20, and 21. Measurements showed that solar flare effects (Sfe) are relatively more pronounced near the equator, where high conductivity generates more variations in Earth's magnetic field. Yet, the largest variations were not consistently observed for the strongest flares. In MUT, manifest variations in H_(sfe)and Z_(sfe)were aligned with the X1.1 and M1.89 flares on day 17. Variations are generally homogenous for days 20 and 21. Meanwhile, the largest variations in DAV were found during the M9.7 flare on day 21. It is inferred that increases in the horizontal component remain greater than in the downward component in both stations. Magnetic responses and fluctuations in H_(sfe) are nonetheless more prolonged and heightened at DAV station.

Keywords: *solar flare, geomagnetic field, ionosphere, space weather*

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A-04

INTERPTRETATION OF GEOLOGICAL MAP BY RADIOMETRIC SURVEYS: A CASE STUDY AT NAMBAK DISTRICT, LUANG PRABANG PROVINCE

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Abstract. This study is to compare airborne and ground radiometric surveys to interpret the geology in Nambak district, Luang Prabang Province. The airborne radiometric survey was conducted in 2016 by the Airbus Helicopter AS350 B3 with the radiation detector system (Exploranium GR820 with crystal detector packs GPX-1024), and the line direction and line spacing are northwest-southeast at N30°W and 185m, respectively. The ground survey was performed using Gamma Surveyor II, which measured a total of five lines with a length between 260 and 300m. The line spacing is 25 m and the measurement point spacing is 10 m in Thalee village, Nambak district, Luang Prabang province. After data collection from the geophysical survey, data analysis using Oasis Montaj. The results of the radiometric analysis could help classify the geology of the area. The airborne and ground radiometric surveys are corresponding; however, the ground survey provides a more accurate result and determines the boundaries of rock formations. This radiometric survey can guide geologic information and is useful for current geology and mineral research.

Keywords: *geological map, airborne and ground radiometric, Nambak district.*

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A-05

RAMAN SPECTROMETRY: SENSITIVE TOOL FOR SAMPLE MAPPING?

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Abstract. Raman spectrometry is an optical method, which monitors the vibrations of molecules. As such, the Raman spectra encode the structure of the analytes and can be used for unequivocal analyte identification. The poor sensitivity of this method is considered its Achilles heel. Therefore, Raman spectrometry is primarily used for analyses of highly concentrated samples. To improve the sensitivity of this method, several powerful modifications of traditional Raman spectrometry have been developed in the past [1].

Surface-enhanced Raman spectrometry (SERS) belongs to the most popular variant, operating with signal enhancement on the silver nanostructures. Indeed, the suitable properties of the silver nanostructures are one of the important prerequisites for the sensitive response. In this work, we introduce two approaches to the deposition of nanostructured silver on the planar solid sample – namely electrospray-assisted deposition [2] and sputtering. We investigated the capacity of both approaches for the mapping of target analytes by surface-enhanced Raman spectrometry.

Keywords: *Raman spectrometry, nanostructures, mapping, electrospray, sputtering.*

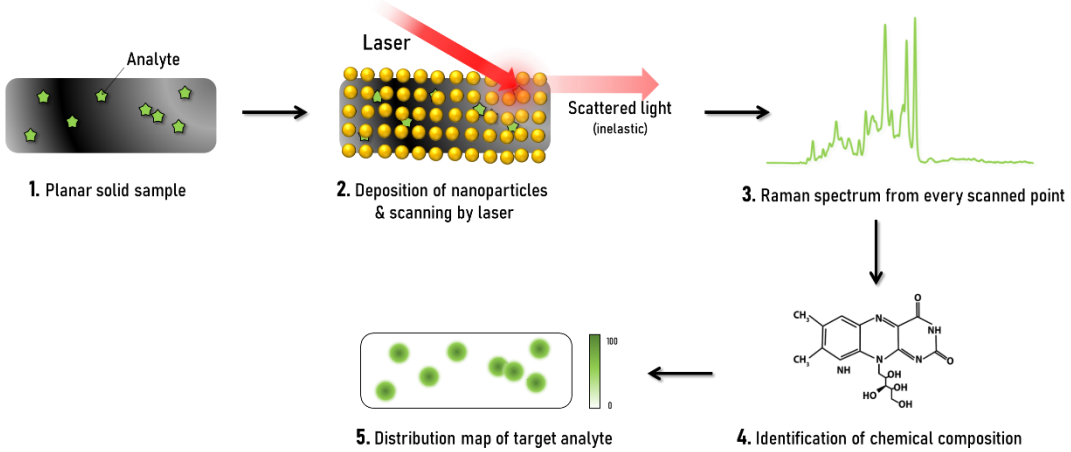

Fig. 2. Graphical scheme of using SERS for sample mapping.

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A-06

NATURAL SUNLIGHT-DRIVEN PHOTOCATALYTIC REMOVAL OF TOXIC TEXTILE DYES IN WATER USING TITANIUM DIOXIDE (TiO_2) NANOMATERIALS

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Abstract. The TiO_2 nanoparticles was prepared using the co-precipitation method, with an average particle size of 18,56 nm, and high uniformity from the common precursors. Synthesis of TiO_2 nanotubes from prepared TiO_2 nanoparticles by hydrothermal route, which exhibited a high porosity, diameters ranging from 4 to 11 nm, with an average diameter of 7.56 nm, and a length of approximately 500 nm. For the characterization of the catalyst obtained, the techniques of X-ray Diffraction (DRX), Fourier-Transform Infrared Spectroscopy (FTIR), and Scanning Electron Microscopy (SEM) were used. The TiO_2 nanotube photocatalysts exhibited better photocatalytic activity than TiO_2 nanoparticles in the removal of methylene blue (MB) dye under natural sunlight irradiation as well as filament lamp as the light source in the laboratory condition. The results showed that as-prepared TiO2 nanotubes have exhibited the highest photocatalytic activity in the process of photocatalytic degradation of MB dye, and its degradation efficiency is 75% when illuminated by sunlight, including UV radiation, after 120 min treatment. These results lay the groundwork for extending the application of TiO2 materials in enhancing the photocatalytic degradation of dyes like Rhodamine B, Crystal Violet, Acid Blue, and other Persistent Organic Pollutants (POPs) when combined with cerium oxide (CeO_2) and graphitic carbon nitride (g-C_3N_4) in future studies.

Keywords: *TiO_2 nanoparticles, TiO_2 nanotubes, Natural Sunlight, Methylene Blue and Photocatalytic Degradation.*

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A-07

OPTICAL, LUMINESCENCE AND SCINTILLATION PROPERTIES OF $LaCl_3:Yb^{2+}$ CRYSTAL

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Abstract. The growth and optical, luminescence and scintillation properties of Yb^{2+} doped LaCl3 single crystal has been investigated. This crystal was grown by the vertical Bridgman method. Photoluminescence spectrum is similar with X-ray induced luminescence spectrum which corresponds to the 5d→4f transition of Yb^{2+} ions. The energy resolution of 7% and light output of 28,000 ± 2800 photons/MeV were obtained for $LaCl_3:Yb^{2+}$ crystal under 662 keV γ-rays excitation. The scintillation decay profile was measured under the excitation of α-particles and γ-rays from ^{241}Am and ^{137}Cs sources, respectively. This result indicates that it is useful to Yb^{2+} as a luminescence center in high light yield scintillation detector.

Keywords: $LaCl_3:Yb^{2+}$ crystal, Bridgman technique, Scintillation

A-08

ADVANCED NUCLEAR PHYSICS AND ENGINEERING ACADEMIC PROGRAMS AT DUBNA STATE UNIVERSITY

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Abstract. In this talk we provide detailed information on academic programs [1] implemented since 2024 by the Dubna State University (DSU) in tight collaboration with famous research organization the Joint Institute for Nuclear Research (JINR). These master's programs are focused on the following areas:

- Physics of atomic nuclei and elementary particles;
- Theoretical and mathematical physics;
- Big Data and Supercomputing;
- Electronics for mega-science project NICA.

Programs are implemented both in Russian and in English. For foreign students planning to study in Russian, there is an opportunity to undergo preliminary training within the framework of the preparatory department, including acquaintance with Russia and Russian culture.

All special disciplines, witpin the programs listed above, are taught by professors who are employees of JINR. Master's theses are supervised by the researchers from JINR laboratories and correspond to the topics of advanced research projects of this organization, i.e. the NICA project (Nuclotron-based Ion Collider fAcility) [2], Super-Heavy Elements Factory [3], Baikal GVD project [4] and others.

A limited number of individual educational grant for foreign students of DSU is annually provided free of charge at the expense of the Russian Federation Governmental Program.

Admission to all programs includes verification of the enrollee’s documents and entrance examinations that accompanied by the DSU international department. Dubna State University supports in obtaining the Russian Entry Visa and local registration for foreign students. Dormitory in University campus is available for all the students.

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4. JINR Press release “Baikal-GVD project”, 20 April 2020, http://www.jinr.ru/posts/press-release-of-baikal-gvd-project-2020/

A-09

BIOIMAGING AND BIOSENSING STRUCTURAL DEVICES USING NEAR-INFRARED PLASMONIC METASURFACES: DESIGN, SIMULATION, AND FABRICATION

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Abstract. In this work we review a part of the achieved results on the design, simulation, and fabrication of the plasmonic metasurfaces toward the realization of the fluorescent bioimaging and refractive index biosensing devices. The plasmonic metasurfaces working at the near-infrared range are formed by stacking up the noble metallic (Ag and Au) subwavelength disk arrays on thin silica (SiO_2) spacing layer and metallic film (acting as a reflector) on a silicon (Si) substrate. The plasmonic metasurfaces with various structural parameters are designed and numerically investigated using the finite-difference time-domain (FDTD) method. The successful fabrication of the near-infrared plasmonic metasurfaces have been achieved by 3D laser direct writing (3D-LDW) combining with sputtering technique, its reflection experiments are in good agreement with the simulation results. In the near-infrared range, the proposed plasmonic metasurface has low Ohmic loss and shows the high fluorescent emitting enhancement and directivity of about 16 times and 625.0, respectively. In addition, the refractive index biosensor based on that provides the figure-of-merit (FOM) to have the contrast and selectivity higher than that of other established plasmonic biosensors. The average sensitivity of 430 nm/RIU according to FOM of 4.4, which correspond to the vapor and liquid sensors, respectively, have been achieved. Thus making plasmonic metasurfaces the impressive approach for near-infrared fluorescent bioimaging and refractive index biosensing devices.

Keywords: *Plasmonic metasurfaces, surface plasmon resonances, array directivity, near-infrared fluorescent bioimaging and biosensing devices.*

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A-10

HIGHLY STABLE PEROVSKITE QUANTUM DOTS FOR LIGHT-EMITTING DIODE APPLICATIONS

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Abstract. Perovskite QDs have been considered as attractive emissive materials for next generation display due to their outstanding opto-electrical properties. However, poor structural stabilities are weakness of perovskite QDs and must be solved. Perovskite QDs with highly structural stability were realized by introducing (1) UV-crosslinking ligand[1], (2) core-shell structure[2] and (3) alkali metal doping. These methods significantly enhanced structural stabilities of perovskite QDs by minimizing ligand dissociation and defect generation.[3]

Keywords: *Perovskite QDs, Structural stabilities, UV-crosslinking, core-shell structure, alkali metal doping*.

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A-11

A NON-ENZYMATIC GLUCOSE SENSOR BASED ON MoS_2 NANOFLAKES/POLYANILINE (PANI)

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Abstract. MoS_2 nanoflakes/polyaniline composites were prepared by electrochemical method on the glass carbon electrode. The samples were characterized by scanning electron microscope (SEM), X-ray diffraction (XRD), Fourier transform infrared spectrometer (FTIR) and Raman spectrum. The morphology results showed that the thickness of MoS_2 nanoflakes was about 5-20 nm and diameter in the range of 50-100 nm and the MoS_2 nanoflakes were completely covered with polyaniline (PANI) nanowires. Cyclic voltammetry (CV) and chronoamperometry (CA) showed that MoS_2/PANI can be used as good electrode material for non-enzymatic glucose biosensor with high sensitivity of 2.5 $\mu AmM^{-1}cm^{-2}$, low detection limit of 10 μM, wide linear range of 1 – 6.5 mM, and the linear correlation coefficient (R^2) was 0.98, as well as good selectivity and stability.

Keywords*: *glucose sensor, non-enzymatic, MoS_2/PANI, electrochemical method.

A-12

MICROFLUIDIC PLATFORM FOR CELL LYSIS: TOWARDS SINGLE-MOLECULE ANALYSIS IN A FREE SOLUTION

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Abstract. The development of droplet-based microfluidic chips has enabled the cells/particles handling in the specific region within the microfluidic channel. Here we present a concept of chemical lysis of the cells in droplet microfluidics utilizing an affordable polydimethylsiloxane microfluidic chip [1]. Microfluidic platform for cell lysis integrates a) droplet formation and passive cell encapsulation; b) passive mixing of the microdroplet content; and c) the cell lysis within the incubation part of the chip (Fig. 1A). Microdroplets are produced continuously at high rates by pumping fluids (oil phase– Fluorinert oil and aqueous phase – assay buffer) from external pressure-driven reservoirs. As a model experiment, HeLa cells (immortalized cell line) were subjected to the chemical lysis utilizing 0.01% (v/v) of non-ionic detergent Triton-X. Based on the dosage scheme cells in the assay buffer were encapsulated into the droplets containing detergent and immediately subjected to the chemical cell lysis in the incubation part of the microfluidic chip. To identify the membrane-compromised cells a red fluorescent reagent Propidium iodide was added to the cell media (Fig. 1B). Healthy cells stayed unstained (Fig. 1C), while *cells with damaged membrane revealed fluorescence (Fig. 1D).* The benefits of the proposed microfluidic platform for single-molecule immunochemical assays based on photon-upconversion single nanoparticle spectroscopy [2] will be discussed.

Keywords: *Droplet microfluidics, Polydimethylsiloxane chip, Cell lysis.*

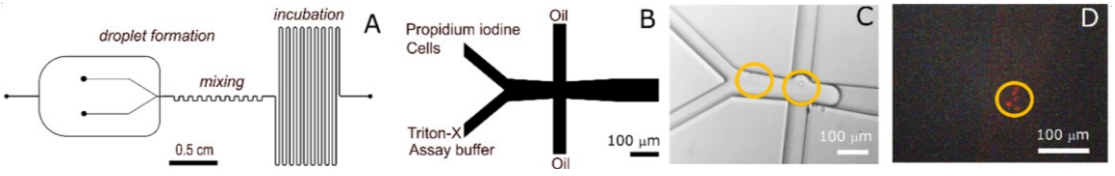

Fig. 3. Microfluidic chip outline (A); lysis dosage scheme (B); droplet formation and cell encapsulation (C); lysed cells in the fluorescence mode (D).

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A-13

MANIPULATING OF PULSE PROPAGATION WITH QUANTUM COHERENT IN A FOUR-LEVEL TRIPOD-TYPE ATOMIC SYSTEM

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Abstract. In recent years, both theoretical and experimental studies in modified quantum systems of dynamical propagation have been reported in very large numbers by scientists [1-3]. In particular, since Harris et al. found the EIT effect [4], this topic has become more and more prominent. Controlling the pulse propagation of laser beams through quantum coherence in coherent atomic media has obtained some very remarkable results such as extremely slow light propagation [5], optical soliton pulse propagation [6], and store light [7]. This is very significant in quantum engineering and optical communication, especially in quantum information [8].

In this paper, starting with the setup of a tripod configuration four-level quantum coherence of ^{87}Rb atomic system, which is controlled by two strong laser fields and a weak probe field, is introduced as the object of investigation. By simultaneously numerical solving the coupled Maxwell-Bloch equations for atom and field, we find that the control of the pulse propagation in the atomic system through the interaction between light and matter is easily controlled by changing the values of the frequency detuning and the intensity of the controlling laser fields. The investigation to give a set of control parameters that help the pulse to propagate stably. Furthermore, finding a mechanism to obtain a soliton-like shape when a Gaussian pulse beam propagates in an coherent atomic medium with a low pulse intensity will be very useful for realizing the storage and reproduction of light in quantum information.

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A-14

CONTROL OF GROUP VELOCITY VIA AN EXTERNAL MAGNETIC FIELD AND KERR NONLINEARITY IN DEGENERATE V-TYPE ATOMIC MEDIUM

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Abstract: Controlling the group velocity of light in optical materials has attracted tremendous interest over the last years because they have many important applications in optical information storage and processing, quantum computers [1]. Recently, the discovery of the electromagnetically induced transparency (EIT) effect not only reduces the absorption but also enhances linear and nonlinear dispersions in the vicinity of atomic resonant frequency [2]. In particular, the magnitude and sign of the dispersion of the medium for a light beam can be controlled by another light beam. Therefore, the discovery of the EIT effect has opened up an excellent solution to control the group velocity of light and slow light propagation [3, 4], ultraslow soliton [5], store light [6], optical bistability and all-optical switching [7-9].

In this report, we study slow light and fast light in a degenerate V-type atomic medium. The expressions for the absorption, linear and nonlinear dispersions, and group index of light of the system are derived as functions of the laser fields. The effect of the magnetic field and Kerr nonlinearity on the group velocity of light is also considered under the effect of Doppler broadening.

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A-15

THZ MOLECULAR SCIENCE IN CONDENSED PHASES

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Abstract. Terahertz (THz) frequency region is located between microwave and infrared regions, and molecular motions and intermolecular interactions in the THz region reflect unique properties of materials, which are important to understand structural stabilization, chemical reactions, and functionalities of molecular systems. We have been applying spectroscopic methods in the THz region to various problems in the research field of molecular science. By using THz time-domain spectroscopy (TDS), we can obtain both the absorption coefficient and refractive index of materials.

Molecular crystals in the solid state show vibrational structures even in the THz region at low temperatures, and mode assignment can be performed by using solid-state density functional theory and crystal structures obtained by X-ray diffraction measurement [1-4]. The agreement between the experiment and theoretical calculations depends on how we treat the intermolecular interactions in the calculations. Consideration of the London dispersion force is crucial to explain the vibrational spectra in the THz region. The normal modes are generally a mixture of intermolecular and intramolecular vibrational modes.

Hydrogen bonding liquids such as water interact with electromagnetic wave in a broad range from the MHz to mid-IR region. Liquid water has different types of molecular motion associated with hydrogen bond dynamics such as librations, intermolecular stretching mode, and collective reorientational relaxation, and these dynamics have specific time-scales and frequencies. In order to understand dynamics of water in the THz region, we perform broadband dielectric spectroscopy ranging from MHz to mid-IR region. The obtained complex dielectric spectra are analyzed in terms of a model function for time-correlation function of the total dipole moment of the system. This work is also extended to protein to investigate effects of thermal excitation and hydration on the protein dynamics [5-7].

Charge carriers in the condensed materials also interacts with THz waves efficiently. The examples are conductive polymers and organic semiconductors. We investigated the charge carrier dynamics of benzoporphrin (BP) and BP-based bulk heterojunction thin films by using time-resolved THz spectroscopy [8, 9]. In both samples, we observed instantaneous appearance of transient THz signals, which are attributed to mobile charge carriers.

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A-16

HORIZONTAL AND VERTICAL AXES WIND TURBINE FOR RURAL AREA HOME APPLICATION IN MYANMAR

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Abstract. Vertical and horizontal axes small scale wind turbine are constructed for home application in rural area. There are three-bladed vertical and horizontal axes wind turbines are set up in different universities. Test running of these two turbines, three-bladed horizontal axis wind turbine is more rotate than horizontal axis turbine. The power output depends on wind speed and blade design.

In this research, three phase AC alternator is used for generating output power of 1 kW. Blades are made of elements namely Teak (Tectonagrandis) and Iron. Rotor diameter is 2.52 meter for horizontal wind turbine and 2.5 meter for vertical axis wind turbine. There is no transmission gear in this turbine. Among these blade materials, it was found that the teak wood provides the best starting wind speed of this turbine. Starting wind speed of horizontal axis turbine is 2 ms^{-1} with 150 rpm and output voltage is 7 V.

Tower height is 15 feet for catching to wind stream. Dynamo is main parts of wind turbine and produce electricity 1kW. Which used as a generator in these two turbines. The 12 V and 60 A battery is used as a storage device. The electricity flow from the alternator is directed into battery passing through the wind turbine controller. This turbine can be used in rural area in Myanmar.

A-17

ULTRA-HIGH SENSITIVE NON-ENZYMATIC OPTICAL SENSORS FOR GLUCOSE DETECTION

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Abstract. In this work, we introduce new types of non-enzymatic fluorescence and absorbance sensors for glucose sensing. The sensors are based on ZnO nanostructures and ZnO nanostructures decorated with metal nanoparticles. The sensor exhibits a high sensitivity of (22 ± 2) % mM^{-1} (defined as a percentage change of the PL peak intensity per mM) and a limit of detection (LOD) as low as 0.01 mM, along with excellent selectivity and a short response time (less than 5 s). In comparison with other glucose sensor-based ZnO nanostructures, our sensors demonstrate a significantly higher which can be used for glucose sensing in other fluids such as human tears, sweat… When compared with other methods such as HPLC, our sensors demonstrated a comparable accuracy when they are treated with real samples. The simple and cost-effective of our sensors highlight the promising possibility of the sensors in many medical and biological applications.

Keywords: *Optical sensor, glucose sensor, ZnO nanorods, Au nanoparticles.*

A-18

ROLE OF Eu^{3+} CONCENTRATIONS DOPED ALUMINIUM SODIUM CALCIUM BORATE GLASS ON LUMINESCENCE PROPERTIES FOR CALIBRATING MATERIAL

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Abstract. Currently, spectrometers are devices used in a variety of industries, whether it's industry, education, research, etc. In the case of the luminescence spectrometer, it is always necessary to calibrate the standard before using it to ensure that the measurement has accuracy and precision with the sample light-emitting tube, such as deuterium lamps. Therefore, calibrators with stable light-emitting properties, an affordable price, and long lasting use have been developed in this research. An interesting material is a light-emitting material made from glass that is ionized with lanthanide elements, as glass has the advantages of having good optical properties, transparency, and ease of making. Preparation uses the technique of melt quenching; the proportionality of each glass structured substance can be changed, and it's also easy to change the amount of dope. Considering the 3+ ion-emitting properties of the f-f transition-type lanthanide element It has very strong properties for stable light-emitting since, when the elements lanthanides are in the form of oxide compounds, the orbital 4f is inside and is encapsulated with 5s and 5p. This makes the spectrum of light absorption and emission unique, stable, and sharp. This research has designed a glass formula of Eu^{3+}-doped aluminum sodium calcium borate glass to study its physical, optical, and luminescence properties. All studies can develop the optical calibrator for the spectrometer.

Keywords: *Borate glass, calibrating, europium, and luminescence.*

A-19

QUANTUM COMPUTING OF NUCLEAR PAIRING CORRELATION INTERACTION USING VARIATIONAL APPROACH ON BERYLLIUM ISOTOPES

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Abstract. The Hartree-Fock approach being the usual starting framework in dealing with a many-particle system assumes that the particles move independently in the system [1]. Any correlations between particles are ignored [2]. However, as in most cases, inclusion of correlations [1,3] on top of the pure Hartree Fock solution will improve agreement between calculated and experimental data. In nuclear structure, pairing correlations is a necessary component in state-of-the-art nuclear models [3].

While the computational work of the Hartree-Fock plus pairing correlations framework can be performed on a normal classical computer, we are interested to investigate the computation of nuclear pairing on a quantum computer. This is in line with increasing global research interests in solving quantum many body systems using quantum computers in atomic physics, quantum chemistry, and nuclear physics.

In this presentation, we present results obtained from calculations of Beryllium isotopes using a pairing delta interaction. The pairing correlation energy is solved using unitary coupled cluster doubles framework [4] with ansatz made-up of double terms [5] only to mock-up the effect of two-body excitations due to pairing. Optimization of the ansatz is performed using the Variational Quantum Eigensolver. Calculated results produced from the emulated quantum computer will be presented.

Keywords: *nuclear pairing, quantum computation, variational quantum eigensolver, unitary coupled cluster doubles.*

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A-20

RAMAN STUDY OF 4*d* TRANSITION-METAL OXIDE COMPOUND Sr_2RhO_4

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Abstract. Due to a 11° rotation of the RhO_6 octahedra around the c-axis, electronic structure of the 4*d* transition-metal oxide Sr_2RhO_4 was proposed to be fancy feature, such as a quasi-two-dimensional Fermi-liquid-like ground state [1]. The orientation of octahedra RhO_6 is a key parameter affect to electronic state of Sr_2RhO_4, however the fundamental research structure such as Raman spectroscopy have not been reported yet. We investigated the Raman spectroscopy of single crystals of a novel correlated electron metal Sr_2RhO_4 by different laser excitations at room temperature. We obtained six distinct modes by both 671 nm and 514 nm laser excitations, which imply that six modes are originated from Raman excitation of Sr_2RhO_4, not from the photoluminescence. Using the density functional theory calculation, we assigned six modes including $3A_{1g}$ phonon, $2B_{2g}$ phonon and $1B_{1g}$ phonon. Our research provides the background information for further study related to the disorder of octahedra controlled by temperature or by electron-doping.

Keywords: *rotation of the RhO_6 octahedra, Sr_2RhO_4, Raman spectroscopy.*

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A-21

MANIPULATION OF SOLID-STATE SINGLE-PHOTON SOURCES BY DETERMINISTIC COUPLING INTO POLYMER-BASED PHOTONIC STRUCTURES

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Abstract. Single-photon emitters (SPEs), capable of emitting exactly one photon at a time, are crucial building blocks for a wide range of sophisticated applications in quantum science. These applications, including optical quantum computers, require high-quality SPEs and the ability to manipulate the emitted photons effectively. Among the diverse types of SPEs, solid-state atom-like particles, such as quantum dots (QDs) and defects in diamond crystals, offer promising avenues for achieving excellent SPE performance. Integrating these SPEs into photonic structures has shown potential for enhancing their quantum properties and enabling precise optical manipulation. At the University of Paris-Saclay (France), within a framework of the collaboration between the LuMIn and GEMaC laboratories, we have developed a powerful technique called the low one-photon absorption (LOPA) direct laser writing (DLW) for fabricating 3D submicrometer polymer-based photonic structures, enabling the integration of solid-state SPEs. Here, we demonstrate the efficient coupling of QD-based SPEs with various 3D polymeric structures, facilitating the manipulation of quantum light beams for quantum experiments and applications at room temperature [1-4]. Our approach presents a cost-effective solution for coupling high-performance SPEs with on-chip photonic devices. The versatility of the LOPA-based DLW technique allows for accommodating various solid-state SPEs and structural designs, opening up new possibilities for the development of scalable integrated quantum photonics.

Keywords: *colloidal quantum dot, single-photon emitter, polymeric structure, LOPA DLW.*

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A-22

SINGLE LASER SCANNING FOR FUNCTIONAL PHOTOACOUSTIC MICROSCOPY: REAL TIME BLOOD OXYGEN SATURATION AND MOLECULAR DYNAMICS MONITORING

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Abstract. The provided description outlines the features and capabilities of a multiwavelength optical-resolution photoacoustic microscopy (OR-PAM) system designed for non-invasive imaging of biological tissues. The system utilizes laser excitation at two different wavelengths, namely a fixed primary wavelength of 532 nm and a tunable range from 735 nm to 85 nm using a external cavity with Ti:Sapphire crystal. The primary laser, operating at 532 nm with a repetition rate in the tens of kilohertz, serves as a pump for the tunable laser cavity. The resulting laser pulses have a time delay of approximately 200 ns between the original 532 nm pump pulse and the wavelength-tunable pulse. Following this, another pump pulse occurs tens of microseconds after the tunable pulse.

The tunable laser enables imaging at various wavelengths, allowing for the acquisition of functional images that selectively target different chromophores in the tissue. The laser used in this system exhibits a repetition rate of either 20 or 3 kHz, a high power conversion efficiency of 32.1%, an energy output per pulse ranging from 45 to 62 mJ, and a pulse width between 26 and 32 ns. The tunable range of the laser spans from 735 to 855 nm. The output pulses are coupled to a single-mode fiber, facilitating their connection to an optical-resolution photoacoustic microscopy system equipped with a microelectromechanical systems (MEMS) scanner. This configuration allows the acquisition of functional images with a single scan by dividing the A-line, a process of segmenting the image into individual elements.

To address the issue of overlapped photoacoustic signals during dual-wavelength excitation, a signal separation method based on unmixing is employed. This method effectively separates the signals originating from different chromophores based on their distinct spectral characteristics. By utilizing the ping-pong pulse output, the system enables the acquisition of functional photoacoustic images during a single laser scanning session. The validity and efficacy of the unmixing signal separation method are demonstrated through in vivo experiments. The OR-PAM system's multispectral capabilities are further utilized for real-time measurement of oxygen saturation (sO_2) by successfully separating and calculating the sO_2 values. This feature allows for the observation and analysis of microvascular dynamics in real-time across different wavelengths. The system's high pulse energy and ability to perform

functional imaging hold promise for future applications in in vivo imaging and various fields of medical research and diagnostics.

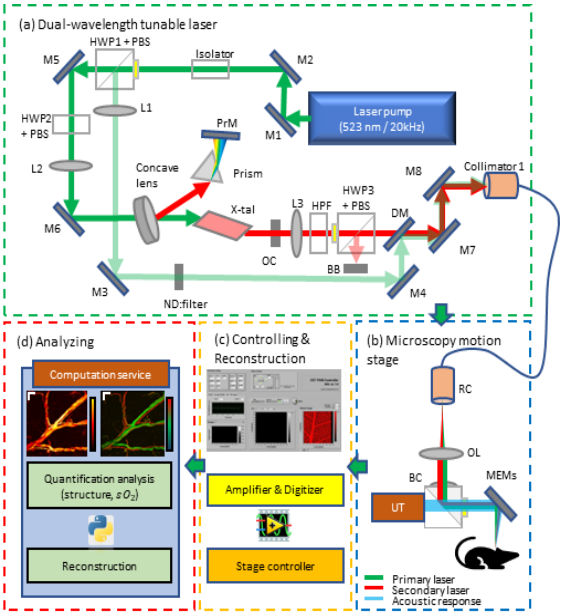

Figure 1. *(a) Diagram of the dual-wavelength tunable Ti: Sapphire pulsed laser, (b) PAM sample part, (c) Controlling and reconstruction with the customized LabVIEW program (d) Analyzing with the customized Python program. (M: mirror, HWP: half wave plate, PrM: prism mirror, DM: dichroic mirror, UT: ultrasound transducer, OL: objective lens, MEMs: MEMs scanner, BC: beam combiner)*

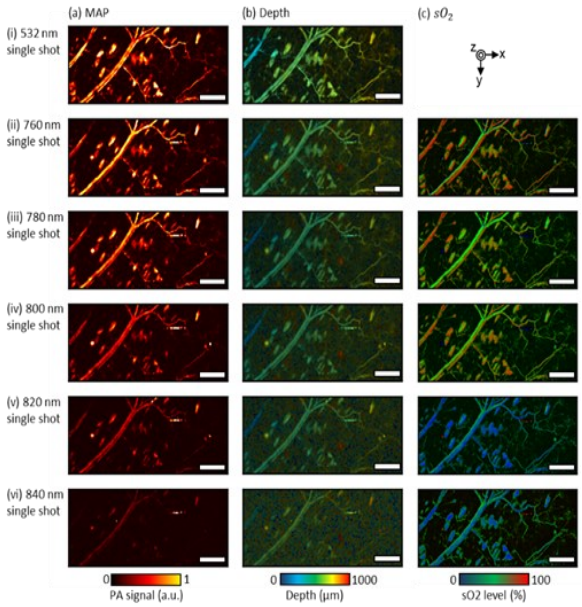

Figure 2. *In-vivo sample with mouse ear presented in (a) MAP and (b) Depth, using single laser shot mode (i) 532 nm, (ii) 760 nm, (iii) 780 nm, (iv) 800 nm, (v) 820 nm, (vi) 840 nm wavelength. The delay between fixed 532 nm and flexible second laser was performed less than 5ms, enough to calculate oxygen saturation in (c) sO_2. Scale bar: 100 μm*

In conclusion, the multiwavelength OR-PAM system described herein, featuring dual-wavelength excitation, signal separation through unmixing, and real-time functional imaging, presents a robust and versatile tool for studying biological tissues and their functional characteristics. Its potential impact spans a wide range of applications in medical research and diagnostics.

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Dr. Eom is interested in Label free functional imaging based on optical interaction (absorption and scattering control) with biological tissue and optical fiber laser in Medical and bio-photonics. Dr. Eom has published more than 50 peer-reviewed articles and serves on the editorial board of biomedical imaging devices in Optical Science. His research interests are the

development of novel biomedical imaging techniques including clinical optical coherence tomography, label-free photoacoustic microscopy tomography.

Dr. Eom has received numerous awards including: the International Mining Industry Exhibition Gwangju Metropolitan City Mayor's Commendation (2015) and Gwangju Institute of Science and Technology, Outstanding Researcher Award (2014, 2020). Dr. Eom earned his B.S. from Pusan National University in Republic of Korea in electronics and received his M.D and Ph.D. degree in Electronics from Gwangju Institute of Science and Technology, Gwangju, Republic of Korea. Dr. Eom also spent at Beckman Laser Institute and laser clinic, University of California, Irvine and Dept. Biomedical Engineering, Washington University in Saint Louis as a Research Scientist.

A-23

INCREASED TERAHERTZ EMISSION FROM A SPINTRONIC Ni/Pt BILAYER FILM WITH PLASMONIC METAL LINE ARRAY

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Abstract. We demonstrate an increased THz emission from a spintronic ferromagnetic/nonmagnetic bilayer film fabricated with a metal line array on the transmission side of the sample. The spintronic film was grown via electron beam deposition of nanometer-thick Ni/Pt films on an MgO substrate. On the opposite side of the MgO substrate, periodic metal lines of 10 μm width, 400 μm spacing and 110 nm thickness were fabricated via UV photolithography and resistive evaporation deposition of gold. A broadband enhancement in the THz power spectra was observed from 0.05 to 1.5 THz for the spintronic THz emitter with metal line array, compared to a bare Ni/Pt spintronic emitter. The increase in the THz power for the spintronic THz emitter with metal line array was as much as two orders of magnitude, with maximum enhancement at ~0.25 THz. This is in good agreement with the calculated surface plasmon resonance frequencies for the metal line array, lending proof to a surface plasmon effect in the enhancement of the THz radiation. Furthermore, the fluence dependence of the THz emission amplitude of the samples was measured. The increase in slope suggests an improved THz conversion efficiency of the plasmonic-enhanced spintronic THz emitter.

Keywords: *Spintronic terahertz emitter, surface plasmon***.**

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A-24

START YOUR CAREER IN DUBNA! OVERVIEW OF JINR OPPORTUNITIES FOR STUDENTS AND YOUNG RESEARCHERS

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Abstract. Being an international intergovernmental scientific research organisation, the Joint Institute for Nuclear Research has great potential in the fields of education and training in disciplines that correspond to its main research areas.

While providing a formal education, like that of a university, is not a purpose of the Institute, graduate, postgraduate students and young scientists from JINR Member States and partner countries can join the research teams of the Institute's numerous laboratories to be trained in various fields of nuclear, particle, and condensed matter physics, engineering, computer science, etc. In 1991, the University Centre, a specialised division, was established at the Institute to ensure the effective use of JINR facilities and expertise for the training of highly qualified scientists and engineers. For more than three decades of fruitful work, the JINR UC has been offering opportunities for the preparation of bachelor's, master's, and PhD theses, as well as for summer practices and hand-on trainings. Recently, JINR launched an attractive postdoctoral programme, which is open for applications twice a year. In addition, JINR implements fellowship programmes in partnership with prestigious organisations such as UNESCO and the Arab Atomic Energy Agency and plans to broaden the geography of the programmes to the countries of the Asia-Pacific region.

A-25

RACE TO THE BEGINNING WITH THE JAMES WEBB SPACE TELESCOPE

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Abstract. Snapping pictures of deep space objects at unprecedented clarity, the Hubble Space Telescope (HST) has revolutionized our understanding of the Universe, from planets in our solar system to remote galaxies. In 1987, three years before the launch of the HST, a telescope that could surpass even what the HST was anticipated to accomplish was presented by NASA. One of the primary scientific goals of this new telescope was to witness the formation of the first stars in galaxies, which might have formed just a few hundred million years after the 'Big Bang', marking the birth of the Universe, now 13.7 billion years old. Launched on Christmas Day in 2021, the James Webb Space Telescope (JWST) has taken astronomers back to a time never before seen – or has it?

Using simple physical principles familiar to many, I will explain why the JWST is uniquely able to peer back in time to observe galaxies near the beginning of the Universe. This feat requires the telescope to be parked 1.5 million kilometres away from the Earth, approximately 118 Earth diameters away. The race to find galaxies near the beginning of time started with the first science image released by the JWST on 12 July 2022. Just over a year into this race, however, the situation has become confusing: are we seeing galaxies at a time when we would not have expected stars to have yet formed? As a member of a research team with guaranteed observing time on the JWST and involved in this race, Dr Lim will provide insights into why determining whether we are seeing galaxies near the beginning of time is so difficult and the next step astronomers are taking with the JWST to resolve this controversy.

A-26

HUMAN EMOTION RECOGNITION BASED ON FACIAL EXPRESSIONS AND DEEP LEARNING FOR IVASBOT HUMANOID ROBOT

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Abstract. This paper presents the application of artificial intelligent recognize human emotions during communication with the humanoid robot IVASBOT. IVASBOT can detect human emotions and responds with appropriate expressions corresponding to the user's emotions. A method utilizing deep learning techniques to recognize facial emotions using a Convolutional Neural Network is presented, enabling real-time facial feature detection for the robot. The robot's expressions are conveyed through some simple emotional icons that will display on an LED screen equipped with the robot, making it easy for users to understand. Simulations and testing have demonstrated the robot's flexible and accurate communication capabilities achieved through human emotion recognition, creating expressions on the robot's face within a short period.

Keywords: *Artificial intelligence (AI), Deep Learning (DL), Convolutional Neural Network (CNN), Facial Emotions Recognition, Humanoid Robot.*

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XXIV: Một số vấn đề chọn lọc của Công nghệ thông tin và truyền thông – Thái Nguyên, 13-14/12/2021.

10. Nguyễn Thị Duyên, Ngô Mạnh Tiến, Hà Thị Kim Duyên, Bùi Quang Tuấn, Trần Bá Hiến, Nguyễn Minh Đông, Đỗ Quang Hiệp, "Xây dựng hệ điều hướng trên bản đồ, định vị SLAM cho Robot tự hành trong nhà kính nông nghiệp dựa trên hệ điều hành ROS," *Hội nghị - Triển lãm quốc tế lần thứ 4 về Điều khiển và Tự động hoá (VCCA),* 2021.
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A-27

DEEP LEARNING-BASED QUALITY IMPROVEMENT OF BIOPHOTONIC IMAGING

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Abstract. Biophotonic imaging utilizes light properties such as scattering, absorption, and polarization to provide structural and functional information of biological tissues in real-time at various scales. Based on these advantages, it is currently being used in various fields of medical diagnosis and life science. However, there is a physical limitation that makes it difficult to show the images of deep tissue, and a large amount of data and high computational processes are required to extract functional image information. Recently, various deep learning techniques have been used to overcome the physical limitations of biophotonic imaging such as low resolution, shallow depth, and low sensitivity. In this presentation, the quality improvement of various biophotonic imaging using generative adversarial networks (GANs) will be introduced.

Keywords: *Deep learning, biophotonic imaging.*

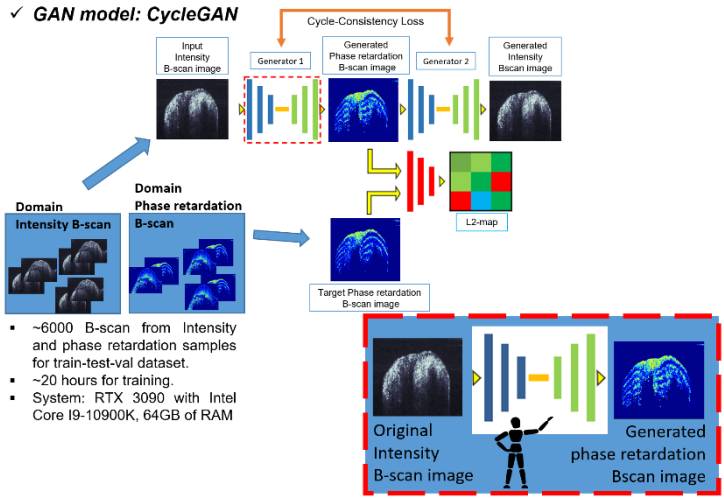

Fig. 4. Synthetic biophotoni imaging with GAN.

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Dr. Changho Lee is currently an associate professor at the Chonnam National University (CNU) in Republic of Korea since 2017. He received his Ph.D. in 2013 at the Kyungpook National University. During his doctoral candidate, he researched at the University of Illinois Urbana-Champaign (UIUC, 2014) and the University at Buffalo, the State University of New York (SUNY, 2011-2013) as a visiting scholar. Before joining the CNU, he worked as an assistant research professor and a postdoctoral fellow at the Pohang University of Science and Technology (POSTECH 2013-2016) and the Johns Hopkins University (2016-2017). Dr. Lee is the author of over 68 peer-reviewed articles in journals including *Nano Letters, ACSNano, Biomaterials, Theranostics, Applied Physics Letters, Journal of Biomedical Optics, etc.* and is a named inventor on 42 Korea and 9 US patents. He is currently a member of Society of Photo-Optical Instrumentation Engineer (SPIE), World Molecular Imaging Society (WMIS), and Optical Society of Korea (OSK). He also served as a journal reviewer > 50, including for Advanced Sciences, *Journal of Biomedical Optics, Applied Optics, Biomedical Optics Express, Photoacoustics, Optics Letters, etc*. He had awards including POSTECH Presidential Fellowship for Student Business Plan; 1st award (2014), SAMSUNG Electro-Mechanics 1nside Edge Best Paper; Bronze Award (2014), APGC Lab. Tech+Star for startup launch contest; 2nd award (2015). CNU Excellent early Faculty Award (2017), CNU Excellent Faculty teaching Award (2020), HBMW Young investigator Award (2020), Photonics Conference Best Poster Paper Award (2021), The Korean Society for Nondestructive Testing Best Paper Award (2022). He focused on developing novel-biomedical imaging modalities such as optical coherence tomography, photoacoustic imaging, multimodal optical imaging, molecular optical imaging, and intraoperative surgical imaging. Particularly, he has experience developing molecular photoacoustic imaging with diverse contrast agents, fast 2-axis water-proof MEMS based photoacoustic microscopy, virtual intraoperative photoacoustic surgical microscopy, raster scanning based photoacoustic whole body imaging of small animals, combined photoacoustic and optical coherence tomography using a single pulsed broadband laser source, tissue coagulation detecting with speckle variance optical coherence tomography, etc. Recently, he focuses on the development of bioimaging techniques utilizing deep learning technology.

A-28

THE EFFECT OF MgO ON Ga_2O_3-Lu_2O_3-Al_2O_3-Y_2O_3-B_2O_3-CeF_3 GLASS FOR PHOTONICS APPLICATIONS

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Abstract. In this work, the Ga_2O_3-Lu_2O_3-Al_2O_3-Y_2O_3-B_2O_3 glasses with Mg^{2+}/Ce^{3+} co dopant were studied on the physical, structural, optical and luminescence properties. The influence of MgO concentration on those properties were investigated to determine the optimum composition for photonics glasses. The glass density tended to increase while the molar volume decreased with addition of MgO amount, except glass with 0.50 mol% MgO. The FTIR spectra confirmed the BO_3 and BO_4 borate complexes as the main structure units of glass network. All glasses strongly absorbed the photons in ultraviolet (UV) region. Under the UV excitation with 308 nm, the glasses generated the strongest emission at 355 nm and the luminescence decay time was in the nanoseconds order. The Ga_2O_3-Lu_2O_3-Al_2O_3-Y_2O_3-B_2O_3 glasses co-doped with Mg^{3+}/Ce^{3+} performed a potential for the fast UV converter and detector.

Keywords: *Cerium, Borate glass, Luminescence*.

A-29

GRAPHENE BASED ELECTROCHEMICAL SENSORS FOR BIOMEDICAL APPLICATIONS

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Abstract. Graphene, a two-dimensional material made of honeycomb structure of carbon atoms, owns many extraordinary properties such as good electrical conductivity, mechanical flexibility, fast electron transfer which make it a very promising material for electrochemical sensors [1-3]. Graphene based materials have been employed as electrochemical platforms for the detection of several biomarkers related to cancer diseases either at early or late stages of diseases [4,5]. Such kind of sensing platforms can also serve as analytical tools for measuring the level of pharmaceutical products (i.e, cancer or inflammation drugs, antibiotics) in patients in serious conditions to monitor the treatment process [6,7]. There are still many issues to be addressed in large-scale production and processing of high-quality graphene based materials. Other issues related to stability and reproducibility of the electrochemical sensing platforms should be also considered carefully.

Keywords: *Graphene, electrochemistry, sensor, biomedicine, point-of-care***.**

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A-30

METAL ORGANIC FRAMEWORK BASED ON BIMETALLIC STRUCTURE (Cu-Ni/BTC) AND CARBONNANOTUBE (CNT) FOR ELECTROCHEMICAL DETECTION OF *Bisphenol A*

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Abstract. Metal-organic frameworks (MOFs) have recently attracted much attention in electrochemical sensors due to their highly porous structure and possible electrocatalytic properties. In this study, a bisphenol A (BPA) sensor was fabricated by modifying the electrode surface with a bimetallic MOF structure (Cu-Ni/BTC) combined with carbonnanotube (CNT) through a drop casting process. Cu-Ni/BTC/CNT was synthesized by solvent heat method at 100^{o}C for 12h with molar ratio of Cu:Ni = 9:1. The results demonstrated that the use of Cu-Ni/BTC/CNT not only facilitates the charge transfer at the electrode surface, but also creates catalytic sites that enhance the electrochemical signals. The sensor works optimally at pH 7.4 with an accumulation time of 120s. The as-developed sensor exhibits a linear range from 2 to 50 µM with detection limit as low as 0.65µM. These kinds of sensors are very promising for on-site and rapid detection of hazardous substances present in water environment.

Keywords: *Bisphenol A, electrochemical, Cu-Ni-BTC/CNT, MOF.*

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A-31

DIMENSIONAL DEPENDENCE OF THERMAL CONDUCTIVITY IN MULTI-LAYERED GRAPHENE

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Abstract. Graphene is composed of carbon atoms arranged in a sheet of repeating honeycomb shape. It is a semimetal and semiconductor known for its superior thermal conductivity. It has a thermal conductivity of 5,300 W/m-K higher than the diamond with a thermal conductivity of 2,000 W/m-K at room temperature [1]. In this study, the dependence of thermal conductivity κon dimensions for multi-layered graphene is studied using molecular dynamics based on the Tersoff-Brenner potential. Both the armchair and zigzag graphene orientations are chosen and the sheets are stacked in an AA alignment from 1 to 8 number of layers. Each layer has a length, width, and height of 3, 2, and 0.335 nm, respectively. Through the velocity Verlet algorithm in the Nose-Hoover thermostat, the average velocity of the system is calculated to compute for the heat flux. The thermal conductivity is then computed using the Fourier's law and plotted as a function of number of layers n. The κ-n plot showed that the monolayer has the highest thermal conductivity for armchair and zigzag graphenes and as n increases, the κ decreases. The zigzag has the higher κ than the armchair graphene in all layers, but its decrease is more pronounced. At layers 6 to 8, the thermal conductivity saturates which implies the 2D to 3D crossover of the multi-layered graphene.

Keywords: *graphene, thermal conductivity, armchair graphene, zigzag graphene.*

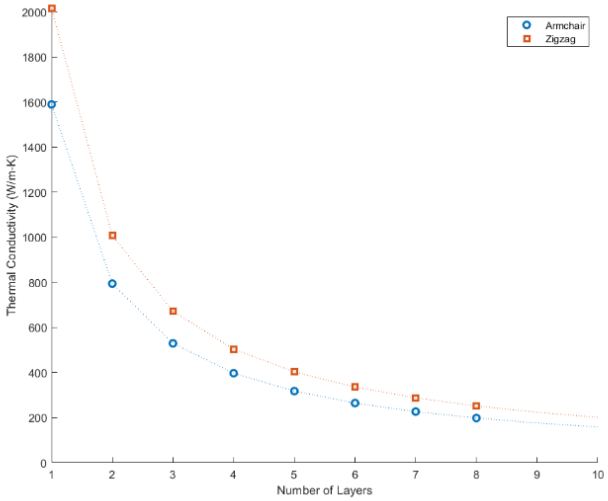

Fig. 5. Thermal conductivity vs number of layers of armchair and zigzag graphenes.

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A-32

STUDY LUMINESCENCE PROPERTIES ENHANCE OF Tb-DOPED AU CO-DOPED GLASSES FOR GREEN OPTICAL APPLICATION

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Abstract. This report focuses on the investigation of luminescence properties and the enhancement of Tb^{3+} co-doped Au glasses for green laser applications. The study aims to explore the potential of Tb^{3+} co-doping AuNPs in glasses. The starting materials including SiO_2, Al_2O_3, B_2O_3, CaO, Sb_2O_3, Na_2O, K_2O, SnO_2, SeO_2, Tb_2O_3, and AuNPs. The glass has been prepared by conventional melt quenching technique and is characterized by physical, absorption, excitation, emission, and decay time measurements. It was found that the density of glass was 2.8269 to 2.8359 g/cm^3, molar volume was 26.3382 to 26.2591 cm^3/mol, and refractive index was 1.5438 to 1.5526. The absorption spectra consist of three absorption bands that are located at 524, 1894, and 2178 nm and are assigned to $^7F_6 \rightarrow {}^5D_4$, $^7F_6 \rightarrow {}^7F_{0,1,2}$, and $^7F_6 \rightarrow {}^7F_3$, respectively. Photoluminescence (PL) was investigated using a spectrofluorometer (Cary-Eclipse). The integral scintillation efficiency has been studied by X-ray-induced optical luminescence. In addition, Tb^{3+} Au co-doped materials are promising ions for green optical applications.

Keywords: *Terbium ion, Gold-nanoparticles, physical properties, optical properties, luminescence properties*.

A-33

PHOTOCATALYTIC ACTIVITY OF p-Si/p-CuO/n-ZnO NANOSTRUCTURED HETEROJUNCTION

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Abstract. The nanostructured heterojunction of ZnO/CuO was fabricated using the sputtering, spin-coating, and hydrothermal methods on a p-Si substrate. The structural properties of the ZnO/CuO nanostructured heterojunction were characterized through X-ray diffraction (XRD) measurements, scanning electron microscopy (SEM), and absorption spectroscopy. The ZnO/CuO nanostructured heterojunction exhibited significantly extended absorption range for visible light and reduced recombination rate of photo-generated electron-hole pairs due to light absorption, making it a promising photocatalyst. The photocatalytic capability of the ZnO/CuO nanostructured heterojunction was evaluated through the degradation of Rhodamine B (RhB). The ZnO/CuO nanostructured heterojunction demonstrated good stability, reusability, and durability for organic compound degradation. The RhB degradation efficiency of the ZnO/CuO nanostructured heterojunction reached 93% after 2 hours of illumination, and the ZnO/CuO nanostructured heterojunction showed a RhB degradation efficiency of 70% after 2 hours of illumination even after three cycles of reuse.

Keywords: *heterojunction, p-n junction, photocatalyst, composite, ZnO/CuO.*

A-34

OPTICAL APPROACHES FOR HIGHLY SENSITIVE AND ACCURATE POINT-OF-CARE BIOSENSORS

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Abstract. Point-of-care testing (POCT) simplifies medical diagnostics by decentralizing patient-centered diagnostic testing. Especially, the outbreak of severe acute respiratory syndrome β-coronavirus (SARS-CoV-2) has created an urgent need for fast, accurate, sensitive, and simple technologies for on-site disease detection.

In this talk, I will introduce how optical techniques can enhance the sensitivity and accuracy of POC biosensors. First of all, optical biosensing techniques enable naked-eye detection for example, a lateral flow immunoassay (LFI), which facilitates POCT and self-testing. Thus, firstly, I would like to introduce the fabrication of highly sensitive optical probes for the LFI [1]. Secondly, I will present a rapid POC, polymerase chain reaction (PCR) kit composed of a lateral flow paper strip with a Joule heater, allowing naked-eye confirmation of test results [2]. Finally, I will discuss our group's most recent study on optical imaging-based, single-step, digital immunoassay techniques.

Keywords: *Point-of-care testing, Biosensors, Optical probes, Polymerase chain reaction, Optical imaging, single-step biosensors*.

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A-35

INTERNSHIP AND Ph.D. RESEARCH OPPORTUNITIES AT SOKENDAI AND INTER-UNIVERSITY RESEARCH INSTITUTES IN JAPAN

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Abstract. SOKENDAI (The Graduate University for Advanced Studies) is the national university that exclusively offers doctoral programs in Japan. The concept of SOKENDAI is unique in the world, whereby it is a university that is affiliated with 20 Inter-University Research Institutes (IURIs). These IURIs are world-class research institutes in Japan. For example, the Japan Aerospace Exploration Agency (JAXA)[2], the High Energy Accelerator Research Organization (KEK)[3], Institute for Molecular science[4], Showa station in Antarctica[5], and so on are part of the SOKENDAI campus. Most SOKENDAI professors and students work on their research and study as members of these IURIs.

In this talk, I will introduce SOKENDAI and the IURIs' research activities. More importantly, I will highlight the internship programs, facilities, and various financial support that are available to students, postdocs and professors from Asian countries. As expected, SOKENDAI welcomes international collaboration from students and faculties.

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A-36

GRAPHENE-BASED FIELD EFFECT TRANSISTOR DECORATED BY METAL OXIDE NANOPARTICLES FOR NON-ENZYMATIC GLUCOSE SENSOR

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Abstract. We have reported a nanostructured composite comprising amino-functionalized graphene oxide (GNH) and nickel oxide nanoparticles (NiO NPs) which was synthesized with hydrobromic acid and ammonia solution in mild conditions for electrolytic-gated field-effect transistor. The synthesized nano-composite structures were verified via X-ray Diffraction (XRD), X-ray photoelectron spectroscopy (XPS), transmission electron microscopy (TEM), and Raman spectroscopic techniques. With the presence of GNH the transistor exhibited ambipolar characteristics with distinct V-shaped transfer curve as usual on graphene based FET. The presented glucose molecules on FET channel are adsorbed on the surface of the NiO nanoparticles due to the interactions with oxygen vacancies, then be oxidized with the aid of NiO nanozyme to generate gluconolactone and release more electrons, thus lead to a positive shift in V-shaped transfer curve. The use of such a highly sensitive sensing micro-platform is very promising for point-of-care devices to monitor the treatment process of metabolism disorders patients such as diabetes.

Keywords: *Non-enzymatic, Glucose, Graphene based Electrolytic-gated Field-Effect Transistor.*

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A-37

COMPARING THE TERAHERTZ EMISSION FROM SEMI-INSULATING AND LOW-TEMPERATURE GROWN GALLIUM ARSENIDE PHOTOCONDUCTIVE ANTENNA DEVICES OPTICALLY EXCITED AT 1550 nm AND 780 nm

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Abstract. In this work, we employed a terahertz (THz) time-domain spectroscopy (TDS) to investigate the THz emission characteristics of semi-insulating (SI) and low temperature grown (LTG) gallium arsenide (GaAs) photoconductive antennas (PCA) optically excited at 1550 nm (below-bandgap, E_g = 0.80 eV) and 780 nm (above-bandgap, E_g = 1.59 eV). Moreover, an equivalent circuit model that accounts for the carrier dynamics in the PCA was utilized in analyzing the experimental results. We found that for SI-GaAs (LT-GaAs) excited at 1550 nm, the dominant THz emission mechanism is the two-step photoabsorption via midgap states. Meanwhile, at 780 nm, the primary emission mechanism are the band-to-band transitions for both PCAs.

***Keywords**: terahertz emission, photoconductive antenna, gallium arsenide*.

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A-38

ASSESSMENT OF STORAGE-INDUCED FERMENTATION IN STINGLESS BEE HONEY BY COMBINING MICROBIAL ANALYSIS AND GAS RELEASED USING FTIR COUPLED WITH A GAS CELL

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Abstract. Stingless bee honey (SBH) is a valuable product with a high nutritional value. However, it is susceptible to fermentation during storage, which can lead to changes in its quality. To investigate the occurrence of fermentation in SBH, fresh samples were harvested and subjected to storage at room temperature (24±2 °C) prior to analysis. The populations of lactic acid bacteria (LAB) and yeast were measured using the total plate count (TPC) method. Simultaneously, Fourier transform infrared spectroscopy (FTIR) coupled with a gas cell was employed to monitor the gas released during storage. This study revealed the natural occurrence of methane in SBH alongside ethanol and ethyl-acetate within 3200 to 2800 cm^{-1} of the absorption band. Methane is detected in the honey samples from the first day and is still visible towards the end of storage suggesting it can be an indicator for the fermentation process in honey. LAB was no longer detected on the 9^{th} day denoting that the lactic acid fermentation stopped after the first week of storage. But the yeast fermentation might still happen albeit its population remains low until the last day of storage. The findings from the gas detection affirmed that the presence of yeast may facilitate further alcoholic fermentation in SBH during storage as methane and ethanol are still detected even without the presence of LAB in the honey sample. However, the pathway of methane production in honey is still unclear implying the need for further study for deeper understanding. This combined approach offers valuable insights into SBH fermentation. Gas detection, particularly the presence of methane, proves to be a crucial indicator alongside microbial analysis in assessing honey fermentation.

Keywords: *Honey fermentation, stingless bee honey quality, lactic acid bacteria, yeast, gas detection.*

SESSION B

B-01

A DFT STUDY ON 2D JANUS QUINTUPLE-LAYER ATOMIC STRUCTURES $XCrSiN_2$ (X= S, Se and Te)

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Abstract. By utilizing first-principles calculation based on Density Functional Theory, the crystal structure, electronic properties and carrier mobility of the proposed 2D Janus $XCrSiN_2$ (X=S, Se and Te) are investigated. The results show that these Janus structures $XCrSiN_2$ (X=S, Se and Te) are energetically and thermally stable. The electronic properties analysis indicates that the proposed systems are semiconductors with small indirect band gap. By applying the biaxial strain, the electronic structures are modulated considerably. The transport properties of the proposed configurations are calculated and analyzed systematically, indicating the highly directional isotropy. Our results suggest that the proposed Janus $XCrSiN_2$ could be potential candidates for various applications, especially in nanoscale electronic devices.

Keywords: *DFT, Janus, transition metal dichalcogenide, semiconductor and biaxial.*

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B-02

FABRICATION OF SURFACE-ENHANCED RAMAN SCATTERING (SERS) SUBSTRATES FOR PROTEIN DETECTION

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Abstract. Surface-enhanced Raman scattering (SERS) is one of the optical phenomena that can be used for biomolecules detection. SERS can amplify the Raman signal more than 10^8 times to obtain better Raman resolution. SERS makes use of noble metal nanoparticles (NPs) such as gold (Au), silver (Ag), or copper (Cu). The confinement of surface plasmon (SPR) in NPs will results in localized surface plasmon resonance (LSPR). Upon laser excitation, these NPs produce hot spot within their interstitial crevices known as SERS. For effective SERS analysis, these NPs must be uniformly distributed and modified across the substrate, where the biomolecules will be deposited. In this research, the Au NPs embedded silicon chip SERS substrate and Au NPs-reduced graphene oxide (Au NPs-rGO) SERS substrate were successfully fabricated and characterized via Raman spectroscopy, field emission scanning electron microscopy (FESEM) and energy dispersive X-ray (EDX). For the future work, the fabricated SERS substrates will be used for SARS-CoV-2 spike protein detection and cancer biomarker diagnostic.

B-03

BUILDING A NATURAL LANGUAGE PROCESSING MODEL FOR VIETNAMESE COMMUNICATION WITH HUMANOID ROBOT IVASTBOT

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Abstract. The article presents the application of Artificial Intelligence, machine learning and natural language processing to build a solution for human-robot communication - IVASTBOT. IVASTBOT has the ability to identify and communicate in Vietnamese with users. The system is built on the Task-oriented Dialogue Systems (TODs) architecture and developed on the open-source Rasa Framework, and is integrated with Speech To Text (STT) and Text To Speech (TTS) functions so that robots can interact with users by voice. The simulation results and the test run process have demonstrated the flexible, accurate communication that is performed on the test set. The result of the article is an application that can be applied in service, medical, sales, etc.

Keywords: *Artificial Intelligence (AI), Speech To Text (STT), Text To Speech (TTS), Dialogue Management (DM), Task-oriented Dialogue Systems (TODs), Natural Language Processing (NLP), Natural Language Generation (NLG), Natural Language Understanding (NLU).*

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B-04

DETECTING AND QUANTIFYING MICROPLASTICS USING A DSLR-LENS BASED UV IMAGING SYSTEM

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Abstract. Microplastics (MPs) are any synthetic solid particle or polymeric matrix, ranging from 1 μm to 5 mm in diameter [1]. Due to their low density and size, MPs can easily be transported through wind and water currents, contaminating the environment with the toxic compounds they contain [2, 3]. In addition to environmental pollution, MPs can harm living organisms through MP consumption and exposure [3, 4]. Moreover, MPs have been found in at least ten bodies of water in the Philippines as found in a study done in 2021 [5]. With this, there is a concerning need to do more research on the extent of MP contamination in the country and develop an efficient and accessible means of identifying and quantifying MPs. In order to do this, this study utilizes a DSLR lens attached to a UV CCD camera to capture images of MPs under UV illumination with a wavelength of 396 nm as shown in Figure 1. To serve as the control setting, white light illumination was used and colored filters were placed over the imaging system to filter out select wavelengths reflected or fluorescing from the sample. Following this, the images were segmented via a threshold normalized to the images taken under UV. Meanwhile, a particle counting algorithm was implemented to quantify the MPs in the captured images. In order to compare the results between both light settings, the histograms, mean gray values, and total calculated area of the samples were obtained and analyzed. Results show that samples were generally brighter under UV illumination in contrast to white light illumination as higher mean gray values, higher calculated areas, and higher histogram distributions of brighter pixels were obtained. Furthermore, particles were quantified more accurately for images taken under UV illumination than for images taken under white light illumination.

Keywords: *microplastics, UV image processing, image segmentation, UV fluorescence.*

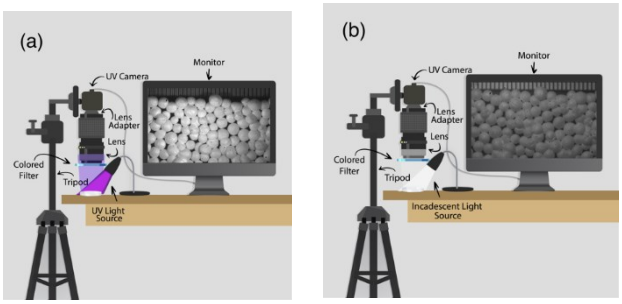

Fig. 6. Imaging setup using (a) a UV lamp and (b) an incandescent lamp.

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B-05

A COMPARATIVE STUDY BETWEEN XFEM AND PHASE-FIELD MODELING IN SIMULATION OF FRACTURE BEHAVIOR

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Abstract. In this paper, we performed a comparative study between two relatively new computational methods that have attracted great interest among researchers in fracture mechanics: eXtended Finite Element Method (XFEM) and Phase-field Modeling. Traditionally, the Finite Element Method (FEM) has been used to simulate the propagation of crack in materials. However, FEM requires enormous computational resources since it has to remesh after each step of crack growth; hence many alternative approaches have been developed to improve the computing efficiency. The XFEM adds a discontinuous enrichment function to model the crack, making it independent of the mesh. On the other hand, the phase-field method represents discrete crack with a continuous damage variable evolving based on the constitutive equations, therefore allowing for capturing the entire crack growth within the original mesh. To evaluate their performance, we modeled several paradigmatic problems, regarding different materials, scale, and loading conditions using finite element analysis software. The obtained results from both techniques, including crack path prediction and force-displacement curve, show good agreement with the published research. The implementation was then assessed in terms of computing time, memory consumption, effort, and applicability to highlight the strengths and weaknesses of each method.

Keywords: *Fracture mechanics, crack propagation, FEM, XFEM, phase-field modeling, numerical simulation.*

B-06

INVESTIGATION OF PHOTOCARRIER DYNAMICS IN InAs/GaAs SELF-ASSEMBLED QUANTUM DOTS VIA OPTICAL PUMP-TERAHERTZ PROBE SPECTROSCOPY

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Abstract. The ultrafast dynamics of photocarriers in self-assembled quantum dots is investigated via optical pump-terahertz probe (OPTP) spectroscopy conducted at room temperature. A set of coupled-differential rate equations were proposed based on the possible dynamical processes which could occur in the system [1]. Results of the OPTP experiment show two prominent carrier recombination mechanisms. These were attributed to the GaAs barrier and InAs wetting layer (WL) recombination based on the fitted lifetimes of the observed carrier decay [2-4]. Experimental data were also supported by numerical simulations of the rate equation model, which confirm the saturation of quantum dots and wetting layer (WL) states in the range of the optical pump fluence considered. Moreover, the time-dependence of the plasma frequency and phenomenological scattering time obtained from global fitting suggests a possible transition from barrier- to WL- recombination as the dominant carrier recombination mechanism [5, 6]. Results of the numerical calculations lend credence to the proposed model of carrier dynamics under state-filling conditions.

Keywords: *quantum dots, carrier dynamics, OPTP spectroscopy*.

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B-07

INVESTIGATING THE PHOTOCATALYSIS EFFICIENCY OF TiO_2/PHOSPHORENE HYBRID COMPOUND BASED ON THE CACBON DIOXIDE CONCENTRATION

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Abstract. In this study, black phosphorus material was synthesized by Vapor Solid method and separated into phosphorene membrains (20 - 30 nm). Phosphorene membrains were coated on commercial Titanium dioxide - TiO_2 particles (100 nm) to form a TiO_2/phosphorene hybrid compound. The TiO_2/phosphorene hybrid compound shows a better ability to degrade Methylene Blue than instrinsic phosphorene and instrinsic TiO_2 materials based on the reduced of the obsorption peak at 662 nm (for 4 hour) by UV-vis measurement. In addition, the photocatalysis efficiency was improved through the cacbon dioxide concentration of the TiO_2/phosphorene hybrid compound (~ 482 ppm) were 1.2 times more than the instrinsic TiO_2 sample (~ 408 ppm) in 1.5 hour. Meanswhile, the intrinsic phosphorene material hardly contribute in the photocatalysis. The result show the geat potential application of hybrid compound to solve the enviromental polution.

Keywords: *phosphorene, TiO_2, photocatalysis, ...*

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B-08

VARIATIONS IN AIR AND LAND SURFACE TEMPERATURES IN URBAN AREAS OF VIETNAM BEFORE, DURING AND AFTER THE COVID-19 PANDEMIC

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Abstract. Land surface temperature (LST) is an important variable in urban microclimate studies. Since the early 2020s, the emergence of Covid-19 pandemic has changed the world in a manner that forced many countries to impose restrictions in human activities. As a measure to prevent the extension of Covid-19 infections, most of the major cities have entered a prolonged lockdown period and drop in human activities between the early 2020 and the late 2021. These restrictions were strict in most of the cities in Southeast Asia, particularly in Vietnam. The present study investigated the variations in LST and NDVI observed in four small-scale and fast growing urban areas, namely Dalat, Da Nang, Hue and Vinh, in Vietnam using Landsat- 8 imagery acquired between 2017 and 2022. There has been a small reduction in LST in the study sites, particularly in Da Nang City, during the lockdown period but not as high as observed in recently conducted studies from big metropolitan cities, including in Vietnam. It is also observed that LST estimated from built-up areas and other impervious surfaces remained relatively stable during the study period which is similar to the results from recent studies. The air temperature data analysis supported the observed anomalies in LST. Since Dalat is not highly urbanized compared to other three study areas, no rapid variations in air temperatures was observed.

Keywords: *Covid-19, Land surface temperature, Urban heat islands, Urban sprawl.*

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B-09

BIODEGRADATION ANALYSIS ON THE SILICATE GLASS CERAMICS USING RICE HUSK ASH AS SILICA SOURCE

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Abstract. The silica was prepared from rice husk and rice straw by combustion at three different temperatures. Before combustion, the rice husk and rice straw were treated with an acid solution to gain a high percentage of silica content. The chemical composition of the resulting silica was compared with that of the extracted silica without acid pre-treatment from previous studying. The high-quality silica from the ashes with acid pretreatment was used as a silica source for sodium silica solution to prepare silica gel. The structure of amorphous silica was identified by XRD analysis. FTIR spectroscopy was used to detect the binding groups in the samples. EDXRF was employed to evaluate the chemical purity of the obtained silica. The bioactive glass ceramic was synthesized via the sol-gel method utilizing rice husk ash. The Simulated Body Fluid (SBF) solution was prepared for the bioactivity test of the synthesized sample. The glass ceramic was exposed to an SBF solution for different soaking periods. The surface morphology of the samples with incubation periods (1 day, 3 days and 7 days) was investigated by Scanning Electron Microscope (SEM). The results confirmed that the synthesized sample is bioactive and the apatite layer is increasingly formed with increased soaking time. The biodegradation of the samples was also investigated by testing pH value changes of SBF and weight loss of glass ceramics after immersion.

Keywords: *silica, rice husk, rice straw, acid pre-treatment, bioactive glass ceramics, invitro degradation, pH variation, SBF solution*.

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B-10

HISTORICAL PROFILE OF POLYCHLORINATED BIPHENYLS AND ORGANOCHLORINE PESTICIDES IN SEDIMENT CORES FROM DAY RIVER, VIETNAM

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Abstract. Persistent organic pollutants (POPs) such as polychlorinated biphenyls (PCBs) and organochlorine pesticides (OCPs) from inland sources enter water sources and accumulate in the sediment of rivers and coastal. In this study, five sediment core samples that were collected along Day River from Ha Nam province to Day estuary in Nam Dinh province were dated using a ^{210}Pb-dating method with the Constant rate of supply (CRS) model. The results showed that the oldest sedimentary layer was formed in 1916 at a depth of 77 cm (CoSD13), and the sedimentation rates ranged from 0.700 cm/year to 1.29 cm/year. Besides, the quantitative results of PCBs and OCPs in layers of sediment cores indicated that the highest accumulation of PCBs was found in the sediment layers corresponding to the late 1970s to early 1980s, with the highest total concentration of 6 PCBs indicators at 22.8 µg/Kg. Among pesticides, the concentrations of δ-HCH, p,p'-DDE, Dielrin, p,p'-DDD and Endrin components were higher than others with concentrations ranging from 0.036 ÷ 3.51 µg/kg, 0.045 ÷ 7.31 µg/kg, 0.021 ÷ 3.56 µg/kg, 0.027 ÷ 3.30 µg/kg, 0.024 ÷ 2.91 µg/kg. The total concentrations of HCHs and DDTs peaked in sediment layers dated after the 1960s when the North of Vietnam began importing pesticides for developing agricultural production.

Keywords: *sediment cores, polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), sedimentation rates*

B-11

CLIMATE CHANGE IMPACT ON DROUGHTS IN VIETNAM: A PERSPECTIVE FROM THE CMIP6-VN DATASET

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Abstract. This research delves into the impact of climate change on droughts in Vietnam, offering a comprehensive perspective derived from the CMIP6-VN dataset [1].

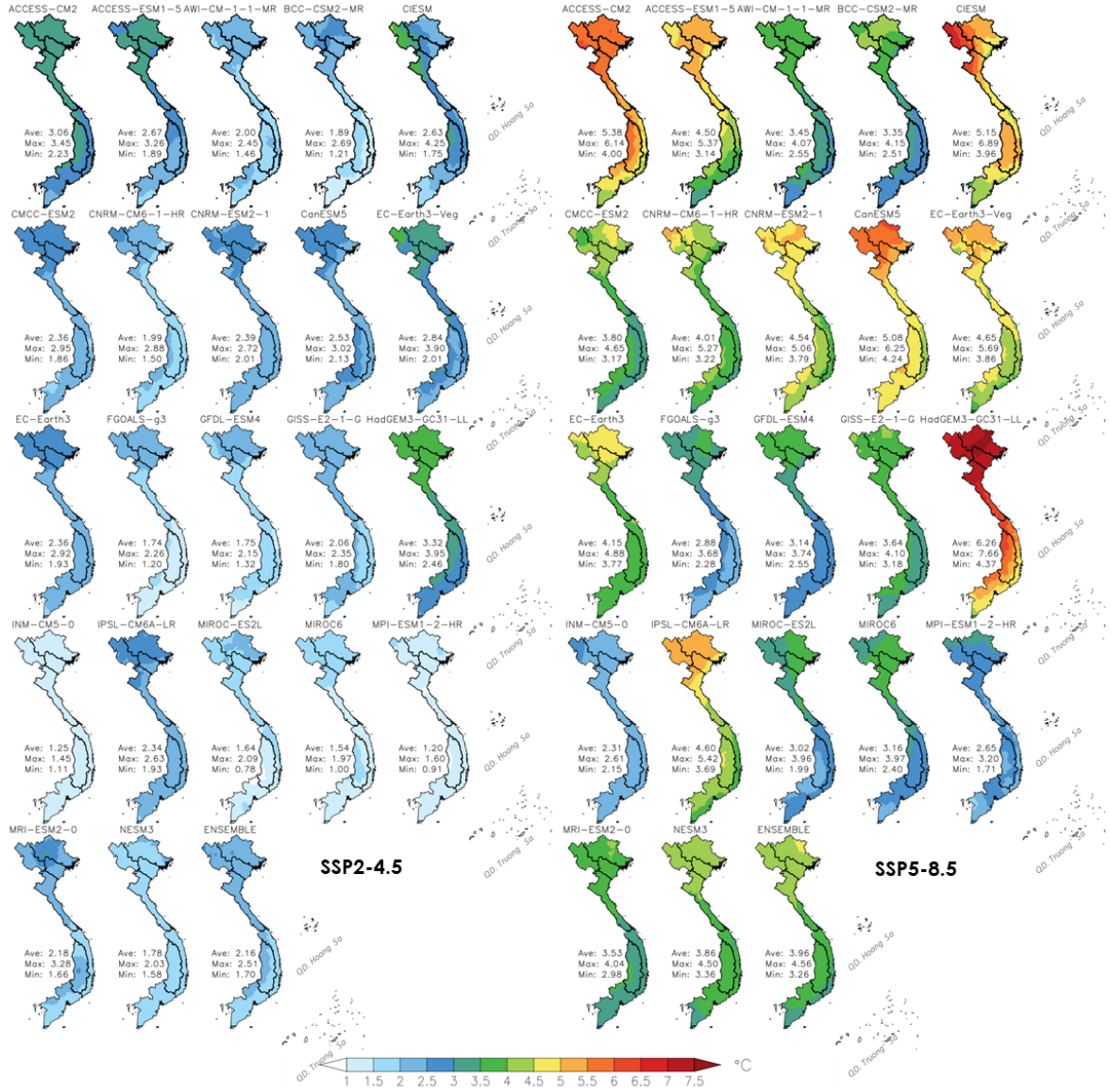

Fig. 7. Projected Changes in Average Temperature for the Period 2080-2099 Compared to the Reference Period 1996-2014 under the SSP2-4.5 (left) and SSP5-8.5 (right) Scenarios using the CMIP6-VN Dataset. The average, maximum, and minimum temperature changes for each individual model are illustrated on the left of the corresponding subplot.

Drought, known to have escalated into one of the most severe disasters in Vietnam, has prompted the need for a profound investigation. Leveraging the high-resolution CMIP6-VN dataset, which encompasses historical and future climate projections from a range of CMIP6 GCMs, this study aims to

clarify the possible consequences of climate change on drought occurrences in Vietnam. The research begins by examining historical observational data to identify previous drought events and their attributes, including frequency, intensity, and duration. Subsequently, future climate scenarios are employed to project potential changes in drought occurrences under varying climate scenarios. By utilizing the CMIP6-VN dataset, the study gains valuable insights into the evolving nature of drought patterns in Vietnam in the face of intensifying global warming. The findings from this research are paramount in shedding light on the vulnerability of Vietnam to drought disasters and the potential consequences of continued climate change. The study emphasizes that as global warming intensifies, droughts in Vietnam are projected to become significantly more severe. The output of this research is expected to contribute crucial information for policymakers, disaster management agencies, and stakeholders in devising effective adaptation and mitigation strategies to enhance the country's resilience against the escalating threat of droughts. The urgency of addressing the impact of climate change on droughts in Vietnam calls for proactive measures to safeguard water resources, agricultural productivity, and socio-economic stability in the region.

Keywords: *CMIP6-VN, Drought, Vietnam, global warming, disaster.*

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B-12

COMPOSITE BASED ON NICKEL NANOPARTICLES AND 3D CARBON FOAM TOWARDS ENERGY STORAGE APPLICATION

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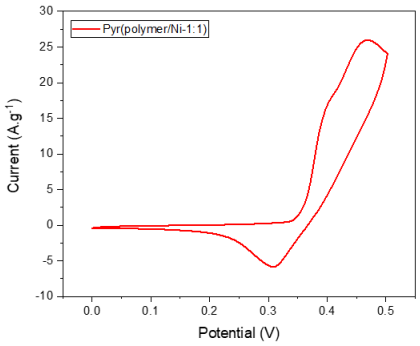
Abstract. Supercapacitors have been received extensive attention due to their high power density and long cycle stability [1,3]. Beside different kinds of metal-based nanoparticles such as iron, cobalt, titanium [2], nickel oxide is a suitable material for supercapacitor electrode because of its high theoretical capacitance and low cost [1]. In this research, a composite based on nikel nanoparticles and three-dimensional carbon foam was prepared and then tested for supercapacitor application. First, the nickel based nanoparticles were chemically grown onto a three-dimesional carbon foam (PolyHIPE). After that, the polymeric structure was converted to pyrolyzed carbon via a pyrolysis process at 900 °C for 1 hour. The morphology and structural behaviors of the as-prepared materials were examined using scanning electron microscopy (SEM), X-ray diffraction (XRD), and Raman spectroscopy techniues. It was shown that NiO/Ni nanostructures (particle size around 11 nm) were formed onto highly porous pyrolyzied carbon material. The hybrid behavior was observed on cyclic voltammetry curves recorded in alkaline solutions with a redox peak couple and a large background. The specific capacitance was found to be up to 200 $F.g^{-1}$. The development of such a highly porous redox material is very beneficial for further applications in hybrid supercapacitors.



$$C_s = \frac{\int Idv}{2mv\Delta E}$$

Keywords: *supercapacitors, 3D carbon, Ni nanoparticles, energy storage.*

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B-13

HIGHLY SENSITIVE PORTABLE SENSOR FOR GASTRIC CARCINOMA DIAGNOSIS

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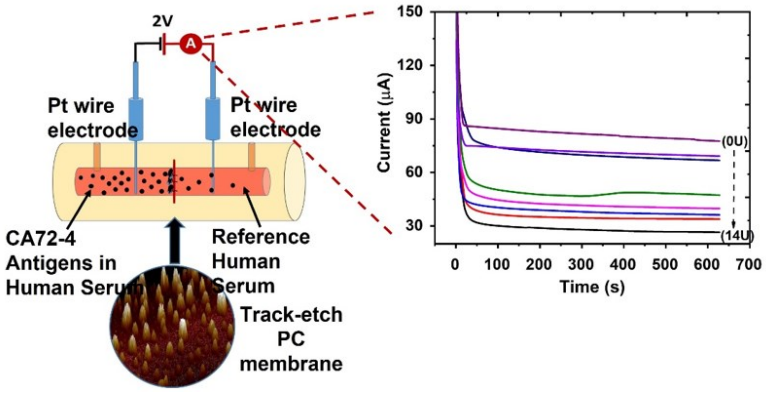
Abstract. Simplistic and efficient early detection of cancer is the major challenge in healthcare. Here in, we developed a novel biosensor with specific sequence of Oligo RNA for detection of gastric cancer antigens. In this design, Oligo RNA molecules was immobilized on the nano-poles of the polycarbonate (PC) membrane. The biomolecules tracked the targeting gastric cancer antigens and decreased the current that passing through the membrane in the concentration manner. The concentration of targeting cancer antigens, CA72-4 used in this work are 4-14 U/mL and the sensitivity of the sensor was 7.029 $\mu AU^{-1}mLcm^{-2}$ with a linear regression (R^2) of 0.965. The membrane base sensing device has not been previously reported to the best of our knowledge. The sensing mechanism relies on the specific sequence of RNA aptamer that captured the targeted cancer antigens. Our device potentially stands as a powerful tool for cancer marker detection, virus detection and other biomolecules.



Keywords: *Oligo RNA, Polycarbonate (PC) membrane, Cancer antigens, CA72-4, Targeting Gastric Cancer.*

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B-14

DEVELOPMENT OF POLYMER ELECTROLYTE MEMBRANES FOR FUEL CELL

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Abstract. Ion exchange membrane (IEM) or electrolyte membrane are extensively attracting research in recent decades due to many applications in energy, environment or water treatment. IEM includes proton exchange membrane (PEM) or anion exchange membrane (AEM) for proton/ anion exchange membrane fuel cell. However, AEM is expecting as alternative of PEM to decrease the cost, as AEM used common metal catalyst (Ni, Ag) rather than expensive catalyst of Pt in PEM. This research describes the synthesis process of AEM from polyphenylene oxide (PPO) with excellent alkaline stability and good mechanical characteristic for fuel cell application. The phenomena or mechanism in each step is fully explained. The validity is confirmed with analysis result from ^{1}H NMR, bromination evaluation, water uptake evaluation as well as ion exchange capacity. The method uses metal organic n-BuLi which is a strong technique for various based polymer structure synthesis.

Keywords: *Fuel cell, anion exchange membrane (AEM), polyphenylene oxide (PPO), n-BuLi.*

B-15

STRUCTURAL ANALYSIS AND SENSORY EVALUATION OF WHEY PROTEIN CONCENTRATE AS AN EGG-SUBSTITUTED IN SPONGE CAKE PRODUCT

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Abstract. Whey protein concentrate (WPC) is a protein-rich ingredient obtained by removing non-protein constituents from pasteurized whey, resulting in a dry product with over 80% protein content. The production of WPC involves physical separation techniques such as precipitation, filtration, or dialysis. The acidity of WPC can be adjusted by adding safe and suitable pH ingredients [1]. This study aimed to investigate the impact of substituting egg-containing components in sponge cake with WPC and identify the resulting structural changes. The experimental methods utilized included sensory evaluation techniques and structural assessments using the Brookfield CT3 texture analyzer. The study evaluated different ratios of WPC for the substitution process, specifically 8%, 10%, and 12%. After a comprehensive experimental approach, it was found that substituting 10% WPC in sponge cake produced the most stable results with the following attributes: hardness of 4.39 ± 0.53 (N), springiness of 18.26 ± 2.35 (mm), cohesiveness of 0.52 ± 0.01, gumminess of 2.25 ± 0.25 (N), and chewiness of 40.96 ± 4.76 (mJ). These properties satisfied the sensory requirements of consumers. Furthermore, the study established that the optimum color, flavor, and texture were achieved when the sponge cake was baked at 165°C for 25 minutes using the appropriate baking mode. The results demonstrate the promising potential of using WPC as a complete substitute for egg ingredients in sponge cake products [2]. Utilizing WPC as an egg-substituted not only contributes to the diversification of sponge cake offerings but also provides an excellent source of protein. Additionally, this substitution offers a suitable alternative for consumers allergic to eggs [3]. The results of this study provide new opportunities for sponge cake product development, utilizing by-products while boosting nutritional value and consumer pleasure.

Keywords: *whey protein concentrate, structure, egg-substituted cake, sensory evaluation.*

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B-16

IRREVERSIBLE DECOHERENCE OF A QUBIT IMMERSED IN AN *N*-QUBIT ENVIRONMENT

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Abstract. Decoherence is considered the loss of coherence in an open quantum system, i.e. the information of a system of interest leaks out to the environment due to the system-environment interaction. Irreversible decoherence implies the non-revival of initial coherence for any time $t > \tau_{\mathrm{D}}$, where τ_{D} is the decoherence time for a specific model. This study aims to determine the necessary conditions for an irreversible decoherence. This is done by obtaining the metric of the reduced density matrix $\hat{\rho}_0(t)$ of a qubit that interacts with an N-qubit environment with a diagonal Hamiltonian. It is shown that the condition of incommensurate interaction coupling g_k in each kth-qubit environment leads to irreversible decoherence. This is due to the suppression of the least upper bound of $|r(t)|$ to zero for asymptotically large N when these conditions are applied. The result herein is supplemented by providing a numerical plot when a white noise interaction coupling $g_k \in [-1,1]$ is considered.

Keywords: *open quantum system, quantum dynamics, decoherence, spin systems.*

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B-17

REDUCING THE SPHERICAL ABERRATION OF LENSES BASED ON CONTROL LIGHT TRAJECTORY

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Abstract. During utilizing converging lenses, aberration is a frequent problem that leads to severe errors in the manufacturing and imaging processes. Lenses with aberration have a critical effect on manufacturing, causing errors in the convergence of laser beams leads to geometric deviation in machine parts. Similarly, aberration prevents lenses from producing precise, accurate images, thereby creating incorrect information in images. This difference causes problems that are difficult to correct by using mathematics to correct images. Thus, aberrations in lens design become significant, notably in optical technology. This study proposed an innovative design that reduces spherical aberration based on control light trajectory in gradient refractive index medium and enhancing the convergent ability of the lenses.

Keywords: *Spherical aberration, Gradient refractive index, Casean, Natural Science, Young Scientists, Master and PhD Students.*

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B-18

FEEDING BEHAVIOUR AND REPRODUCTION OF ELONGATED TORTOISE *INDOTESTUDO ELONGATA* (Blyth, 1853) IN CATIVITY AT PHIALAT VILLAGE SANGTHONG DISTRICT VIENTAINE CAPITAL

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Abstract. Feeding behaviour and reproduction of the elongated tortoise *Indotestudo elongata* at phailat village, Sangthong District, Vientaine Lao. From May 2018 to July 2023. A total of 10 individual tortoise (5 males and 5 females). these tortoises were origins from the wild by people's donation to the turtle conservation center in Laos since 2017. The tortoises are separate in two enclosures and raised in natural habitats with suitable environment, each enclosure with forest cover. This study focus on observation of matting, eggs laying, eating preferences between plant and meat of the tortoises. Matting was observed from May to August with oviposition at the end of the raining season (October) until March. Hatching emerges at the end of dry season and beginning of following rainy season (February to July) by incubator room. Preferred diet for adult is meat over plants and for baby is earthworm, cat food, small fish, pork meat, fruit, vegetable.

Keywords: *Indotestudo elongate, tortoises, feeding, reproduction, Lao turtles' conservation center, incubation, hatching.*

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B-19

BIODEGRADATION OF OIL AND IRON POLLUTED WATER IN NHA TRANG, KHANH HOA

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Abstract. Biofilm is compactly packed microorganisms attached to a surface or interface. Biofilm ability to tolerate environmental stress could be used to increase biodegradation. In this study, a product formed by 04 well biofilm-forming bacteria strains which were isolated from oil contaminated water and sediment samples collected in several coastal zones in Vietnam was used to remove oil and iron pollution. The product could degrade 99.98 % of total oil after 24 hour-incubation with the beginning concentration of 11 ppm. And it was also demonstrated to absolutely iron from ground waste water collected in Nhatrang, Khanhhoa after 24 hours by SMEWW 3500-Fe.B:2017 analysis. The obtained results show that the product formed by multiple bacterial strains may considerably increase the degrading efficiency of total oil and iron containing in ground water and may lead to a new approach to treat oil and metal contaminated water in Vietnam.

Keywords: *Bacteria; Biofilm; Degradation; Ground water; Heavy metal.*

B-20

BIAS FIELD CORRECTION BASED ON B-SPLINE BASIS

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Abstract. The early applications of magnetic resonance imaging (MRI) primarily required that images should be adequately clear and free of artifacts to support the diagnosis of pathologies. The segmentation of MRI images is still common especially when the intensities of the objects of interest are overlapped owing to the presence of intensity inhomogeneities. Thus, there is a necessity for quantitative analysis with the bias field before the segmentation of the MRI images. The correction of the bias field images with different levels of intensity non-uniformity before image segmentation can improve the its efficiency before the subsequent image segmentation, In this study, the Legendre and B-spline basis function are utilized to the expression of the bias field for MRI images and the results of the bias field correction based on the different basis function will be validated and discussed.

Keywords: *Segmentation, B-spline basis, Legendre basis.*

B-21

STUDY OF 2D GAP PLASMON RESONATOR ON ORDERED SILVER STRUCTURE

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Abstract. This paper presents the research results on the ordered Ag nanostructures creating the gap plasmon resonance effects. The theory of gap plasmon resonance effect for 1D structure is introduced [1]–[4]. The Finite Difference Time Domain (FDTD) method [5] was used to simulate the optical properties of the ordered Ag structures. Some numerical results are introduced and analyzed to study the 2D gap plasmon resonators.

Keywords: *2D gap plasmon resonator, Ordered Ag structure, FDTD, plasmonic.*

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B-22

INKJET-PRINTING OF AMINATED GRAPHENE-BASED INK ON SOFT SUBSTRATE FOR BIOSENSING APPLICATIONS

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Abstract. Printed electronics technology is one of the most dynamic ways to facilitate the low-cost fabrication and mass production of electronic devices [1,2]. Recently, growing attention has been paid to inkjet printing (IJP) technology due to the direct patterning onto various substrates without any screens or masks, thus generating nearly zero waste. Inks used in inkjet printing require fluid dynamic parameters such as viscosity and surface tension, as well as the size and stability of particles [3]. In this work, we synthesized and formulated aminated graphene-based ink for inkjet printer. The ink formulations were then applied in the active channel of the field-effect transistor device.

Keywords: *Aminated graphene, inkjet, ink, graphene based Electrolytic-gated Field-Effect Transistor.*

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B-23

QUANTITATIVE OF HEAVY METALS, ORGANOCHLORINE AND ORGANOPHOSPHATE PESTICIDE GROUPS IN SOIL AT BANANA PLANTATION, SANGTHONG DISTRICT, VIENTIANE CAPITAL

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Abstract. This work aimed to study the quality of the soil and quantitatively analysis of heavy metals and organochlorine and organophosphate pesticides in soil samples at banana plantation, Sangthong district, Vientiane capital. The soil samples consisting of four point soil samples were collected at the depth of 0-15 and 15-30 cm within the banana plantations by using a random method of collecting along the spider web and around it and the sediment sample were collected along the Namton river from the top one point, the inside one point and the bottom three point of the banana plantation. Determine the soil quality index for both physical and chemical properties. According to the results, every sample had sandy loam texture, with pH ranging from 4.3 to 6.4 in soil and between 5.0 to 6.8 in sediment and comparatively low electrical conductivity in both soil and sediment range 0.07 to 0.19 dS/cm. In addition, the 5 studied heavy metals namely arsenic (As), lead (Pb), chromium (Cr), cadmium (Cd) and mercury (Hg) were found in the range 0.31-0.53, 12-20, 25-48 ,<1.49 and <0.8 mg/kg soil, respectively and were found in the range 0.35-1.67, 7-22, 58-79 ,<1.49 and <0.8 mg/kg sediment, respectively. Heavy metals are natural constituents of the earth's crust, but indiscriminate human activities have drastically altered their geochemical cycles and biochemical balance [1]. However, the heavy metals found levels were below the allowed contamination level in environmental standard for living and agricultural production set by the National Environmental Standards of Laos. Organochlorine and organophosphate pesticides in totally 25 compounds were not found in each soil sample. But were found 9 substance of Organochlorine pesticide residue in sediment such as Aldrin (0.004-0.022 mg/kg), heptachlor epoxide (0.004-0.026 mg/kg), gamma-chlordane (0.012-0.026 mg/kg), alpha-chlordane (0.004-0.028 mg/kg), dieldrin (0.012-0.050 mg/kg), 4,4'-DDE (0.006-0.057 mg/kg), endrin (0.010-0.058 mg/kg), 4,4'-DDD (0.032-0.093 mg/kg) and endrin aldehyde (0.075-0.118 mg/kg) and could say that in the banana plantation or in a nearby area ever used the Organochlorine pesticide [2]. When rainwater flows into water source and had accumulated in the sediment.

Keywords: *Soil Quality, Heavy metals, Pesticides, Sangthong district.*

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B-24

IN VITRO NEUROPROTECTIVE EFFECT OF NANOASTAXANTHIN

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Abstract. Alzheimer's disease (AD) is a neurodegenerative disorder that leads to cognitive decline and loss of memory. Astaxanthin, a well-known carotenoid, is extracted mainly from green microalgae, *Haematococcus pluvialis* which shows a promising therapeutic strategy for several cognitive disorders. In previous studies, we have produced nanoastaxanthin with high bioavailability (5–20 times higher than free astaxanthin). Compared with free astaxanthin, nanoastaxanthin has high antioxidant and lipid-lowering activity at very low concentrations. However, the impact of astaxanthin in the form of nanoparticle treatment on AD has not been evaluated. In this study, we exampled the potential neuroprotective effect of nanoastaxanthin on H_2O_2- and $A\beta_{25-35}$-induced neurotoxicity in C6 cells. The obtained results showed that nanoastaxanthin was not cytotoxicity and enhanced cellular uptake. The cellular uptake efficiency of astaxanthin in the form of nanoparticles was 35 times higher than in its free form. Furthermore, nanoastaxanthin pretreatment protected C6 cells against H_2O_2- and $A\beta_{25-35}$-induced neurotoxicity. At a concentration of 100 µg/mL, nanoastaxanthin raised the survival rate of H_2O_2- and $A\beta_{25-35}$-induced cells from 49.32 and 53.65% to 69.87 and 81.92%, respectively. Molecular mechanism studies showed that nanoastaxanthin inhibited the activity of acetylcholinesterase and promoted the expression of genes involved in the inflammatory pathway (iNOS, COX, TNF-α and IL-6), antioxidant defence system (CAT, SOD, GPx and Nrf2) and acetylcholine biosynthesis (ChAT and VAChT). Taken together, our results suggest that the nanoparticles of astaxanthin in this work may be appropriate ingredients for functional foods.

Keywords: *Astaxanthin, Acetylcholine, Antioxidation, Anti-inflammation, C6 cells, Neuroprotection.*

POSTER SESSION I

PI-01

MEASUREMENT OF NATURAL RADIOACTIVTY AND RADIATION HAZARD ASSESSMENT IN THE SOIL SAMPLES GOLD MINING VILABULY DISTRIC SAVANNAKHET PROVINCE

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Abstract. The natural radioactivity and radiation hazard assessment in the soil sample has been analyzed. It is the natural radioactivity in 20 soil samples collected from gold mining area Vilabuly district Savannakhet Province, Laos by using an HPGe detector. The activity concentrations of the natural radionuclides ^{226}Ra,^{232}Th and ^{40}K are 72.57±3.6 Bq.kg^{-1}, 113.35±5.6 Bq.kg^{-1} and 975.07±48.7 Bq.kg^{-1} respecttively. The average activity concentrations of ^{226}Ra, ^{232}Th and ^{40}K in this work are higher than those of the world average values. The mean values of radium equivalent activity (Ra_{eq}), absorbed dose rates D (nGy h−1), annual effective dose equivalent, external hazard index (H_{ex}) and internal hazard index (H_{in}) are 285.96 Bq.kg^{-1}, 131.69 nGy.h^{-1}, 0.16 mSv.y^{-},0.77 Bq.kg^{-1} and 0.96 Bq.kg^{-1} respectively. The results of present study show that the soil of the study area is safe from radiological hazards and will not pose any harmful effect to the environment.

Keywords: *Activity concentration, Radiological hazard, gold mining Vilabuly district.*

PI-02

ENHANCING THE PERFORMANCE OF POLYMER BINARY BLEND SOLAR CELLS BY POST-TREATING THE PEDOT:PSS SURFACE WITH HYDROQUINONE POWDER

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Abstract. The optical performance of the photovoltaic devices was enhanced by the use of novel polymer materials[1]. In this study, non-fullerene PBDB-T and fullerene PCBM polymer photovoltaic device was fabricated by using solution processing techniques. The optical properties and molecular vibrations of polymer blend organic conducting polymer films had been investigated by ultraviolet-visible (UV-Vis) spectroscopy and Raman spectroscopy. It was found that the values of their bandgap decreased by 2.52 eV, 2.175 eV and 1.851 eV. The band gap became narrower and suitable for organic photovoltaic devices. In fact, the addition of polymer solvents and polar compounds improved the conductivity of each layer.

Keywords: *PBDB-T, PCBM, Optical Properties, Molecular Vibrations, Bandgap.*

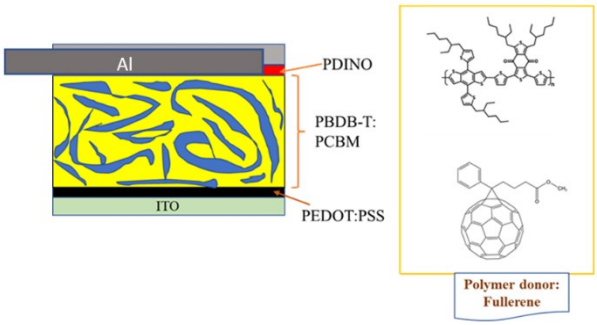

Fig. 8. The fabrication of polymer binary blend solar cell.

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PI-03

ENHANCED NEAR-INFRARED FLUORESCENT SENSING USING TRUNCATED-PYRAMID BASED PLASMONIC METASURFACES

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Abstract. This work presents a numerical study of truncated-pyramid-based plasmonic metasurfaces used to enhance a near-infrared fluorescent sensor. The truncated-pyramid plasmonic structure consists of silver (Ag) subwavelength disk arrays on a disk thin silica (SiO_2) and 100-nm-thick-Ag film on a silicon (Si) substrate. This structure with various structural parameters is designed and numerically investigated using the finite-difference time-domain (FDTD) method. Results show that the optical properties of designed structures are strongly dependent on the SiO_2 disk diameter and thickness. In the near-infrared wavelength range, the high fluorescent emitting enhancement is about 65 times, thus making truncated-pyramid plasmonic structure an alternative approach for near-infrared fluorescence bioimaging and biosensing devices.

Keywords: *Metal-dielectric-metal plasmonic array, surface plasmon resonances, near-infrared fluorescence bioimaging and biosensing.*

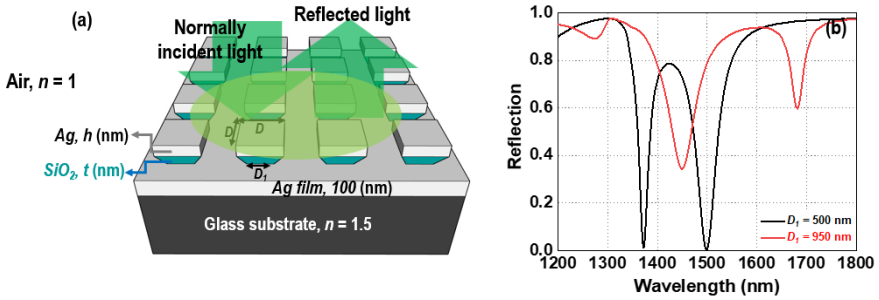

Fig. 9. (a) The designed plasmonic metasurface with truncated pyramid; (b) The reflection spectra for the structures with and without truncated pyramid.

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PI-04

GREEN SYNTHESIS AND OPTICAL PROPERTIES OF STABILIZED SILVER NANOPARTICLES USING GUAVA TWIGS EXTRACT

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Abstract. In this study, rapid, green synthesis of silver nanoparticles was achieved using extracts of guava twigs. The pH value of the reaction medium greatly influences the synthesis of silver nanoparticles. Surface plasmon absorption bands between 412 nm and 425 nm confirm the formation of silver nanoparticles. Silver nanoparticles were characterized using XRD, TEM, FTIR, Raman, and luminescence spectroscopy. The prepared silver nanoparticles are spherical in shape with sizes ranging from 8 to 20 nm. A luminescence spectrometer recorded. The emission spectra were recorded at 530 nm when excited at 400 nm.

Keywords: *nanoparticle; green synthesis; fluorescence, guava twigs***.**

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PI-05

THEORETICAL INVESTIGATION OF ISOMERIC RATIOS FROM PHOTONUCLEAR REACTIONS ON NATURAL BA TARGET USING TALYS 1.96 AND GEANT4 SIMULATION

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Abstract. In this study, we conducted theoretical calculations of isomeric ratios for isomeric pairs produced by photonuclear reactions on a natural Ba target. The calculations were performed using the TALYS 1.96 statistical nuclear model code [1] in combination with GEANT4 simulation [2]. The isomeric ratios were computed as a function of bremsstrahlung endpoint energies, ranging from 10 to 25 MeV. This was achieved through the convolution of TALYS-based calculated differential cross-sections with GEANT4-based simulated bremsstrahlung spectra. To investigate different nuclear models, we considered a total of 54 sets, comprising a combination of six level density models and nine gamma strength functions. Our theoretical predictions were validated, and the accuracy of the models used was assessed through a comparison of the calculated results with available experimental data from the literature [3-5]. This study enhances our understanding of isomeric ratios in photonuclear reactions, provides valuable insights into the underlying nuclear processes, and contributes to the refinement of nuclear reaction models in the Giant Dipole Resonance region.

Keywords: *Isomeric Ratio, Photonuclear reaction, Bremsstrahlung, TALYS 1.96 code, GEANT4 simulation.*

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PI-06

EFFECT OF PRECUSOR CONCENTRATIONS ON THE PHOTOLUMINESCENT PROPERTIES OF ZINC IONS IMPLANTATION ON COMERCIAL PAPER

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Abstract. In this study, Zinc ions were successfully implanted by using a hydrothermal method on a commercial paper. The effect of precursor concentrations on the photoluminescent properties of Zinc ions implantation is further investigated. Different concentrations of 10 mM, 20 mM, 30 mM, 40 mM and 50 mM are chosen to identify the optimum PL emission. It was shown that due to presence of Zn ions, the photoluminescent (PL) emission intensity of Zn ion implanted on the paper surface was first reduced in comparison with the blank paper's PL emission. The highest PL emission of the Zinc ion implantation is obtained with precursor concentration of 40mM. Other optical properties of the samples including SEM, XRD, FTIR, EDS were also studied in detail.

Keywords: *Zinc ions, photoluminescence, hydrothermal method.*

PI-07

VARIATION IN EFFECTIVE MODE AREA AND NONLINEAR COEFFICIENT OF As_2S_3-BASED CIRCULAR-LATTICE PCF WITH CHANGE IN CORE DIAMETER

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Abstract. A unique circular photonic crystal fiber (PCF) made in As_2S_3 chalcogenide glass is designed in this study. The change in nonlinear optical properties such as effective mode area and nonlinear coefficient is considered with the change in core size. The results reveal that there is a significant difference in the effective mode area values of small-core and large-core PCFs while their curves tend to be similar over the entire wavelength range. Based on the calculation of the effective mode area at the respective pump wavelengths, two fibers with the smallest ones are selected as two good candidates to investigate nonlinear factors. Their high nonlinearities of 387.88 $(W.km)^{-1}$ and 176.33 $(W.km)^{-1}$ at 5 μm and 6 μm, respectively, are important in nonlinear optical applications. These values also demonstrate different degrees of interaction between light and the nonlinear medium for PCFs with various core diameters.

Keywords: *Nonlinearity, Effective Mode Area, Core Diameter Change, As_2S_3 Substrate, Circular Photonic Crystal Fiber.*

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PI-08

STUDY OF THE THERMODYNAMIC PROPERTIES OF $BaTiO_3$ PEROVSKITE BY THE STATISTICAL MOMENT METHOD

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Abstract. We study the thermodynamic properties of cubic $BaTiO_3$ perovskite going beyond the statistical moment method within approximation up to the fourth-order of the power moments of the atomic displacements. The analytic expressions of the thermodynamic quantities, such as the free energy, thermal expansion coefficients, and heat capacity at the constant volume and constant pressure of $BaTiO_3$, are obtained. The potential with the partial charge model is used to calculate the numerical thermodynamic quantities of $BaTiO_3$ at various temperatures and pressures. Our research also shows that the anharmonic effects of the lattice fluctuations affect the thermodynamic properties of $BaTiO_3$ dominantly.

Keywords: *$BaTiO_3$, Statistical moment method, Anharmonicity, Thermodynamic properties.*

PI-09

DEGRADATION EVOLUTION OF MINI-SOLAR MODULES DUE TO ENVIRONMENTAL IMPACT

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Abstract. Electricity generation from solar panels is one of the renewable energy technologies. According to PID phenomenon, the quality of solar panels can be more decrease to decrease due to the high temperature [1]. In fact, there is no technology that can avoid the degradation state of solar modules. The solar panel can reach a failure state due to environmental impacts. One factor caused by environmental stress is temperature and it can diminish and degrade the performance of solar panels. In this work, the solar modules (12.5 cm × 7.2 cm) were annealed in the oven at 500˚C for 15 min, 30 min, 45 min, 1 hr, 1 hr 15 min, and 1 hr 30 min. Afterward, I-V characteristics of degraded solar modules due to temperature in dark conditions were investigated to find shunt resistance (R_{sh}). The surface features of the solar modules under different temperatures were performed by an electroluminescence camera. The experimental data results from this research described that the increase in temperatures causes the degradation states of solar modules. The results showed that heat-induced degradation displays degenerate gradually the p-n junction performance of solar modules.

Fig. 1. Electroluminescence camera (EL- camera).

Keywords: *solar modules, temperature, degradation, PID.*

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PI-10

USING SEMI-AUTOMATIC PROGRAMS AND REFERENCE CHARTS IN EARTHQUAKE FORECASTING

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Abstract. The study and prediction of earthquakes is becoming more and more necessary for Vietnam as well as the world. Many data processing programs and earthquake prediction models [1] have been created by researchers around the world with high accuracy. Currently, earthquakes have been occurring daily in many different areas in Vietnam with different strength and weakness. However, with relatively limited technical conditions, the use of semi-automatic programs and reference charts [2] to determine the location of the epicenter, the Richter magnitude of the earthquake based on data collected provided from monitoring points are being used by many Vietnamese researchers with high efficiency. In this study, we present the implementation of the research procedure with the actual data set of an earthquake occurring in Mexico.

Keywords: *Earthquake Forecast, Forecast Chart, Semi-Automatic Technique.*

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PI-11

DESIGN AND SIMULATION OF A SUSPENDING SYSTEM FOR Z-AXIS DISPLACEMENT ACTUATOR

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Abstract. This work reports on design and simulation of a suspending system for z-axis displacement, employing a configuration consisting of four suspension beams positioned at the corners of a central square plate. The micro-suspension system incorporates a z-axis displacement priority design, exhibiting substantial disparities between adjacent modes and providing effective resistance against interference from neighboring oscillation modes. The structural arrangement ensures the maintenance of proper edge ratios during fabrication while significantly improving displacement. To assess the performance of this structure, we employ both the theoretical calculation method and the finite element method. By comparing the results obtained from theoretical calculations with those derived from the finite element method, we observe differences of less than 10%. Moreover, the frequency difference between neighboring modes exceeds 50% and can be fully controlled by adjusting the length of the spring.

Keywords: *z-axis miniaturized suspension system, mode coupling*, *finite element method, straight beam spring.*

PI-12

THE PHOTOCATALYTIC PROPERTIES OF MnO_2 /ZnO COMPOSITES

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Abstract. In this paper, MnO_2/ZnO composites were successfully synthesized by hydrothermal method using $Zn(NO_3)_2.6H_2O$ and $MnCl_2.4H_2O$. The samples were characterized using X-Ray diffraction (XRD), Scanning Electron Microscopy (SEM) and Raman spectroscopy. Their photocatalytic activities were examined using Red Congo (RC) degradation under illumination of Xenon lamp 110 W. The organic dyes degradation was determined by decreasing of characteristic intensity peak in UV-Vis spectrum versus time of their solutions. In comparison with RC, the degradation of other organic dyes such as Methylene Blue (MB), Rhodamine B (RhB), Crystal Violet (CV) was examined. The result showed that the MnO_2/ZnO composite (MnO_2/ZnO = 7% by wt. %) exhibited higher photocatalytic activity in comparison to pristine MnO_2 and ZnO. The degradation reaches 81,1 % when the RC solution with concentration of 5 mgL^{-1} and 0.05 g of this composite was tested. The enhanced photocatalytic activity in mainly attributed to the construction of chemical potential gradients between proper amount of MnO_2 and ZnO.

Keywords: *MnO_2/ZnO composites, photocatalytic activity, degradation, chemical potential gradient.*

PI-13

TREATMENT OF DYEING WASTEWATER BY PHOTOCATALYTIC EFFECT OF SYNTHESIZED SILVER NANOPARTICLES USING *SALIX BABYLONICA*

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Abstract. The primary sources of human-caused environmental contamination are colored waterways and, in particular, wastewater from the dyeing industry. Toxic organic dyes in wastewater can be treated using a variety of techniques [1-4]. However, using catalysts to absorb dyes in water is a low-cost but incredibly effective way [5-8]. With their inherent photocatalytic abilities, silver nanoparticles make excellent candidates for this purpose. The green reduction process is particularly effective in producing silver nanoparticles [9, 10]. In this study, we employ a green technique to create silver nanoparticles by reducing and stabilizing a solution with *Salix babylonica* leaf extract. By examining the impact of pH, $AgNO_3$ precursor concentration, and extract concentration by UV-Vis absorption spectra, the best parameters for the synthesis are discovered. SEM pictures, FTIR, and EDX spectra were used to analyze silver nanoparticle structure, size, surface activity, and atomic composition. When exposed to white light, silver nanoparticles are used to dissolve RB dyes in water. In roughly two hours of light, the photodegradation effectiveness reaches 90%.

Keywords: *Treatment, Wastewater, Silver nanoparticles, Salix babylonica, Photocatalytic*.

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PI-14

MAPPING PLASTIC-COVERED GREENHOUSE FARMING AREAS IN VIETNAM USING HIGH-RESOLUTION SATELLITE IMAGERY

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Abstract. The proliferation of plastic-covered greenhouse (PCG) farming has resulted in high horticulture crop yields worldwide during the last few decades. A proper and cost-effective PCG monitoring method is necessary for maintaining sustainable horticulture and high-quality agricultural production with less plastic pollution. Remote sensing applications for mapping PCG have received great attention from the scientific community in recent years. In this paper, a comparative study was carried out in two plastic-covered greenhouse areas in Loukkos perimeter in Morocco and Dalat City in Vietnam to test PCG mapping accuracy of high spatial resolution RapidEye and PlanetScope satellite data and to understand the differences in PCG mapping quality due to topographic effects. Medium-resolution Landsat-8 OLI and Sentinel-2 MSI imagery were also applied. Moreover, two classification algorithms-retrogressive plastic greenhouse index (RPGI) and a supervised classification algorithm using random forest (RF) were used for mapping PCG. The findings reveal that RF outperforms RPGI. Overall, the mapping accuracy achieved exceeded 90% in both study areas, except for the RPGI method using Landsat-8 data (PCG mapping accuracy using Landsat data varied between 87.4 and 89%). Furthermore, PCGs were better detected by PlanetScope data than by RapidEye imagery due to the differences in the spectral range. Better performance in Loukkos perimeter can be explained by the study area's topography; Dalat City and surrounding areas are situated in mountainous terrain. The results obtained from this study indicate that spectral indices can be used as a cost-effective tool for mapping PCG under cloud-free conditions. PCG mapping using RF classifiers resulted in accurate PCG mapping without topographic factors' influence..

Keywords: *High-resolution imagery, Plastic remote sensing, Plastic-covered greenhouses, Spectral indices.*

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PI-15

AN EXPERIMENTAL PROCESS OF SYNTHESIS AND THE CHARACTERISTICS OF ETHYLENE GLYCOL-N-NITRAMINE DINITRATE

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Abstract. This paper presents a synthesis of ethylene glycol-N-nitramine dinitrate (DINA) by nitration of ethylene glycol-N-amine with concentrated nitric acid in the presence of anhydride acetic and concentrated hydrochloride acid. The structure of DINA is clarified by FTIR and ^{1}H-NMR. The melting point and solubility of DINA are tested. The stability is determined by the Abel method at 72 ^{o}C. The impact and friction sensitivities are also assessed. The results indicate that the obtained DINA was synthesized with a yield of about 89.2 %. The spectrum methods and melting point (51.2 ^{o}C) confirmed the high purity of the DINA. The thermal stability and sensitivity of obtained DINA reached 48 minutes and 220.3 ^{o}C at 10 ^{o}C/min of heating rate, respectively. The impact sensitivity was 88 % with a hammer weight of 10 kg and height of 25 cm. The friction sensitivity is more than 192 N of load.

Keywords: *DINA, explosive, nitramine, nitration, ethylene glycol-N-amine.*

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PI-16

THE DEPENDENCE ENERGY RELAXATION OF ELECTRONS IN QUANTUM WELL GaAs/GaAlAs ON MAGNETIC FIELD

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Abstract. We report the dependence of energy intrasubband relaxation of electrons in the Landau levels system of quantum well on magnetic field strength. It was shown that electron-electron scattering plays a role in redistributing the electrons between Landau levels and rate relaxation depends on the rate delivering electrons to Landau levels close to optical phonon energy by this kind of scattering. In contrast, although electron-phonon scattering plays a role in energy relaxation, its rate has a weak effect on the rate relaxation.

Keywords: *Intrasubband relaxation, Landau levels, Electron-electron scattering, Electron-phonon scattering.*

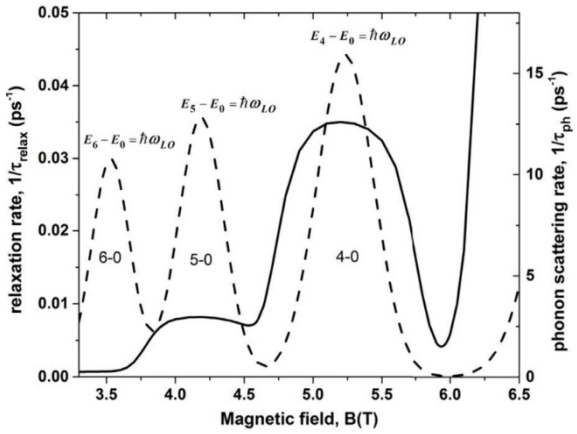

Fig. 10. *The magnetic field dependence of the energy relaxation rate (solid line) and the total rate of electron scattering via emission of optical phonon (dashed line).*

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PI-17

COMPARISON THE SCOPE OF EMISSIONS BETWEEN EXPERIMENTS AND CALCULATION MODEL IN SOC SON WASTE INCINERATION PLANT

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Abstract. Three parameters TSP, SO_2, NO_x (NO_2) of the emissions from Soc Son garbage power plant by using the calculating results of AUSPLUME air pollution dispersion model and the experimental analysis data are compared. Two samples of incinerator emissions and twenty-six ambient air samples were taken in the rainy and dry seasons, respectively in July 2022 and January 2023. The model's calculation and the analyzed experiment data are quite similar with the difference rate is less than 6%. Pollution indexes of ambient air samples mostly have higher values than results calculated by AUSPLUME model at locations within 1km around the chimney, the concentration pollution parameters are relatively low and there is no big difference in results between the two methods. But at sample locations far from the chimney, experimental and model results show a difference less than 20%. Some experimental results for TSP, SO_2, and NO_2 gases are higher than the predicted ones by AUSPLUME model. The main reason that in the process of model calculating, the resonance of neighboring waste sources such as industry, traffic, etc. arising in the period from 2019 to 2023 has not been forecasted. The AUSPLUME models predictions are relatively well for the extent of pollution dispersion but have large deviation for concentrations. This deviation increasing with the distance from the emission point.

Keywords: *Model, solid waste, incinerator, exhaust gas, pollution dispersion.*

PI-18

CHARACTERIZATIONS OF BETULIN EXTRACTED FROM BIRCK BARK (BETULA UTILIS) IN ITS RAW POWDER AND NANOEMULSION STATES

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Abstract. Betulin is a naturally occurring pentacylic triterpene which can be found in several plants such as the Chaga mushroom (Inonotus bolquus), the red Alder tree (Alnus rubra) and especially in many species of birch. However, like many naturally occurring bioactive compounds, it has poor aqueous solubility, which greatly limits its pharmacologically promoting effects. In the present study, a Betulin nanoemulsion formulation was prepared by the Self Nano-Emulsifying Drug Delivery System (SNEDDS) technique in order to overcome this disadvantage. Droplet sizes were less than 100nm and the solutions were optically clear, and they could remain stable for 24 hours. In addition, the results of SEM, UV-VIS, FTIR characterizations of betulin powder and nanoemulsion were also reported.

***Keywords**: betulin, enhanced solubility, nanoemulsion, antioxidant activity.*

PI-19

EFFECT OF TEMPERATURE ON OPTICAL PROPETIES OF CS_2 LIQUID CRYSTAL OPTICAL FIBERS

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Abstract. In this paper, we design a photonic crystal fiber and investigate the dependence of dispersion on wavelength for the case where the fill factor d/Λ varies from 0.2 to 0.9 with different lattice constants Λ = 0.5 μm; 1.0 μm; 1.5 μm; 2.0 μm; 2.5 μm; 3.0 μm. The characteristics of hollow core PCF with hexagonal lattice permeable with CS_2 liquid according to temperature have been studied, it has been shown that the lattice constant Λ = 1.5 μm and the fill index f = d/Λ changed. from 0.2 to 0.4 at the temperatures of 263 K, 273K, 283K, 293K, 303 K and 313 K.

Keywords: *photonic crystal fiber, CS_2 liquid, temperatures.*

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PI-20

TEACHING PHYSICS WITH STEM EDUCATION ORIENTATION

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Abstract. STEM education is known as a new approach in educating and training future human resource, in which the connection between the four fields: Science, Technology, Engineering and Mathematics. In which, the application of STEM in teaching physics is more focused on. Teaching physics, according to STEM education, responds well to capacity-oriented teaching is also the goal of the new general education program.

Keywords: *STEM education, physics, capacity, group.*

PI-21

FABRICATION OF SILICON TIP ARRAYS USING WET CHEMICAL ETCHING

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Abstract. This work reports the fabrication of silicon nanometer tip arrays based on MEMS technology. We use photolithography to pattern SiO_2 masks for defining tips on a Si wafer. The silicon tip arrays are then formed by using wet anisotropic etching of crystal silicon in alkaline solution. The process of reducing the size of tips is carried out by optimizing the SiO_2 mask etching and oxidation process. The investigation results show that from the micrometer-scale photography mask patterns, we can fabricate nano-size silicon tip arrays.

Keywords: *Photolithography, wet anisotropic etching, silicon tip array.*

PI-22

CALCULATION OF THE FORMULATION FOR HIGH-ENERGY SPHERICAL PROPELLANT

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Abstract. A spherical propellant commonly containing nitrocellulose (~78%), nitroglycerin (~20%), and additives (1÷2%) has a combustion heat of 1020÷1070 Kcal/kg. The spherical propellant with a higher energy can improve the velocity of the warhead. In this paper, the formulations of spherical propellant are established by varying the nitroglycerin content from 20 to 50% and evaluated through the calculated energy characteristics. The obtained results show that when stepping up the nitroglycerin content from 20% to 50%, the combustion temperature increases from 2834 K to 3405 K, the propellant force goes up from 1008 kJ/kg to 1128 kJ/kg, the combustion heat grows from 985 Kcal/kg to 1198 Kcal/kg, the gas pressure raises from 171 Mpa to 185 Mpa. The calculated results suggest that the NG content should be chosen in the range of 30 to 40 % for the high-energy spherical propellant.

Keywords: *High-energy spherical propellant, propellant force, combustion heat.*

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PI-23

ENHANCED OPTICAL ABSORPTION IN GALLIUM ARSENIDE SUBSTRATE WITH DESIGNED PLASMONIC NANODISK ARRAY THROUGH RCWA- AND FDTD-BASED SIMULATION

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Abstract. We investigated the effect of gold (Au) plasmonic nanodisks arranged in a rectangular array in enhancing the optical absorption of a gallium arsenide (GaAs) layer through rigorous coupled-wave analysis (RCWA)-based and finite-difference time-domain (FDTD) Lumerical simulations. The parameterization of nanodisk diameter and height revealed the optimal dimensions for maximum optical absorbance of an 800 nm incident light. The dependence of the absorbance and the absorption coefficient as well as reflectance on the simulated nanodisk dimensions indicate that the plasmonic nanostructure can alter the optical properties of the substrate. Additionally, localization of the electric field in the regions around the nanodisks was observed from the electric field profile which increased the absorbance. These results demonstrate the efficacy of the Au nanodisk array in enhancing the optical absorption of GaAs substrates.

Keywords*: absorbance, nanodisk, plasmonic effect, rigorous coupled-wave analysis, finite-difference time-domain method.*

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PI-24

HIGH-RESOLUTION FOR WIDE FIELD MICROSCOPY BY DEEP LEARNING

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Abstract. In this paper, we have developed the deep learning into wide field microscopy to obtain high resolution. The set of low-resolution images was generated by the objective of *NA* = 0.25 and the set of high-resolution images was created by the objective of *NA* = 0.65. The Unet model is built in order to training for the two sets. The tested results demonstrated that the low-resolution images of the objective of *NA* = 0.25 is improved to the high-resolution image of the objective of *NA* = 0.65.

Keywords: *Deep learning, Wide field microscopy, super-resolution.*

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PI-25

INVESTIGATION OF RANDOM LASING EMISSION FROM CARBOXYMETHYL CELLULOSE AND ZnO NANOCOMPOSITE MATERIALS

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Abstract. In recent years, random lasers based biological materials have attracted a lot of attention in many biological and medical applications due to their biocompatible, biodegradable, and non-toxic properties. In this work, we fabricated a simple, high-performance random laser from the biopolymer carboxymethyl cellulose (CMC) mixed with ZnO nanoparticles to enhance the scattering of light, providing resonance feedback for random laser emission. When doped with pigments, the random laser based on CMC and ZnO nanocomposite is capable of random laser emission with a low emission threshold of 7.0 $\mu J/mm^2$, and a high-quality factor Q of 2931. In comparison with other random lasers based on natural materials, our random laser shows a lower lasing threshold and a comparable quality factor. The compatibility and biodegradability together with an exceptionally simple, low-cost fabrication process show promising potential in biomedical applications.

Keywords: *carboxymethyl cellulose (CMC), ZnO nanoparticles, random laser.*

PI-26

ELECTROMAGNETIC INDUCED TRANSPARENCY EFFECTS IN SEMICINDUCTOR QUANTUM WELL WITH V CONFIGURATION

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Abstract. From the density matrix equation, the paper has presented the interaction between the electromagnetic field and electron in the semiconductor quantum well with V configuration. We study the change of absorption coefficient in a semiconductor and frequency of probe laser and coupling laser. From the research results, we determine the values of Ω_p , Ω_c, Δ_p, Δ_c for the appearance of the electromagnetically induced transparency effect.

Keywords: *semiconductor quantum well, absorption coefficient, electromagnetically induced transparency.*

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PI-27

COMPARISION OF EFFECTIVE REFRACTIVE INDEX AND DISPERSION CHARACTERISTICS OF CIRCULAR, HEXAGONAL LATTICES PCF WITH As_2S_3 SUBSTRATES

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Abstract. This work performs a comparative study on two solid-core photonic crystal fibers (PCFs) with an As_2S_3 substrate. These two new photonic crystal fibers are designed using Lumerical Mode Solution software based on the finite element method. The introduced structure is a novel structure of six air-hole rings arranged in circular and hexagonal lattices. We analyze and compare the effective refractive index and dispersion characteristics of the two structures with the change of lattice constant (Λ), filling factor (d/Λ). The PCF structures obtained dispersion characteristics diverse including all-normal dispersion and anomalous dispersion with 1 or 2 zero-dispersion wavelengths (ZDWs). Flat dispersion and closeness to the zero-dispersion curve in the long wavelength range are the advantages of these structures. The hexagonal lattice PCF structure possesses flat dispersion and is closer to the zero-dispersion curve than the structure with the circular lattice. Meanwhile, the real part of the effective refractive index of the circular lattice is always larger than the hexagonal lattice in the investigated wavelength range, and the effective refractive index decreases as the wavelength increases. Based on analysis and comparison, we have proposed structures with optimal dispersion and pump wavelength suitable for supercontinuum generation with a wide, flat, and smooth spectrum.

Keywords: *Photonic Crystal Fibers, Dispersion, Effective refractive index.*

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PI-28

ACCURATE CONTROL OF HYSTERESIS NONLINEARITY IN OPEN-LOOP AND CLOSED-LOOP OF XMT PIEZOELECTRIC CERAMIC ACTUATORS

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Abstract. Piezoelectric ceramic is a functional material which can make a conversion between mechanical energy and electrical energy. Piezoelectric actuator has been widely used in the fields of micro and Nano-positioning applications such as aerospace, data storage, optical communication, ultra-precision machining, biological engineering and semiconductor technology, due to the excellent advantages of small volume, fast response time, extremely fine resolution, large mechanical force and noiseless. This paper introduced development overview of piezoelectric ceramic and actuators, analyzed the control method of piezoelectric ceramic actuators and the hysteresis nonlinear, summarized and analyzed the dynamic hysteresis modeling and control method of piezoelectric ceramic actuators. Herein, we described the XMT PZT controller, the testing method of piezoelectric ceramic displacement sensors, the high-frequency response of piezoelectric ceramic controlled fast knives, and the design part of PZT software. In this experiment, the resolution of the iridium capacitance sensor is 2.5nm, and the accuracy is 5nm. The displacement of the PZT fast tool-servo for the amplification mechanism is generally relatively large, which can reach 120um with an accuracy of 50-100nm, and the bearing capacity is 20kg with a resonant frequency of 100-200 Hz.

Keywords*: Piezoelectric ceramic actuators; control system; hysteresis non-linearity; micro displacement platform; Fast tool-servo.*

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PI-29

ANALYSIS OF ANTHOCYANIN COMPONENTS IN PURPLE SWEET POTATO POWDER SAMPLES CURRENTLY AVAILABLE ON THE VIETNAMESE MARKET BY UVVIS SPECTROPHOTOMETRIC METHOD

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Abstract. Anthocyanin (ACNs) are the natural colorants that belong to a group of plant compounds called flavonoids, which are attracting new attention in the field of functional foods and natural pharmaceutical products due to their high natural antioxitant capacity. The health benefits that they bring can be mentioned that they provide powerful antioxidant, antiinflammatory, and anticarcinogenic activities, and possess very strong antioxidant properties. There are many foods that contain ACN such as fruits (grapes, strawberries, blueberries...); vegetables (eggplant, purple cabbage, purple sweet potato - solanum andigenum...); herbs (basil, lavender...). In particular, the direct extraction or production of foods that are containing ACN have been reported in very large numbers by scientists because of not only its nutritional composition, but also natural beautiful colors, so that consumers do not have to worry about toxicity or denaturation.

Absorption spectroscopy, especially UV-Vis spectroscopy, has been extensively utilized for the identification of anthocyanins. Therefore, in this paper, we use UVvis spectroscopy to investigate ACN in samples of purple sweet potato powder currently available in Vietnam market, which could be potentially useful for foodists and scientists in processing of foods and in the diet.

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PI-30

MXene-$NiFe_2O_4$ COMPOSITE WITH BROADBAND ELECTROMAGNETIC WAVE ABSORPTION PERFORMANCE

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Abstract. The MXene and $NiFe_2O_4$ composite material was effectively synthesized by using a moderate hydrothermal reaction in this study. In order to conduct an analysis of the composites, a number of different techniques were applied, including scanning electron microscopy, X-ray diffraction, energy-dispersive X-ray spectroscopy, and vibrating sample magnetometer. The dielectric loss and multiple scattering of $Ti_3C_2T_x$-$NiFe_2O_4$ are considerably improved as a direct result of the nanoparticles of $NiFe_2O_4$ that are present in the material. These nanoparticles promote the delamination of hierarchical structures. Therefore, the composite demonstrated an exceptional microwave absorption, as evidenced by a maximum reflectance of -46 dB at 14.5 GHz for a sample that measured 2.8 mm in thickness and contained 30% wt%. The results further demonstrate that the wideband design in the X-Ku band may be customized by adjusting the absorber thickness to a specific value of around 0.8 mm. By permitting small magnetic particles to deposit on the hierarchical structure, the current technique provides a strategy for designing unique 2D absorbers. This is possible by employing the hierarchical structure.

Keywords: *$NiFe_2O_4$; MXene; hydrothermal, microwave absorber.*

PI-31

THE PHASE TRANSITIONS IN KAGOME MAGNETS

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Abstract. The emergence and properties physic of magnetic phases in the model for kagome magnetic materials is studied. The model consists of a Heisenberg interaction and Dzyaloshinskii - Moriya interaction in the kagome lattice. We use the Bogoliubov variational principle to find the stable phases at zero temperatures. For the value of fixed D (D>0), we obtained the phases characterized by vectors chiral χ =1, χ=-1, $\chi=\pm 1$, the out-of-plane ferromagnetic state. For large values of J, the ground state has χ=-1. We obtained the rich phase diagram.

Keywords: *Bogoliubov, kagome lattice, vectors chiral*.

PI-32

WIDEBAND HIGH GAIN TRANS-IMPEDANCE AMPLIFIER FOR HIGH SENSITIVITY OPTICAL RECEIVER

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Abstract. The high sensitivity optical receiver has attracted great interest in pulsed laser rangefinder, speed measurement, three dimensional profiling and scanning applications. In the paper, we propose a trans-impedance amplifier convert the fast current pulses into the corresponding voltage for an optical receiver. The architecture of trans-impedance amplifier is based on a modified feedback network with a DC cancellation loop. Based on analysis of parameters of different TIA topologies, equations for the complex transfer function are evaluated and simulated. Simulations show trans-impedance amplifier using T-network operates in the low noise configuration with a high gain range and bandwidth in excess of 500 MHz. This research allows obtaining stable analog front-end amplifier in the presence of low dark current.

Keywords: *Trans-impedance Amplifier, T-network, SPICE model, Avalanche photodiode.*

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PI-33

STUDY AND FABRICATION OF 300 NM SILICA NANOPARTICLE MONOLAYER ON SILICON SUBSTRATE BY SPINCOATING TECHNIQUE

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Abstract. In this paper, we present a study on the fabrication of a silica nanoparticle monolayer on a silicon substrate using the spin-coating technique. Spherical silica nanoparticles were prepared by Stöber method [1]. The effect of different spinning time and speed for assembling 300 nm silica nanoparticle monolayer on Si substrate was experimentally investigated. The obtained result of this research is potential for various applications including plasmonic substrates [2,3].

Keywords: *Silica nanoparticle, Stöber method, monolayer, plasmonic substrate.*

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PI-34

MEC SCHEDULING IN 5G NETWORKS WITH UFGC

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Abstract. This article explores Mobile Edge Computing (MEC) scheduling in 5G networks with a segmentation mechanism to optimize computation tasks. By dividing tasks into smaller segments and distributing them to MEC servers, computation processing time is reduced, enhancing system performance and improving the user experience. The study utilizes the RND scheduling algorithm combined with UFGC segmentation channel protection to determine congestion probabilities for user sessions at An Giang University (Vietnam).

Keywords*: MEC, segmentation, scheduling, 5G networks*.

PI-35

FABRICATION A SIMPLE AND PORTABLE FREESTANDING TRIBOELECTRIC-LAYER MODE NANOGENERATOR

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Abstract. Over the past ten years, triboelectric nanogenerators (TENGs) have emerged as effective and low-cost power sources based on environmental and mechanical vibrations. The principle operation of TENG is based on triboelectrification and electrostatic induction with four main configurations including vertical contact/separation mode, lateral sliding mode, single electrode mode, and freestanding triboelectric layer mode (FTLM). Among those configurations, the FTLM is a simple and low-cost fabricated device using simple, readily available, and easily replaceable materials. In this study, we have successfully fabricated the high-performance and low-cost FTLM-TENG based on waste paper, Polytetrafluoroethylene film, and Copper tape. Under the gentle force of fingers, the fabricated TENG can generate an open-circuit voltage reach to 20 V and a short-circuit current of 4.5 μA. The device can supply power to 128 commercial white LEDs, demonstrating potential applications as an efficient alternative to traditional chemical power supplies for low-power electronics.

Keywords: *Triboelectric, Freestanding Triboelectric Layer Mode nanogenerator, Energy harvesting.*

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PI-36

EVALUATING GROWTH AND YIELD PARAMETERS OF TWENTY QUINOA GENOTYPES UNDER WINTER CROPPING SEASON IN GIA LAM – HA NOI

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Abstract. Quinoa *(Chenopodium quinoa Willd.)* is native to the Andean region, known for its outstanding nutritional value, genetic diversity, and its high adaptability to stressful environments. The aim of this study was to evaluate the growth and yield of twenty quinoa genotypes, cultivated under the open field conditions in Gia Lam, Hanoi. The experiment was conducted in the winter cropping season, sown sequentially without repeating, the area of each plot for each variety was 14 m^2, the distances among rows was 50 cm, and among plants was 25 cm. The data was collected for 3 indicators: (i) growth and morpholophy: duration, plant height, number of branches, number of leaves, stem diameter, (ii) pets and diseases, and (iii) grain yield and its components: 1000-grain weight, 20 quinoa yield. Out of the twenty quinoa varieties, five genotypes (Edk – 04, 08 Un know, 42 test, 42 yellow test, 42 red test) were recommended to farmers for large-scale adaptation.

Keywords: *grain yield, growth, quinoa.*

PI-37

OPTICAL BISTABILITY AND MULTISTABILITY USING QUANTUM COHERENCE AND INTERFERENCE IN A DEGENERATE V-TYPE ATOMIC SYSTEM

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Abstract. Optical bistability (OB) has been and still is a topic of a giant number recent research because it has practical and potential applications in optical switching, as well as other fields in quantum communication such as optical logic gates, optical memories, etc [1-3]. In particular, this research trend has aroused the interest of researchers since the electromagnetic induced transparency (EIT) effect was discovered [4,5]. As a result, we can obtain large changes in medium properties through absorption and dispersion properties, as well as create large nonlinear environments that only need low-intensity applied fields. It is possible to create bistability at the resonant frequency region based on the mechanism of atomic coherence between two or more closely lying atomic levels [6]. More remarkable, bistability can be converted to multistability (OM) only by adjusting the strength of SGC or the intensity of the controlling fields and the relative phases through quantum interference mechanism [7,8].

In this paper, starting EIT effect through quantum coherence and interference, we investigate the behavior of OB and OM in the degenerate V-type of ^{87}Rubidium atomic system. Furthermore, we will demonstrate OB can be obtained and can be switched to OM by the controlling of the applied fields and the relative phases. There are very valuable in studying single-channel and multi-channel all optical switching in the future.

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PI-38

THE LASER-INDUCED DAMAGE THRESHOLD OF CMOS CAMERA SENSOR

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Abstract. The laser-induced damage threshold of a camera sensor is currently a fundamental research topic. This study aims to determine the threshold at which a continuous wave laser with a wavelength of 532 nm begins to cause irreparable damage to a CMOS color camera sensor. An experimental setup was established to measure the level of damage to the sensor based on laser power, where the laser beam was focused to a small size to target individual pixels. The experimental results revealed that the threshold for damage was equivalent for red and blue pixels, while the threshold for green pixels was higher by more than 50%.

Keywords: *Laser-induced damage threshold, camera sensor, CMOS, pixels.*

PI-39

ORBITAL CLINGING CONTROL FOR FOUR - WHEELED SELF – PROPELLED VEHICLES CONSIDERING THE INFLUENCE OF MANY EXTERNAL NOISES

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Abstract. In this paper, we propose an algorithm using the DSC controller to control to cling the orbital of a four-wheeled autonomous vehicle while considering the influence of external noise. The control structure consists of speed and position loop circuits. The stability for each control loop is proven based on the Lyapunov criterion. The quality of the controller is verified by simulation on Matlab- Simulink software. The simulation results show that the same controller and parameters, in the case of no external and with external noises, are still guaranteed to cling to the preset orbital.

Keywords: *mobile robots, skid-steering vehicles, DSC controller.*

Fig. 11. Four wheel mobile robot.

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PI-40

RESEARCH, BUILD MANUFACTURING EXECUTION SYSTEM IN SMART FACTORY MODEL FOR RESEARCH AND TRAINING

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Abstract. The article presents research, building simulation systems, managing production data (Manufacturing Execution System - MES) in the smart factory model for research and training digital transformation in industrial factories towards Industry 4.0 approach. The whole includes a system of flexible production stations MPS, including many interconnected modules, the central control room is equipped with management software for the levels in I4.0: MES, PLM, SCADA system controls the whole plant in combination with a simulated virtual system. Purpose of simulating the operation of physical equipment in real time through Plant Simulation forms a digital simulation system. Smart factory close to reality. The proposed model was built and tested to achieve good results, very effective for research, development and digital transformation training for industrial production enterprises in Vietnam.

Keywords: *Smart Factory; MES; PLM; DT; MPS.*

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PI-41

GENOTYPING OF AVIAN INFECTIOUS BRONCHITIS VIRUS ISOLATED IN BAC GIANG PROVINCES FROM 2019 TO 2022

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Abstract. Infectious bronchitis (IB) is indeed a significant infectious disease that poses a substantial threat to the chicken industry due to its economic impact. The causative agent of IB is the infectious bronchitis virus (IBV), which belongs to the family *Coronaviridae*. IBV is known for its high mutation rate, which results in a diverse range of genotypes and strains circulating in the chicken population. This study focused on the S1 gene of four IBV strains collected from unvaccinated chicken flocks in Bac Giang province, Vietnam, in 2018, 2021, and 2022. Bac Giang province, located in the northern part of Vietnam, is known for its high density of free-range chickens, making it a relevant area to investigate IBV strains. The study's findings indicate that there is a considerable difference in nucleotide and amino acid sequences among the IBV strains collected from Bac Giang province, as well as when compared with the vaccine strains being used in Vietnam. The Phylogenetic analysis revealed the existence of three distinct types of IBV strains in Bac Giang province: Massachusetts, QX-like, and TC07-like. These types likely represent different lineages or clades of IBV that have evolved independently in the region. [Thanks for NVQG-2019/ĐT.03].

Keywords: *Bac Giang, Vietnam, chicken, infectious bronchitis virus, type.*

PI-42

DEVELOPING A NEW METHOD FOR RAPID SCREENING α-GLUCOSIDASE INHIBITORS AND APPLICATION TO *ASPERGILLUS* SP ISOLATED IN VIETNAM

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Abtract. Diabetes is becoming a dangerous pandemic in the world as well as in Vietnam because of the increasing number of patients, causing many consequences of the disease on health and life expectancy, and the burden of treatment costs. According to the World Diabetes Association, in 2019, there were 463 million people (aged 20-79) worldwide with diabetes, and by 2045, this number is expected to reach 700 million (IDF Diabetes Atlas, 2021). Nowadays, one of the drug groups being used to treat diabetes is the α-glucosidase inhibitor group, commonly used in clinical practice such as acarbose, voglibose, and miglitol... to control the patient's blood sugar. Most of the α-glucosidase inhibitors have been isolated from microorganisms, making microorganisms an important and potential source to screen for α-glucosidase inhibitors with therapeutic efficacy while minimizing side effects (Lee 2000; Singh and Kaur 2015; Yang et al. 2012).

This study will focus on rapidly screening secondary compounds capable of inhibiting the α-glucosidase from *Aspergillus* sp. isolated in Vietnam. Based on a new method for rapid screening by thin layer chromatography using substrate agar, addition to enzyme could help to screen very effectively, simply, quickly and accurately. As a result of developing the rapid screening method, we have given the parameters to quickly screen AGIs from microbial strains such as sample volume of 5 µl, 1.0% starch substrate to bind to create agar, 0.2 IU/ml enzyme was added to agar, incubation time 90 min, 45°C and 50 mM iodine solution was used to wash the TLC plate. Using this method, the study successfully selected 13 strains of *Aspergillus nige*r with the α-glucosidase inhibitory activity among 30 strains of *A. niger* were investigated. Evaluation of α-glucosidase inhibitory activity using p-nitrophenyl-α-D-glucopyranoside substrate showed that *A. niger* 031 could produce the secondary compounds with high α- glucosidase inhibitory activity reached 79%. Therefore, it is necessary to screen of some α- glucosidase inhibitors producing from *Aspergillus* isolated in Vietnam.

Keywords: *Aspergillus*, *diabetes α-glucosidase, p- nitrophenyl-α-D-glucopyranoside.*

PI-43

FAULT TOLERANT CONTROL FOR WHEELS MOBILE ROBOT WITH ACTUATOR FAULTS

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Abstract. This article uses a fault-tolerant control (FTC) schemes for a two-wheeled mobile robot. The focus of this model is to address the impact of faults within the actuator, a critical aspect that can significantly impact the robot's performance and operational efficiency. An observer is designed to monitor the dynamic state of the robot's system, allowing it to promptly identify and assess faults in actuators that may arise during its operation. Based on this, it can estimate the extent of the fault's influence on the overall system, providing crucial information for subsequent control decisions. Analyzing and synthesizing control laws is built based on mathematics and Lyapunov stability theory. The simulation outcomes on MATLAB-Simulink validate the efficiency of our proposed control law, contributing valuable insights to the domain of robotics and control engineering.

Keywords: *FTC, Wheel Mobile Robot* (*WMR), Faults Observer, Lyapunov stabilizer.*

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PI-44

INVESTIGATION OF AIRBORNE TRACE ELEMENT POLLUTION IN HAI PHONG CITY (VIETNAM) USING BARBULA INDICA MOSS AND NEUTRON ACTIVATION ANALYSIS

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Abstract. This paper presents the results of the frst observation of airborne trace elements using Barbula Indica moss in Hai Phong city, one of the two largest seaport cities in Vietnam. A total of 39 moss samples were collected at 39 diferent locations in January 2020 in Hai Phong. Neutron activation analysis method was used to analyze the concentration of 36 chemical elements in the collected moss samples and the obtained data were compared with the data obtained in other regions of Vietnam, China and Europe. The level of chemical elemental contamination in the air of Hai Phong was categorized and the possible sources of pollutant emissions were identifed by applying principal component analysis.

Keywords: *Air pollution, Moss biomonitoring, Neutron activation analysis, Hai Phong, Vietnam*.

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PI-45

A THEORETICAL STUDY OF THE BAND STRUCTURE, THERMOELECTRIC AND OPTICAL PROPERTIES OF BULK MOLYBDENUM CARBON MoC_2-

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Abstract. In this work, the electronic band structure, thermoelectric and optical properties of bulk molybdenum carbon Mo_2C- are studied using first-principles calculations combined with the Boltzmann transport equation within a constant relaxation-time approximation. Bulk Mo_2CF_2 and $Mo_2CO_2H_2$ are semiconductors with indirect band gap 0.2305 eV and 0.1527 eV, respectively, while Mo_2CO_2 behaves as a metal. Mo_2CF_2 possesses a positive Seebeck coefficient near the band edges, suggesting that the material is a p-type semiconductor. Comparing bulk Mo_2C- at different temperatures in the range of 300-600K, Mo_2CF_2 shows a significant improvement in the Seebeck coefficient, electrical and thermal conductivity. In the real part of the dielectric function, we obtained an inflection point around 1.5 eV, where $\varepsilon_1(\omega)$ takes on negative values in Mo_2CF_2 and $Mo_2CO_2H_2$ materials compared to positive value in Mo_2CO_2 material. Bulk Mo_2C- exhibits a relatively low imaginary part of the dielectric function. The results indicate the potential application of this material in the field of electronic and energy storage.

Keywords: *Molybdeum carbon Mo_2C-; band structure, thermoelectric, optical properties; energy storage.*

PI-46

COMPARISON OF EFFECTIVE MODE AREA AND CONFINEMENT LOSS OF CIRCULAR AND SQUARE LATTICE PHOTONIC CRYSTAL FIBERS BASED ON Ge-Sb-Se

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Abstract. In this study, we researched the circular and square lattice photonic crystal fibers (PCFs) with $Ge_{20}Sb_5Se_{75}$ substrate, considering the first ring removal to simultaneously optimize their properties. The effective mode area and confinement loss of PCFs were carefully analyzed and compared using numerical simulation. In general, circular PCF (CF) has advantages over square PCF (SF) because of small effective mode area (A_{eff}), high nonlinearity. But conversely, SF has lower confinement loss (L_c). In detail, we selected the two structures with the smallest and largest core diameters of each lattice type for comparison at the same pumping wavelength of 3000 nm. As a result, with the same geometry (Λ = 1.0, d/Λ = 0.8), the CF has an effective mode area of 5.17 μm^2 smaller than that of the SF 0.95 μm^2 while the loss of CF is $4.9.10^{-14}$ dB/m is 20 times greater than that of SF. The acquired findings with the structure (Λ = 2.0, d/Λ = 0.3) are similar to the ones mentioned above. This is good information to choose the right photonic crystal fiber for different applications.

Keywords: *Photonic crystal fibers (PCFs), square lattice (SF), circle lattice (CF), chalcogenide, $Ge_{20}Sb_5Se_{75}$, effective mode area, confinement loss.*

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PI-47

NUMERICAL SIMULATION OF LIGHTNING BREAKDOWN IN A TRIPOLE ELECTRIC FIELD STRUCTURE OF THUNDERCLOUD

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Abstract. Lightning discharge can either be categorized as cloud-to-ground (CG), or inter-cloud (IC) lightning [1]. Between the two, IC lightning is more common as majority of lightning discharge does not involve the ground. Lightning can be modeled using a probabilistic approach to simulate the stochastic behavior of electric breakdown. Experimental observations record 103 to 104 lightning flashes per thunderstorm. In this paper, we simulate discharge using a one-dimensional electric circuit model to reproduce the lightning phenomenon inside a thundercloud. The circuit is charged by current sources that represent the electrification and precipitation in thunderclouds. Charging currents are applied to reproduce the classical tripole structure of electric field. Lightning initiation and propagation paths were then simulated using a cell-based percolation model of the circuit [2,3]. Each cell contains a resistor and a capacitor representing the electrical conductivity and the spatial electrocapacity of air. Lightning path was determined from the discharge after initiation. Both CG and IC lightning discharges were observed. Majority of the discharge initiated inside the thundercloud, at the locations of the negative and positive poles of the tripole structure. The frequency of IC and CG lightning was recorded for 1000 iterations. In comparison to other simulation models of lightning [4], our model can differentiate between intracloud and cloud-to-ground events. Our results obtained an IC:CG ratio of 2.52, which closely reproduces the satellite-and surface-based recorded lightning strikes in [5].

***Keywords*:** *cloud-to-ground, inter-cloud, lightning, electric breakdown, circuit model.*

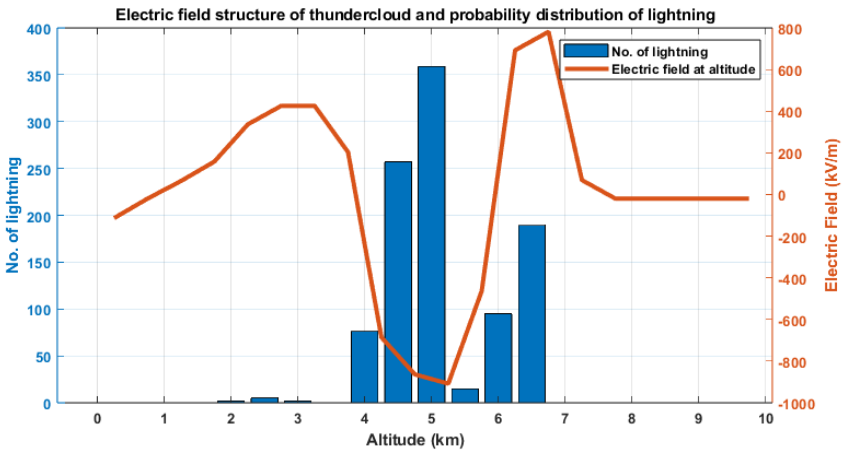

Fig. 1. Probability distribution of lightning initiation over the tripole electric field structure.

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PI-48

INFLUENCE OF VARYING AGEING TIME FOR ZINC OXIDE NANORODS BY CHEMICAL BATH DEPOSITION METHOD

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Abstract. This research aims to fabricate the zinc oxide (ZnO) nanorods were deposited on indium doped tin oxide (ITO) glass substrates by means of chemical bath deposition method (CBD). The chemical bath deposition method has lots of good things since it does not require high temperature to prepare ZnO nanorods. However, the time required for the synthesis takes several hours. Microwave heating has been used for rapid synthesis of ZnO nanorods. The glass substrates with precursor solution were placed in a bath at 100 ºC with increasing growth duration time at 4 h, 8 h, 12 h and 16 h respectively. This as-prepared nanorods were investigated their structural, morphological and optical properties for solar cells applications in the future. Characterization of zinc oxide nanorods were carried out using X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM) and Ultraviolet-Visible (UV-Vis) spectroscopy. The XRD pattern analysis showed that the crystal structure of ZnO nanorods were found to be hexagonal wurtzite structure and all diffracted peaks of observed spectrum well matched with those of standard zinc oxide. The SEM studies determined that the surface morphology and size distribution of ZnO nanorods. The diameter distributions between the ZnO nanorods for different immersed time intervals exhibited a significant difference which shows growth dense nanorods with diameters between (120 nm-200 nm). Optical properties and energy band gap of ZnO nanorods were examined through UV-Vis spectroscopy. The structural and morphology of the grown ZnO nanorods depended on the ageing time, concentration of the solvent, post-annealing temperature and final growth temperature. The prepared ZnO nanorods using chemical bath deposition method can apply the development of energy storage and photovoltaic nanomaterials production at cost effective, simple and eco-friendly.

***Keywords**: ZnO nanorods, CBD method, XRD, SEM and UV-Vis.*

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PI-49

EFFECT OF SQUEEZE FILM AIR DAMPING ON THE SENSITIVITY OF ACCELEROMETER

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Abstract. Squeeze damping is a phenomenon where a mass-spring-damper system experiences energy dissipation due to mechanical vibrations, which leads to reduced sensitivity in the accelerometer's measurements. Understanding and analyzing the effects of squeeze damping on accelerometer performance are of paramount importance to enhance its accuracy and optimize its applications. This paper presents a study on the impact of squeeze damping on the sensitivity of one-axis accelerometers. The research's contributions hold significant implications for the development of high-precision sensing systems in critical industries and pave the way for advancements in accelerometer technology.

Keywords: *Accelerometer, sensitivity, squeeze film air damping***.**

PI-50

ISOLATION AND SELECTION OF SOME MICROBIAL STRAINS PRODUCING BIOSURFACTANT FOR DRILLING MUD TREATMENT IN THE PETROLEUM INDUSTRY

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Abstract. Drilling mud is generated in conducting exploratory drilling and mine development, consisting of a mixture of soil and rock contaminated with oil, chemicals, and drilling fluid. It is very difficult and expensive to treat this waste source, so the biosurfactant produced by microorganisms is considered a highly effective biological treatment method. Biosurfactant is a bipolar compound that allows the dissolution of insoluble substances into water, creating an emulsion solution that helps microorganisms better contact the oil and easily decomposes the contaminated oil. Therefore, this study was conducted to select some microbial strains with high biosurfactant production capacity from samples of soil, water, and mud drilling in some marine areas of Vietnam. The morphological characteristics of cells and the ability to degrade oil were investigated to evaluate the influence of environmental conditions on the ability to generate biosurfactant. Biological strains were identified by API - 20NE, API - 50 CHL and API - 50 CHB test kits combined with a Bergey taxonomy key. The results showed that four micoroganism strains with strong oil-degrading biossurfactant production ability are identified and selected from Cat Ba, Hue and Vung Tau areas, namely CB150, CB 1C, CB port and NVD. In which strain of Brevebacterium celere (CB150) is considered as a potential producer at fermentation conditions pH = 7.5; temperature 30°C; concentration NaCl 1%, carbon source is DO oil and emulsifying ability reaches 72.8%.

Keywords: *Biosurfactants, CB150, Drilling mud, Microoganism, Petroleum industry.*

PI-51

FABRICATION AND ANALYSIS OF $CaTiO_3$ PHOTOANODE WITH DIFFERENT IMMERSED TIME FOR DYE-SENSITIZED SOLAR CELLS

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Abstract. Dye-sensitized solar cell (DSSC) is a low cost solar cell belonging to the group of thin film solar cells. This research aims to fabricate and study the photovoltaic properties of $CaTiO_3$ thin films as photoanode for DSSCs. Perovskite type calcium titanate ($CaTiO_3$) powder was firstly prepared by the hydrothermal method at 130 ºC for 15 h. Secondly, $CaTiO_3$ nanopowder was deposited on ITO glass substrates by spin coating method. Phase identification and structural properties of $CaTiO_3$ powder were examined by X-ray diffraction (XRD). The XRD results of hydrothermal synthesized $CaTiO_3$ specimen were perovskite type with tetragonal structure. Surface morphology and microstructural properties of $CaTiO_3$ powders were observed by Scanning Electron Microscopy (SEM). The optical properties and energy bandgap of $CaTiO_3$ thin films were examined by UV-Vis spectroscopy. This research aims to prepare and study the variation of the duration of $CaTiO_3$ thin films immersion with the dye Eosin Y in the working of DSSCs. Normal current-voltage characteristics were measured under illumination to evaluate the photovoltaic behavior of $CaTiO_3$ thin films for Dye-sensitized solar cells applications. The electrical performance of $CaTiO_3$ dye-sensitized solar cells were measured repeatedly for various immersion time of photoanode. The performance of photovoltaic properties of dye-sensitized solar cells using Eosin Y dye solution was analyzed about the aging effect on DSSC under different immersion periods.

Keywords: *$CaTiO_3$, XRD, SEM, UV-Vis and DSSCs.*

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POSTER SESSION II

PII-01

PRODUCTION OF FRESHWATER FROM SEAWATER BY PASSIVE TYPE SINGLE SLOPE SINGLE BASIN SOLAR STILL

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Abstract. This research aims to fulfill the blueprint of the United Nations (UN) Sustainable Development Goal 6: "Clean Water and Sanitation". Desalination is one of the targets of the goal: SDG 6 by the UN (Interim 2030) Elizabeth et al [1]. Freshwater scarcity is one of the most important issues concerned with the whole world. This research uses the conventional single slope single basin of passive type solar still. The present work was conducted from 2023 March 19 to March 30 for 12 days. The seawater was collected from Tanintharyi Coastal region in Myanmar at Latitude N 14° 8′28′′and Longitude E 98° 5′31′′. 1927 ml of freshwater was obtained for 3 L of seawater. Average freshwater productivity was 160.58 ml per day. Some physicochemical parameters and the constituent elements of freshwater and seawater were measured. Some of the elements in the water sample; Cd, Cr, Ni, Cu, Fe and Mn were measured by Atomic Absorption Spectrophotometer (AA 7000 Shimadzu). The obtained data were compared with Class III of the National Surface Water Quality Standards (NSWQS) of WHO. By the comparative analysis, all constituents were under the permissible limit of WHO standards. The total dissolved Solid (TDS) of Seawater was 29.9 g/l and that of freshwater was 0.116 g/l. Salinity was 32.07 ppt for seawater and 0.01 ppt for fresh water. The pH 8.56 S.U. of the obtained freshwater was normal with the water quality standards of (6-9 S.U.) while that of seawater was 9.48 S.U. Utilizing single slope single basin solar still is quite promising for the desalination process in accord with the outcome freshwater quality.

Keywords: *Solar still, Freshwater, Desalination, Physicochemical parameters and NSWQS.*

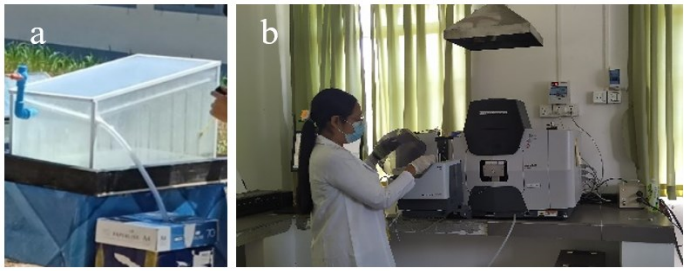

Fig. 1. Single Slope Single Basin Solar Still and Atomic Absorption Spectrophotometer.

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PII-02

FAULT DECTECTION USING ELECTRICAL RESISTIVITY TOMOGRAPHY AND SEISMIC REFRACTION TOMOGRPHY (SRT) AT LUANG PRABANG, LAOS

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Abstract. Geophysical methods such as electrical resistivity tomography (ERT) and seismic refraction tomography (SRT) provide powerful tools for subsurface imaging with reasonable accuracy, especially for investigating the structure of geology. The aim of this study is to use the integration of two geophysical techniques consisting of electrical resistivity tomography and seismic refraction tomography to detect faults in Luang Prabang Province, Lao PDR. There are two geophysical profiles that were performed at the study site, and both methods measured the same line. The ERT measurements were conducted using a *SuperSting R8*/IP resistivity meter with a dipole-dipole array and electrode spacing of 5 m. The SRT measurement was taken with a Geometrics 24-channel Geode seismograph with a geophone spacing of 5 m and 235 m of length. The results from the 2D geophysical models showed the fault bearing at 150 m from the first electrode and up to 40m of depth in Line 1. For Line 2, a fault was found at 125 m from the first electrode and up to 50m in depth. The result corresponds with geologic mapping. The geophysical methods are useful for geologic structure studies, especially faults.

Keywords: *Electical resistivity tomograph y(ERT), Seismic refraction momography (SRT) fault.*

PII-03

EFFECT OF SURFACE PLASMONIC STRUCTURES ON THE TERAHERTZ EMISSION OF A DIPOLE PHOTOCONDUCTIVE ANTENNA

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Abstract. Terahertz (THz) photoconductive antennas (PCA) with dipole structure were fabricated on semi-insulating gallium arsenide (SI-GaAs) substrate. On the transmission or THz output side of the SI-GaAs PCAs, metal line arrays (MLA) were patterned using UV photolithography, followed by electron beam deposition of gold, and lift-off process. The effect of the periodicity of the plasmonic structures on the THz emission of the PCA devices were investigated by fabricating two PCA's with different MLA periodicities (~100 μm and ~410 μm). For the device with longer (~410 μm) MLA periodicity, the integrated THz power was enhanced by x1.4, while the device with shorter (~100 μm) MLA periodicity was enhanced by x4.8, compared to the reference PCA (without MLA). Moreover, the device with longer (~410 μm) MLA periodicity showed an enhancement in the 0.1 to 0.3 THz range, whereas the device with shorter (~100 μm) MLA periodicity exhibited a broadband enhancement from 0.1 to 1 THz. This result may be explained by the surface plasmon resonance frequencies of the MLA structures. For the MLA with shorter (~100 μm) periodicity, the calculated resonance frequency is ~0.8 THz, which is higher than the resonance frequency of ~0.2 THz for the MLA with longer (~410 μm periodicity). Higher frequency resonances enhance the higher THz frequency components, resulting in a broader THz enhancement range exhibited by the device with ~100 μm MLA periodicity. The results demonstrate the feasibility of employing plasmonic effects to increase THz emission intensity and modify the output THz frequencies.

***Keywords**: terahertz emission, photoconductive antenna, plasmonics.*

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PII-04

INVESTIGATION OF THE TERAHERTZ EMISSION CHARACTERISTICS OF ZINC OXIDE AND LOW-TEMPERATURE GROWN GALLIUM ARSENIDE PHOTOCONDUCTIVE ANTENNAS VIA AN EQUIVALENT CIRCUIT MODEL

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Abstract. In this work we investigated and compared the terahertz (THz) emission characteristics of zinc oxide (ZnO) and low-temperature grown gallium arsenide (LT-GaAs) photoconductive antenna (PCA) devices via an equivalent circuit model that accounts the carrier photogeneration, transport, and screening effects. We found that the THz emission of ZnO and LT-GaAs are in the same order of magnitude. Furthermore, parametrization was performed to probe the dependence of the ZnO (LT-GaAs) PCA THz emission on the bias voltage (V_{bias}) and laser pump power (P_{pump}). The simulations reveal that at low V_{bias} and P_{pump}, the LT-GaAs THz emission is more intense than ZnO. However, at high V_{bias} and P_{pump} the THz emission of ZnO shows significantly better performance due to its high voltage breakdown and wide bandgap. Hence, for high-power and high-voltage applications, the ZnO PCA is a more suitable semiconductor substrate for PCA fabrication.

Keywords*: terahertz, zinc oxide, low-temperature grown gallium arsenide, photoconductive antenna*.

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PII-05

ELECTRICAL RESISTIVTY TOMOGRPHY (ERT) AND INDUCED POLARIZATION (IP) FOR DEFINING POTENTAL MINERALIZATION ZONE: A CASE STUDY OF KASI DISTRICT, LAOS

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Abstract. Geophysical methods, especially electrical resistivity tomography (ERT) and induce polarization (IP), are widely used in mineral exploration due to their time and cost efficiency. Ag-Pb-Zn and fluorite deposits are located at Poungluk village, Kasi district, Vientiane province, Laos. The main objective of this study is to map the subsurface at the ore deposits using electrical resistivity tomography and time-domain induce polarization methods. There are total of five parallel surveyed ERT and IP lines with a dipole-dipole array with a length of 235 m. The results of the ERT and IP models can provide the mineralized zones with low resistivity (<200 ohm-m) and high chargeability values (ca. 200–800 msec). The results from both ERT and IP indicated a high correlation between those anomalous mineralization zones. The results from both ERT and IP indicated a high correlation between those anomalous mineralization zones. The structure of the ore from excavation can confirm the mineralization zone interpreted from the geophysical models that is useful in current mineral research.

Keywords: *electrical resistivity tomography, induce polarization, mineralization.*

PII-06

COMPARISON OF OPTICAL PROPERTIES OF SQUARE LATTICE PHOTONIC CRYSTAL FIBERS WITH $Ge_{20}Sb_5Se_{75}/As_2S_3$ CHALCOGENIDE GLASSES

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Abstract. In this research, we have used the full-vectorial finite difference method for comparing the linear and nonlinear characteristics in the square lattice of solid-core PCFs using different substrates ($Ge_{20}Sb_5Se_{75}$ and As_2S_3). It has been demonstrated that most of the optimized As_2S_3-PCFs are superior in dispersion properties due to possessing near-zero flattened dispersion curves in the case of all-normal dispersion and anomalous dispersion with two zero-dispersion wavelengths (ZDW). Particularly, the $Ge_{20}Sb_5Se_{75}$-PCF with one ZDW is designed to achieve an ultra-flat dispersion in the wavelength range of 5–9 μm. It is also shown that all As_2S_3 glass PCFs provide much lower confinement loss compared to fibers based on $Ge_{20}Sb_5Se_{75}$ of the same structure. The light intensity in the cores of the latter is large and hence, the nonlinear effects become more obvious. The proposed PCFs have high potential in optical communication systems.

Keywords: *Photonic Crystal Fibers, Square-lattice; Optical Characteristics; $Ge_{20}Sb_5Se_{75}$ Glass, As_2S_3 Glass.*

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PII-07

STUDY ON 3D CARBONACEOUS STRUCTURES FOR ELECTROCHEMICAL DETECTION OF NARROW THERAPY INDEX DRUGS

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Abstract. In this study, we modified carbon nanotubes (CNTs), graphene oxide (GO) and metal nanotubes to enhance the sensitivity of the glassy carbon electrode for the drug detection electrochemical sensor with narrow therapeutic window methotrexate (MTX). The quality of the electrode after fabrication was investigated by electrochemical potential measurement on the Autolab PGSTAT 302 potentiostat. Research results show that rGO-CNTs will get better electrode quality than bare carbon glassy electrode.

Keywords: *Narrow therapeutic index drugs, Methotrexate, Graphene, Carbon nanotubes.*

PII-08

OPTO-INDUCED SURFACE OF NONLINEAR MEDIUM

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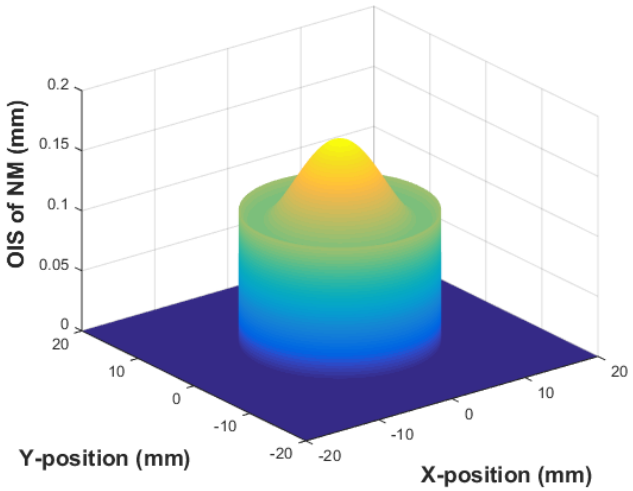
Abstract. Under irradiation with Laser Gaussian beam, the physical surface of a nonlinear medium is induced to optical surface, wiich is called opto-induced surface (OIS). In the paraxiall approximation, the nonlinear medium becomes a GRIN lens with determined focal length or curvature radius. However, in the general case, the OIS is not spherical one, it will be an aspherical surface with different called self-adaptive conic constant (SACC).

The opto-induced surface of a nonlinear medium irradiated by the laser Gaussian beam with high order approximations (aspheric coefficients).



Keywords: *Nonlinear optics, Opto-induced surface, Aspheric surface, Conic constant.*

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PII-09

STUDY ON FABRICATION OF PORPHYRIN@g-C3N4/Ag NANOCOMPOSITE FOR ENHANCE PHOTOCATALYTIC DEGRADATION OF COLARANTS IN WATER

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Abstract. The combination of two or more semiconductors has attracted the attention of scientists in the field of photocatalysis to improve the efficiency of photocatalytic reactions. Doping of conductive metals is also an effective avenue to improve photocatalytic performance by limiting electron/hole pair recombination and enhancing photon energy absorption. In this study, we have successfully fabricated porphyrin@g-C_3N_4/Ag nanocomposites by self-assembly (acid-base neutralization) from porphyrin and g-C_3N_4 monomers. The extract of Cleistocalyx operculatus leaves acts as a "green" reducing agent in the synthesis of g-C_3N_4/Ag materials. SEM, TEM, FT-IR, XRD, EDX, UV-vis techniques are used to analyze the properties of the synthesized materials. The prepared porphyrin@g-C_3N_4/Ag nanocomposite showed good integration of the porphyrin nanostructures on the surface of g-C_3N_4/Ag, in which the porphyrin nanofibers have nanoscale diameter and a few micrometers in length, and the Ag nanoparticles have an average particle size of less than 20 nm. The photocatalytic activity of the resulting nanocomposite was tested for the degradation of Rhodamine B dye, and the treatment efficiency was up to 97% after 90 min. The mechanism for the photocatalysis of porphyrin@g-C_3N_4/Ag nanocomposite for Rhodamine B dye has also been proposed.

This work is supported by Vietnam Academy of Science and Technology under grants TĐHYD0.04/22-24 and QTKR01.03/22-23.

Keywords: *porphyrin@g- C_3N_4/Ag, self-assembly, green reducing agent, photocatalysis.*

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PII-10

A NEW DESIGN FOR A FLOWER-SHAPED HOLLOW-CORE PHOTONIC CRYSTAL FIBER INFILTRATED WITH CARBON TETRACHLORIDE WITH LOW CONFINEMENT LOSS

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Abstract. In this work, the significant improvement of the nonlinear properties of the flower-shaped hollow-core photonic crystal fibers is emphasized. This is the result of a combination of the carbon tetrachloride infiltration in the hollow-core and the difference in the radii of the air holes in the cladding. Low confinement losses are obtained with a minimum value of 14.704 dB/m for the structure Λ = 2.0 μm, d_1/Λ = 0.55. These new fibers could be an efficient laser source for supercontinuum generations.

Keywords: *Flower-shaped hollow-core, Photonic crystal fibers, Low confinement loss, supercontinuum generation.*

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PII-11

NUMERICAL STUDY OF SPECTRAL SHAPING IN Ce:LiCAF MULTIPASS AMPLIFICATION BY CHROMATIC FRANTZ-NODVIK MODEL

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Abstract. Cerium-doped lithium calcium aluminum fluoride (Ce:LiCAF) crystal has been recognized as an efficient amplification medium in the ultraviolet wavelength region. However, spectral characteristics in the multipass amplification process have not yet been studied theoretically. This work investigates spectral effects including gain narrowing and spectral shifting in a 8-pass Ce:LiCAF amplification by using the chromatic Frantz-Nodvik model. From the simulation results, 60 mW output power can be obtained using a 8-pass amplifier with seed pulses having 1 mW, 3 ns pulse duration and 288.5 nm peak wavelength. Seed pulses with peak wavelength of 292 nm and linewidth of 10 nm could be shifted to 289 nm peak wavelength and narrowed to 3,4 nm linewidth after 8-pass amplification. Accounting for the spectral effects will enable a more accurate prediction of the amplified pulses' characteristics, thereby aiding the applications of high-power UV lasers.

Keywords: *Ce:LiCAF crystals, multipass amplifier, gain narrowing, spectral shifting.*

PII-12

HEALTH RISK ASSESSMENT OF INHALATION EXPOSURE TO GAS AT SOC SON MUNICIPAL SOLID WASTE INCINERATION PLANT AND SURROUNDING RESIDENTS

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Abstract. The ambient air quality and the health of residents might be affected by emissions from municipal solid waste (MSW) incinerators generating electricity. The ninety-six ambient air samples were taken in the rainy and dry seasons, respectively in July 2022 and January 2023 at different distances from the chimney of Soc Son MSW incineration plant. The results of monitoring showed that the total matter particles (TSP) and the concentration of some pollutants such as CO, NO_2, and SO_2 tend to be decreased from the sampling sites at a distance of 200m to the sites at a distance of 2500m. However, the concentrations of TSP, NO_2, and SO_2 in ambient gas at some sites with 200m distance exceeded the allowable limit values specified in national technical regulation on ambient air quality (QCVN 05:2013/BTNMT). The concentrations of CO ranged from 1025 $\mu g/m^3$ to 11,049 $\mu g/m^3$ in the rainy season and from 954 $\mu g/m^3$ to 13019 $\mu g/m^3$ in dry season that were very low compared to limited values in QCVN 05:2013/BTNMT. The hazard quotient (HQ) values were calculated to assess the impact of these pollutants on the health of male and female workers and residents. The results indicate the HQ values of TSP, CO, NO_2, and SO_2 were higher than 1 at some sites inside the plant recommending the potential risks for factory workers and residents.

***Keywords*: *incinerator, ambient gas, health risk assessment, inhalation exposure*.**

PII-13

SYNERGISTIC EFFECT OF $CuFe_2O_4$ AND NON-THERMAL PLASMA FOR EFFICIENT DEGRADATION OF RHODAMINE B

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Abstract. Wastewater management is becoming a serious issue worldwide. Removing toxic pollutants, such as dyes, is necessary to enhance the reuse of wastewater. Herein, we report an effective way to remove Rhodamine B (RhB) using Fenton-like reaction with magnetic nanomaterials of $CuFe_2O_4$ as catalyst combination with cold plasma treatment. $CuFe_2O_4$ was synthesized by a facile one-pot coprecipitation method with microwave assisted and analyzed by basic characterization techniques such as XRD, SEM, EDX and VSM before application. The degradation experimental results showed that with the aid of plasma and $CuFe_2O_4$, RhB could be completely removed within 10 minutes. Compared with only plasma treatment, the rate constant of RhB degradation was enhanced significantly. Effects of experimental conditions on the catalytic activity were studied. A catalytic mechanism was proposed based on the experimental results, which the synergetic action between Fe^{3+}/Fe^{2+}, Cu^{2+}/Cu redox pairs and plasma-generated RONS such as H_2O_2, OH● radicals induced the excellent catalytic properties. The interaction of plasma with water molecules generates H_2O_2 and OH● radicals, which are utilized to transform RhB into RhB*, while concurrently reacting with $CuFe_2O_4$ to form a Fenton-like catalytic system. Meanwhile, the catalyst exhibited high stability and good reusability characteristics, which showed great potential for the actual application in wastewater treatment.

Keywords: *Cold plasma, $CuFe_2O_4$, Rhodamine B, synergistic effect.*

PII-14

DESIGN AND FABRICATION OF MULTIPLE BANDPASS OPTICAL FILTERS FOR LASER WARNING SYSTEM

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Abstract. The laser range finders and laser designators are key components of high-precision, laser-guided weapon systems. As a countermeasure, laser-warning systems (LWS) have been developed and used by the armies of developed countries [1]. On the one hand, LWS must possess high sensitivity and fast response time to be able to detect nanosecond laser pulses from a long range. On the other hand, LWS must be capable of functioning reliably under the strong influence of ambient light. AC filtering or DC servo circuitries can help reduce the DC bias due to the ambient light, however, cannot protect the detector from saturation, especially when the LW detector is exposed directly to the sun. In this paper, we present our work on the design and fabrication of multiple bandpass optical filters to overcome this mentioned issue. This type of filter can let laser emissions at the wavelengths of 905, 1064, and 1550 nm commonly used on the battlefield [2] pass through while efficiently blocking optical background noise on other wavelengths. The filter design can also be easily adapted for other spectroscopic applications.

Keywords: *Laser warning system, Thin-film deposition, Multiple bandpass optical filters.*

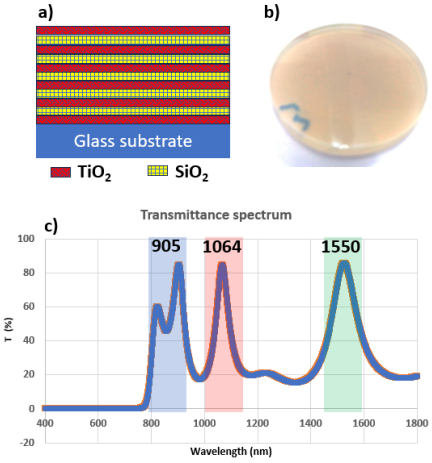

Fig. 3. a) Layout and b) Fabricated by e-beam evaporation triple bandpass optical filter, c) Transmittance spectrum of the fabricated filter.

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PII-15

EVALUATION OF CALIBRATION RESULTS FOR GAMMA AND X-RAY DOSE RATE MEASUREMENT DEVICES

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Abstract. The use of portable radiation survey meters (PSM) has become increasingly widespread for accquiring and monitoring of radiation levels in areas where ionizing radiation is utilized. Ensuring the accuracy of these radiation dose rate measurements is crucial. The Secondary Standards Dosimetry Laboratory at the Nuclear Center in Ho Chi Minh City provides calibration services for gamma and X-ray dose rate measurement devices using calibrated sources of gamma radiation (Cs-137) and X-rays (N-40, N-60, N80, N-100, N-120). In this report, we present a statistical analysis of approximately 250 measurement devices from more than 20 different models. We evaluated the calibration factors, measurement uncertainties, and energy responses of these radiation measurement devices. Therefore, we maked assessments regarding the quality and suitability of these devices for accurate radiation measurement. Some of the devices in this study include the Survey Meter PM1405, Nuclear Radiation Monitor Inspector AlertTM, Inspector Alert IMI,...

Keywords: *portable radiation survey meters, Secondary Standard Dosimetry Laboratory, calibration factor, energy response.*

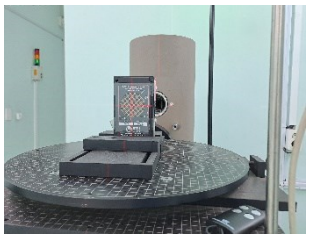

Fig. 12. Arrangement of equipment for gamma calibration.

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PII-16

MONTE CARLO SIMULATION ON THE PHASE TRANSITION OF NEMATIC PHASE

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Abstract. The nematic phase is the simplest liquid crystal phase in which the molecules maintain a preferred orientational direction as they undergo diffusion. In this study, we show the results obtained by Monte Carlo simulations for the nematic – isotropic phase transition using a mobile 6-state Potts model. We considered a system, in addition to the microscopic interactions producing nematic ordering [1], Hamiltonian contains Morse potential and chemical potential. The physical quantities such as the energy, the heat capacity, the order parameter, and the susceptibility as functions of temperature have been discussed. This system exhibits two melting points corresponding peaks in the curvature of the heat capacity. These results are in very good agreement with experimental observations.

Keywords: *Liquid Crystals, Nematic, Monte Carlo, Phase transition.*

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PII-17

GEOLOGICAL SURVEY IN SOME CONSTRUCTION WORKS USING GEOELECTRICAL EXPLORATION METHOD

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Abstract. Geological survey is the first step that most construction works take to study and evaluate the geology of the construction site. In geotechnical engineering, the geoelectrical and elastic parameters of the soil and rock medium below the ground play an important role in surveying the foundation of construction works. The geoelectrical exploration method is used to determine the distribution of resistivity of the medium below the ground by measuring the apparent resistivity values above the ground. In this study, 2D electrical imaging method was used. The processing and interpretation of collected data were performed through inverse problem solving, using least squares method. From the survey results, we evaluate and provide an overview of the geological environment of the research area, determine the structure of the soil foundation, the relationship between soil, rock, underground water and geological hazards, support planning or foundation treatment, and forecast challenges that may arise during construction for proper handling.

Keywords: *Geology, resistivity, 2D electrical imaging method, solving the problem of inverse, least squares method.*

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PII-18

HIGH CONTRAST AND SENSITIVE NEAR-INFRARED REFRACTIVE INDEX SENSORS BASED ON TRUNCATED PYRAMID PLASMONIC

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Abstract. This work presents a numerical study of truncated pyramid plasmonic metasurface-based refractive index sensors that have high contrast and sensitivity in the near-infrared region. The truncated-pyramid plasmonic structure consists of silver (Ag) subwavelength disk arrays on a disk thin silica (SiO_2) and 100-nm-thick-Ag film on a silicon (Si) substrate. This structure with various structural parameters is designed and numerically investigated using the finite-difference time-domain (FDTD) method. Results show that the optical properties of designed structures are strongly dependent on the SiO_2 disk diameter and thickness. Because of operating in the near-infrared range, the proposed truncated pyramid plasmonic metasurface has low Ohmic loss, and then the refractive index biosensor based on that shows the figure-ofmerit (FOM) to have the contrast and selectivity higher than that of other established biosensors. The sensitivities of 1190 nm/RIU and 1347 nm/RIU according to FOMs of 36.5 and 72.3, which correspond to the vapor and liquid sensors, respectively, have been achieved. Our systematic investigation provides useful guidelines for designing sensing devices.

Keywords: *Metal-dielectric-metal plasmonic array, surface plasmon resonances, refractive index sensor.*

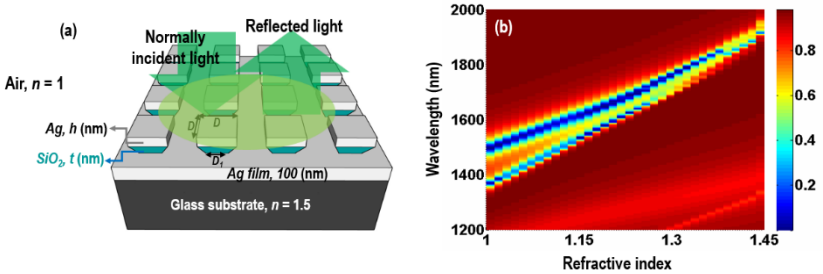

Fig. 13. a) The designed plasmonic metasurface with truncated pyramid; b) Simulated reflection dependence for two refractive index windows (from in air to 1.1) and (from 1.3 to 1.45).

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PII-19

FABRICATION OF MICROLASERS USING A STANDARD PRINTER

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Abstract. In recent years, soft material microlasers have attracted a significant research interest due to their simple fabrication, cost-effectiveness, and potential applications in flexible photonic devices. Among various methods explored, ink-jet printing has proven to be an efficient technique for producing microlasers with uniform size. However, achieving precise control over the size and position of these microlasers on a substrate remains a challenge, often requiring expensive microplotter systems which is not readily available in domestic facilities. To address this issue, our work investigates the use of a cost-effective standard printer for creating microlasers. By utilizing dye-doped glycerin-water (1:1 volume ratio) as the ink, we successfully fabricated uniform dome-shaped structures, referred to as hemispheres, on a dielectric mirror with hydrophobic surface, with sizes ranging from 40-65 μm. Under optical pulse pumping at 532 nm, these hemispheres exhibit lasing emission with clear lasing modes. The lasing threshold is approximately 6 μJ/mm^2, and the quality factor reaches 2700. Based on the analysis of the lasing spectrum, the lasing mechanism is studied and identified as the whispering gallery mode. Due to its cost-effectiveness, our fabrication method proves highly suitable for exploring various kinds of soft matter microlasers, and the resulting microlasers hold potential for sensing applications.

Keywords: *Microlasers, Whispering gallery mode, Ink-jet printing, Standard printer.*

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PII-20

SYNTHESIS AND PROPERTY OF GRAPHENE-BASED CONDUCTIVE NANO-INKS FOR 3D PRINTING

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Abstract. With high electrical and thermal conductivity, chemical stability, environmental friendliness and low temperature treatment, grapheme-based nano-inks have attracted a lot of attention due to its potential applications in printed electronic, energy storage device, biomedicine or sensor [1]. In this work, we report our study on the fabrication of graphene-based conductive nano-inks by electrochemical extraction method. The FESEM, AFM data and electrical measurements indicate that obtained graphene consists of few layers and has a relatively high conductivity of 10^5 S.m. The graphene nano-inks exhibites a good adhesion on different substrates, including glass, wood, rubber and plastic. Our mechanical test also shows that the electrical conductivity and the adhesion of printed circuits on a plastics are almost unchanged after more than 120 bends. Fig. 1 is a conductive circuit using graphene nano-ink connects the power source to light a LED.

Keywords: *graphene, conductive nano-ink.*

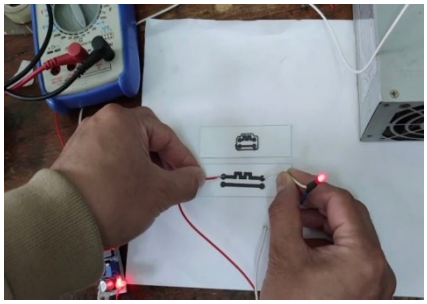

Fig. 1. A conductive circuit using graphene nano-ink connects the power source to light a LED.

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PII-21

STUDY ON THE COMPOSITION OF METAL OXIDES IN FLY ASH OF WASTE-TO-ENERGY PLANTS FOR REUSE PURPOSES

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Abstract. Fly ash from household waste incinerators is a product of the process of treating exhaust gas by activated carbon, lime milk… with components including many substances and compounds such as: heavy metals, Dioxin/furan, PCBs… Especially, unlike organic toxins that are easily decomposed, heavy metals in fly ash are in the form of oxides that easily accumulate in the environment because they can link short carbon chains that are difficult to excrete and cause poisoning. The paper aims to study the composition of metal oxides in fly ash samples of Soc Son Waste-to-Energy plant (WTE) and Can Tho WTE plant by modern physical methods such as SEM/EDX, XRF… Preliminary measurement results detected some metal oxides in fly ash incinerators such as: SiO2, Al2O3, Fe2O3, MgO, TiO2… When compared with TCVN 10302:2014, fly ash incinerators have alkaline properties and have a total content of SiO2 + Al2O3 + Fe2O3 of 28.05% not meeting the standard of replacing construction materials and need to have a treatment plan before reuse purposes

Keywords: *Waste-to-Energy plant; Fly ash; Construction; Metal oxides.*

PII-22

ESTIMATING 3D TOPOGRAPHY OF THE DEEP SOURCES BY PARKER – OLDENBURG AND BIDIMENSIONAL EMPIRICAL MODE DECOMPOSITION METHOD: A CASE STUDY OF THE SOUTHERN VIETNAM

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Abstract. This study attempts to estimate 3D topography of density interface from gridded Bouguer gravity data of Southern Vietnam. For potential field data inversion, many methods have been proposed, such as the method of Cordell and Henderson (1968); Parker (1973), Bhaskara Rao et al. (1990); Oldenburg based on Parker's algorithm to give a method to determine the surface topography form gravity data called Parker - Oldenburg algorithm in 1974. The Parker-Oldenburg algorithm is a 3D gravity inversion method that uses multiple layers to estimate the variations in density contrast interfaces within the lithosphere, including Moho depths and crustal structure thicknesses (Tiberi et al., 2005; Luan, 2015; Zhao et al., 2020; Rao et al., 2022). This method has been applied in various fields to estimate the topographic variations of interfaces that contribute to the observed gravity anomaly (Salimi and Motlagh, 2012; Pallero et al., 2015; Hung, 2015; Hong et al., 2016; Feng et al., 2016; Hong et al., 2017; Sabah & Al-rahim, 2018; Luan, P. T. and Oksum, 2019; Zhao et al., 2020; Kebede et al., 2021; Du et al., 2022; Nguyen, 2022). By utilizing an apriori initial model input, the Parker-Oldenburg algorithm allows for the iterative calculation of the three-dimensional geometry of interfaces, thereby reducing the non-uniqueness of inversion.One of the new approaches is to identify interfaces of the Earth's crust corresponding to the high, medium and low frequency of the gravity/magnetic. According to Prutkin (2017), the field correspond to depth sources, about 20 km deep (low frequency) and to determine the Earth’s gravity surface, the processing of separating the sources by applying the upward and downward continuation the Bouguer anomaly. In this paper, the Bidimensional Empirical Mode Decomposition method (Nunes, 2003) was applied to decompose the gravity data of Southern Vietnam into the bidimensional intrinsic mode functions. An intrinsic mode function, represents a signal’s component from high to low frequencies - corresponding depth from shallow to deep, and was determined the source’s depth of each intrinsic mode function by the Radially Averaged Power Spectrum method. After that, chosing the intrinsic mode function correspond to depth sources for identifying the 3D topography of the deep contact surface in the Southern Vietnam by Parker - Oldenburg algorithm.

Keywords*: density contrast interface, gravity data inversion, 3D topography, deep source.*

PII-23

CREATING METALLIC COATING LAYERS FROM THERMAL EXFOLIATED GRAPHITE MATERIALS

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Abstract Graphene oxide (GO) is synthesized from graphene through an oxidation reaction. GO is known to contain numerous oxygen-containing functional groups on its surface, allowing it to easily form free radicals, enabling it to bond with metal surfaces [1]. Using reduction reactions via thermal or chemical methods can convert GO back to a structure similar to graphene (reduced graphene oxide - rGO). GO facilitates the easier creation of surface coatings on metal surfaces compared to the use of graphene. In this paper, we present a method for synthesizing GO from exfoliated graphite using the improved Hummer method, and a metal surface coating technique using GO combined with heat treatment at various temperatures. The GO coating, after being reduced to rGO, exhibits chemical inertness, thermal stability, and hydrophobicity similar to graphene, making it suitable for metal protective coatings. The surface properties of the coatings are also investigated through water contact angle measurements.

Keywords: *graphene oxide, reduced graphene oxide, graphene coating layers*.

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PII-24

DETERMINING THE SIZE OF DROPLETS USING LASER INTERFEROMETRIC IMAGING TECHNIQUE

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Abstract. Summary The Interferometric Laser Imaging for Droplets Sizing (ILIDS) technique for determining the size of droplets in a moving particle cluster has been developed since the 1980s. This technology has undergone significant improvements in image acquisition and processing in recent years. ILIDS is a relatively intuitive and accurate method for measuring droplet sizes. However, until now, this technology has not been researched for applications within the country. In response to the new demands in measurement, we have successfully constructed a droplet sizing system using the laser interferometric imaging technique. We employed a high-power Nd:YAG pulsed laser with a wavelength of 532 nm and a pulse duration of 10 ns. This paper will present the system design and some of the measurement results we have achieved.

Keywords: *ILIDS, Droplet sizes, Laser interferometry.*

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PII-25

EFFECTS OF HYPERPARAMETERS AND MACHINE LEARNING APPROACHES IN FORECASTING ABSORPTION BEHAVIOR OF GHZ DISK-SHAPE METAMATERIALS

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Abstract. The last decade has witnessed an increasing interest in metamaterial absorbers (MMAs) because of their huge potential in a wide range of applications including energy harvesting, photodetectors, sensors, light modulators, infrared camouflage and wireless communication. Recently, machine learning (ML) has become one of the modern and powerful tools that can examine the design data in order to forecast the absorption behavior with much less effort and cost-effectiveness than conventional experimental and computation approaches. In this work, we utilize two ML algorithms, Polynomial Regression (PR) and Random Forest Regression (RFR), to predict the absorption strength and frequency of a symmetric disk-shape metamaterial structure operating within 10 and 16 GHz. The proposed models are trained on hundreds of simulation-generated samples. We show that fine-tuning some hyperparameters results in higher forecasting performance. The dependence of predicted results on input parameters demonstrates that PR has better performance in predicting absorption strength, while both algorithms share similar accuracy in predicting the absorption frequency.

Keywords: *Metamaterials, absorbers, machine learning, absorption forecasting, polynomial regression, random forest regression*.

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PII-26

A FLEXIBLE ELECTROMAGNETIC NANOGENERATOR FOR VIBRATION ENERGY HARVESTING

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Abstract. In recent years, sustainable and environmentally friendly energy sources have attracted significant attention to replacing traditional power sources. Different types of supply powers are used depending on the category, size, and capacity of devices. Microsensors and microelectronics devices commonly use small power supplies in the range from nano to microwatt. Among the diversity of micro-nano power solutions based on piezoelectric, thermoelectric and electromagnetic effects, the electromagnetic generator is one of the most effective ones because of its advantages including operation, durability, and controllable output feature. In this paper, we fabricated a flexible electromagnetic nanogenerator (F-EMNG) which combines elastic Polyester film, magnets, and copper coils. The proposed nanogenerator proves its efficiency in converting low-frequency oscillation energy from the surrounding environment into an electric micropower source. The maximum power is approximately 1910 μW at a 3 Hz excitation frequency. This nanogenerator has potential applications in different fields.

Keywords: *Electromagnetic microgenerator, Nanogenerator, Energy harvesting.*

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PII-27

CHARACTERISTIC FACTORS AFFECTING SUPERCONTINUUM GENERATION PROCESS IN As_2S_3 LARGE-CORE PCFs WITH FOR SQUARE, CIRCULAR, AND HEXAGONAL LATTICES

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Abstract. The possibility to combine the optical properties of photonic crystal fiber (PCF) offers an excellent foundation for application in nonlinear optics. Here, we report large core PCFs with As_2S_3 glass nanolayers as subjects to study the chromatic dispersion, loss, and effective mode characteristics for each specific lattice. The results from the graphs reveal that the long-wavelength optical field has better penetration in square lattice PCFs. Two square and circular fiber structures with 0.3 and 0.35 filling factors, respectively, are considered very suitable for high-coherence and broadband supercontinuum generation due to their small dispersion at 5 μm. In addition, square lattice PCF also proves its advantage in minimizing the loss during light propagation in the core region. Whereas, the effective mode area of the hexagonal PCF is smaller than that of other lattices expected to produce the greatest nonlinearity.

Keywords: *Chalcogenide glass, Photonic crystal fiber, Supercontinuum Generation, Large core.*

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PII-28

STUDYING CHARACTERISTICS OF THE SINGLE BAR USED IN TOF DETECTOR OF THE T2K ND280 UPGRADED

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Abstract. The purpose of the ToF detector in the T2K ND280 upgrade be used to veto the particles from the outside of detector. The ToF detector is constructed by 6 modules covering an active neutrino target (sFGD) and two HA TPCs upstream of the ND280 detector, each module is assembled from 20 plastic scintillator bars (0.12×2.2 m^2). Two SiPM arrays are attached to both ends of this single scintillator bar and absorb the scintillation light emitted by the scintillator. The SAMPIC electronic system is used to adapt to measuring the Time of Flight of particles with ps precision. This paper shows the results of detected cosmic rays at thirteen different positions along the bar. The average waveform and rising time of SiPM left and right are studied as a function of distance detected in a bar. The distributions of the reconstructed position are also studied to perform track reconstruction for six modules of the ToF detector.

Keywords: *Time-of-Flight, SiPM, ToF, SAMPIC, T2K***.**

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PII-29

IDENTIFY IMPLICIT OBJECTS BASED ON AMPLITUDE AND DISPLACEMENT PROPERTIES F-K IN GPR METHOD

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Abstract. The Ground Penetrating Radar (GPR) method is very effective in shallow geophysical research. However, due to the complex nature of many types of terrain studied and the modernity of surveying techniques, it will greatly affect the quality of measured GPR slice images. Therefore, the work of interpreting underground objects must be very meticulous, careful and use analytical methods and algorithms accordingly [1]. In this study, I propose the method of using frequency-wave number shift (F-K) method [2] to accurately determine the wave velocity in the geological environment, combined with using the amplitude property to that accurately determines the information about the foreign body. The study was conducted in an area in Ho Chi Minh City.

Keywords: *GPR F-K, amplitude attribute, GPR method.*

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PII-30

OPTIMIZING THE TRANSMISSION EFFICIENCY OF THE MAGNETIC RESONANCE WIRELESS POWER TRANSFER SYSTEM BY VARIABLE COUPLING METHODS

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Abstract. In magnetic resonance wireless power transfer technology (MR-WPT), electrical power is transferred from a power source to one or more receiver devices without wires by using magnetic resonance coupling. In practical applications, the transmission efficiency is sensitive to distance variations between coils, which results in attenuation for transmission line. In this article, we present analysed calculations and investigations for optimal distance of an MR-WPT system in commercial software CST Studio Suite. Thus, we find out optimal positions for transmitter and receiver coils. An MR-WPT system worked at frequency of 6.7 MHz has created and measured to demonstrate the extracted results of calculations and simulations.

Keywords: *Magnetic resonance, Wireless power transfer, Coupling method.*

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PII-31

STORAGE AND RETRIEVAL OF ULTRASLOW WEAK-LIGHT SOLITONS IN A DEGENERATE V-TYPE ATOMIC MEDIUM

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Abstract. In recent years, tremendous efforts have been paid to the investigation on optical pulse memory, which is important for the realization of fast optical information processing. One of the main techniques to realize optical pulse memory is the utilization of electromagnetically induced transparency (EIT) [1], an interesting quantum interference effect typically occurring in three-level atomic systems. The light behavior in EIT systems possesses many striking features, including substantial suppression of optical absorption, group velocity slowdown, Kerr nonlinearity enhancement, efficient memory of optical pulses, and so on [2, 3]. Based on these features, many applications of nonlinear optical processes at a weak light level [4, 5], optical bistability and all-optical switching [6, 7].

One of the most prominent applications of EIT is light storage, which has critical applications in quantum informatics [8]. However, up to now, most previous works on optical storage based on EIT have been carried out in linear regime. The linear probe pulses suffer spreading and attenuation due to the existence of dispersion, which may result in a serious distortion for retrieved pulses [9, 10]. For practical applications of light memory, it is necessary to realize robust storage and retrieval of light pulses.

In this work, we study the propagation of an intense probe pulse in a degenerate V-type atomic system with the EIT. We demonstrate that the ultraslow optical soliton formed by a balance between dispersion and nonlinearity can be stored and retrieved in the system by switching off and on a coupling light and/or the magnetic fields. Because the probe pulse before and after the storage is shape-preserved and hence very robust, the result obtained may have promising applications in quantum information processing and optical quantum memory.

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PII-32

BIO PLASTIC MADE FROM FISH SCALES

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Abstract. Bioplastic made of fish scales, tacca leontopetaloides starch, gelatin and glycerol is self-degradable, non-toxic and environmentally friendly. In Vietnam, there has not been any research project on forming bioplastic from fish scales. This is a whole new direction in the field of Materials science.

Keywords: *Bio plastic, Fish scales.*

PII-33

A SOLUTION FOR THERMAL COMPENSATION OF APD USING IN RECEIVER OF LASER RANGEFINDER

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Abstract. In this article, we presents a circuit design for thermal compensation of Avalache Photodiode (APD), which used in single nano-second pulsed laser applications, like as, laser range finders. When the ambient temperature changes, the breakdown voltage of APD will change. This situation may cause a result in poorer signal to noise ratio and sometime permanent damage to the APD. In order to overcome these problems, a design of bias system, which would be self-adjusting according to any changes in temperature. The later technique was adopted and design of a bias suply is presented in this article.

Keywords: *Thermal compensation of APD, laser range finder receiver sensitivity, nano-second pulsed laser, breakdown voltage of APD, signal to noise ratio.*

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PII-34

EFFECT OF DRYING MODES ON ANTHOCYANIN CONTENT IN THE PRODUCTION PROCESS OF PURPLE SWEET POTATO POWDER

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Abstract. Anthocyanin compounds have been shown to bring many benefits to human health [1,2] and have been reported in very large numbers by scientists[3-7]. Anthocyanins are polyphenolic pigments that belong to the flavonoid group and are responsible for many of the red-orange to blue-violet colors present in plant organs such as fruits, flowers, and leaves [1]. Worth mentioning is the purple sweet potato, also known as solanum andigenum, which is a high crop yield in Vietnam. However, the economic value of this agricultural product is low, especially after the Covid 19 epidemic, the export market was cut off, causing the price of purple sweet potatoe to drop sharply [8]. Diversifying agricultural products from purple sweet potato raw materials is essential to increase the value of purple sweet potatoes. When we study the production process of purple sweet potato powder, obtaining purple sweet potatoes powder with high anthocyanin content has an important role in the quality of flour products.

In this study, we investigated the effect of drying regimes on acquisition of anthocyanin in the purple sweet potato powder production process, including convection drying method and sublimation method. With convection drying at a temperature of 70 ^{o}C in 100 minutes, we obtained anthocyanin, starch and protein content are 65 mg/100g, 68% and 2.73%, respectively. This is the optimal result with an anthocyanin retention capacity of 27.74%. In particular, by the sublimation drying method, almost keeping the color of the product, the anthocyanin content increased 2.57 times compared with the convection drying method. It will benefit for food processing, especially when the global increase in demand for high-quality and nutrient-dense foods.

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PII-35

CONFINEMENT LOSS CHARACTERISTICS OF SQUARE LATTICE PCFS WITH As_2S_3 SUBSTRATES FOR DIFFERENT NUMBERS OF AIR-HOLE RINGS

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Abstract. In this paper, we use As_2S_3 substrates to design three new solid-core photonic crystal fiber (PCF) structures with five, six, and seven rings, respectively, arranged in a square lattice. We study and analyze the confinement loss characteristics of three structures with the change of lattice constant (Λ), filling factor (d/Λ), and the number of air-hole rings to optimize them at the central wavelength $\lambda = 4.5$ μm. The obtained PCFs have almost the same loss characteristics, however, their values have large differences between the structures. In which a small loss is the advantage of these structures. The minimum loss obtained in the As_2S_3 substrate square-lattice PCF structure for the seven-ring case is most efficient for supercontinuum generation (SCG).

Keywords: *Square lattice, Photonic Crystal Fibers, Confinement Loss.*

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PII-36

STUDY ON THE THERMAL DECOMPOSITION PROCESS OF 2,4,6-TRINITRORESORCINOL USING NON-ISOTHERMAL METHODS

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Abstract. Abstract. The thermal decomposition characteristics and kinetic parameters of 2,4,6-trinitroresorcinol (TNR) were analyzed under non-isothermal conditions using TG/DTA techniques. This study delves into the thermal degradation of TNR and the determination of kinetic parameters (i.e., the activation energy E_a and the frequency factor A) using Kissinger and Ozawa methods. The results of TNR thermal analysis by TGA/DTA demonstrated that there are one melting point and two thermal decomposition points in the temperature range from 50 to 450 ºC. The activation energy values of two thermal decomposition peaks calculated by Kissinger and Ozawa methods were 152.03/96.14 KJ.mol^{-1} and 152.14/98.28 KJ.mol^{-1}, respectively. The decomposition process of TNR has also been verified by temperature-programmed FTIR spectroscopy.

Keywords: *2,4,6-trinitroresorcinol, styphnic acid, thermal stability, decomposition kinetics.*

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PII-37

A STUDY ON THE COMBUSTION CHARACTERISTICS OF KNO_3-BASED MATERIALS CONTAINING PHENOL FORMALDEHYDE RESIN AND SORBITOL

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Abstract. The main objective of this study was to examine the combustion properties of KNO_3-based samples. These samples contained 78,5% KNO_3, 14.5% phenol formaldehyde resin and sorbitol, which were plasticized with 6% dibutyl phthalate. Additionally, other additives were included in the mixture. The calculation results revealed that as the ratio of phenol-formaldehyde resin in the total binder increased, there was a gradual decrease in both the calculated combustion temperature and the oxidizer excess ratio α. Notably, when only sorbitol was used in the sample, the maximum calculated combustion temperature (1653 K) and the highest α value (0.99) were achieved. On the other hand, when phenol formaldehyde resin alone served as the binder, the KNO_3-based sample exhibited a combustion temperature of only 1496 K, and α reached 0.69. As the α value increased, there was a decrease in the production of incomplete combustion products such as CO and H_2, while the generation of complete combustion products like CO_2 and H_2O gradually increased. Experimental results indicated that with increasing content of the phenol-formaldehyde resin in the adhesive mixture, the burning rate also increased gradually, reaching a maximum value of 2.5 mm/s when the phenol-formaldehyde resin was used exclusively. Although the experimental combustion temperature (average value) aligned closely with the calculated combustion temperature, some fluctuations were observed on the combustion temperature graph. However, the gas production volume of the samples did not exhibit significant differences.

Keywords: *KNO_3, phenol formaldehyde resin, sorbitol, combustion temperature, burning rate.*

PII-38

A REFLECTIVE STRUCTURAL EQUATION MODEL FOR ESTIMATING LEAF FUNCTIONAL TRAITS

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Abstract. Leaf functional traits, such as leaf size and mass, are key determinants of plant ecological strategies and ecosystem functioning. Leaf size is typically inferred from the length, width, and area of the leaf, while leaf mass is typically inferred from the leaf fresh mass and dry mass. This study developed a reflective structural equation model (SEM) to simultaneously estimate two constructs (leaf mass and leaf size) from leaf measured indicators (leaf fresh mass, dry mass, length, width, and area). The results showed that leaf mass highly explains the variation in leaf size, and all studied indicators have high loadings on the respective constructs. However, there is some redundancy among the indicators. This study suggests a simple approach to study the variation of leaf functional traits according to specific living conditions.

Keywords: *Casean, Natural Science, Young Scientists, Master Students, Leaf Funtional Traits, SEM.*

PII-39

DISPERSION CHARACTERITIES OF THE DUAL-CORE-PHOTONIC CRYSTAL FIBER BASED ON FUSED SILICA GLASS

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Abstract. In this work, we studied numerically the dispersion properties of the dual-core-symmetry photonic crystal fiber (PCF). The fiber made of fused silica glass with five rings of air holes. The dispersion properties of the guided modes are studied by full vectorial finite element method with a perfectly matched layer (PML) boundary condition. The results show that the dispersion profile of the fiber can be controlled by controlling the lattice pitch and diameter of the inner core in the cladding. In particular, in the cladding region, the air hole diameter is reduced to achieve a high negative dispersion values. Meanwhile, the dispersion properties are shifted forward higher dispersion value and less flat with increasing lattice pitch (Λ).

Keywords: *Dual-core photonic crystal fiber, Chromatic dispersion and Loss.*

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PII-40

DEVELOPMENT OF AUTONOMOUS HARVESTING ROBOTS IN THE AGRICULTURE GREENHOUSE ENVIRONMENT BASED ON ROBOT OPERATING SYSTEM

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Abstract. This paper presents a method of developing an autonomous robot in greenhouse, using Robot Operating System-ROS and harvesting based on YOLOV4 to identify fruit ripeness. The hardware is a self-propelled two-wheeled ARM robot with the Jetson-Tx2 high performance embedded computer platform for central processing, a 3D camera, a Lidar sensor for data collection from the operating environment, and a robotic arm with 6 degrees of freedom for harvesting. The simulation results in Matlab and the robot simulation in a greenhouse using Gazebo, Rviz reveal the potential of implementing ROS in controlling autonomous havesting robots in high-tech agricultural applications.

Keywords: *autonomous robot, ROS, YOLOV4, harvesting.*

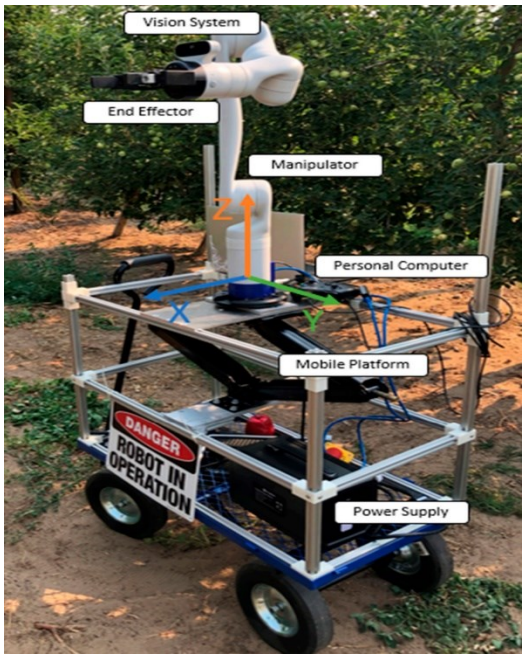

Fig. 14. Robotic harvesting system.

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PII-41

TEMPERATURE TRANSFORMATION IN FIRE ZONES OF PROPELLANT ON NITRATE CELLULOSE AND NITROGLYXERIN WITH P/H=1

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Abstract. The burning of ballistic propellant is a complex physicochemical process consisting of several stages that turn the original gunpowder into exothermic gaseous products. When propellant ignites, chemical reactions occur in the high temperature range in areas that differ in the physical state and space of the fire. The main spatial areas of the fire arise: a heated zone, a k-phase reaction zone; mixed vapor-gas zone, dark areas and reaction zone by gas. The rate of fuel combustion is determined mainly by the heat generated in the region of the k-phase reaction zone. In this article, using a thermocouple, you can determine the temperature in some areas of the combustion space (especially the temperature in the solid phase K) in accordance with the pressure of the launcher containing: Nitrate cellulose (NC)- 49,0%; nitroglyxerin (NG): - 49,0%; centralite-2: 1,0% and vaseline: 1,0%. Thus, with increasing pressure from 1,2 MPa to 4,4 MPa, the surface temperature of the solid phase increases by 103 K, the temperature of the mixed region increases simultaneously by 262 K, the maximum temperature by 908 K and at high pressure the surface temperature of the solid phase does not increase much.

Keywords: *Ballistic, thermo pair, phase K, propellant A.*

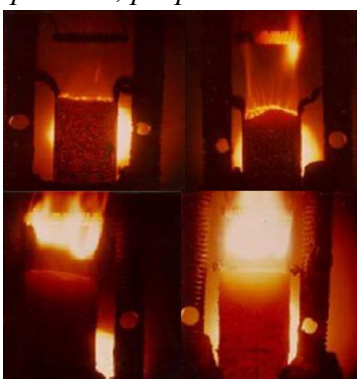

Fig. 1. Images of fuel ignition at different pressures.

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PII-42

DETERMINATION OF LIQUID PROPERTIES BASED ON DYNAMICAL SURFACE REFLECTION

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Abstract. An optical method is presented to characterize the properties of a liquid based on light reflection from the surface of a liquid tornado. A physical model of the liquid tornado is constructed using two primary parameters: the rotating speed and the radius of the tornado. By shining a laser beam onto the dynamic liquid surface, the reflected beam provides valuable information for calculating the liquid's properties. Since the container and the liquid tornado rotate at different speeds, accurately determining the rotational speed of the liquid tornado is crucial for obtaining precise measurements. In this study, a digital image processing method is employed to accurately determine the rotating speed of the liquid tornado. This method introduces a new approach to investigating the properties of liquids.

Keywords: *Optical method, Liquid tornado, Properties, Digital image processing.*

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PII-43

NiO - BASED SENSOR TOWARDS LACTATE DETECTION

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Abstract. Lactic acid (or lactate) is one of the significant metabolites of the anaerobic phase of glycolysis, and it is also known to be involved in the regulation of cellular physiological and pathological processes [1,2]. Evaluating the lactate concentration plays an important role since lactate is strictly linked to many disorders, such as respiratory failure, metabolic disorders, or heat failure [2]. Due to the previous analytical methods for lactate detection are expensive and time consuming, herein, we develop a non-invasive wearable electrochemical sensor based on Nickel oxide (NiO) towards lactate sensing and monitoring. In this research, a printed electrochemical sensor based on carbon and NiO was fabricated towards detection of lactate. This lactate sensing platform is made of three electrodes printed on Kapton substrate by a dispenser printer (Kelenn DMD): the counter electrode (CE) and working electrode (WE) were printed from a carbon ink, and the reference electrode (RE) was printed from a Ag ink. Then, AuNPs were electrochemically deposited with the aim to enhance the electron transfer rate at the electrode surface. After that, NiO suspension was dropcast on the WE surface and dried under ambient condition for 1h. The surface morphology and composition of this sensor were studied by scanning electron microscopy (SEM), X-ray diffraction (XRD), and X-ray photoelectron spectroscopy (XPS). The fabricated sensor demonstrated a low limit of detection (0.529 mM), which is suitable for on-site detection and monitoring of lactate and this sensing platform is potential for fabrication of a wearable lactate sensing device.

Keywords: *Lactate sensor, printed electrode, electrochemical sensor, wearable, non-invasive, on-site sensor.*

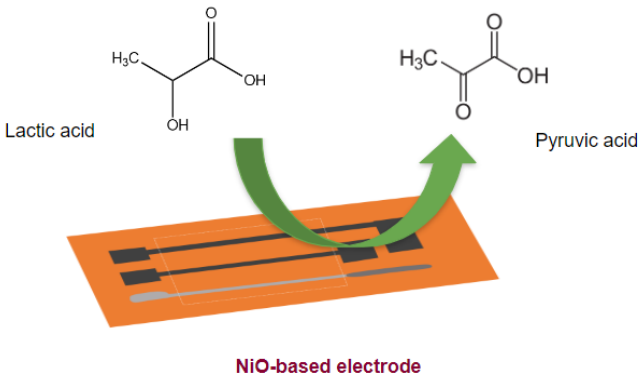

Fig. 15. Schematic illustration of lactate sensor.

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PII-44

APPLICATION OF ULTRAVIOLET Ce:LiCAF LASER FOR ENVIRONMENTAL MONITORING

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Abstracts. Ce:LiCAF crystal has previously been demonstrated as successful laser medium in the ultraviolet wavelength region. In this paper, we present results on application of Ce:LiCAF laser for environmental monitoring. A differential optical absorption spectroscopy (DOAS) system using broadband ultraviolet Ce:LiCAF laser for SO_2 density determination has been developed in the laboratory. The results show that the DOAS system accurately determines the gas concentration with a measurement error of 6%. Moreover, the angular scattering intensity of some common single-particle aerosols such as black carbon, brown carbon, and polluted water has been studied using Mie scattering theory. This result can serve as the basis for using the UV Ce:LiCAF laser for environmental application, particularly in identifying atmospheric particles and gases.

Keywords: *Ce:LiCAF laser, aerosol, DOAS, Mie scattering*.

PII-45

DESIGN AND IMPLEMENTATION OF A LOW-COST CNC LASER ENGRAVING MACHINE FOR UNIVERSITY LABORATORIES

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Abstract. This paper proposes a low-cost design for a two-axis CNC laser engraving machine that provides similar functionality to high-cost industrial systems. The proposed design is suitable for university laboratories due to its accessibility, small size, ease of use, low manufacturing cost, and transportability. The machine is based on an Arduino platform and uses a high-watt burning laser module to engrave 2D and grayscale images on paper, plastic, and wood. The dimensional, dependency, and coordinate tests were conducted to verify the validity of the machine. Finally, pilot experimentation was carried out on cardboard composites and wood.

Keywords: *Laser Module, Arduino, Stepper Motor, G-code, GRBL.*

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PII-46

DESIGN AND IMPLEMENTATION OF REAL-TIME SELF-DRIVING CAR USING CONVOLUTIONAL NEURAL NETWORK AND IoT

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Abstract. Self-driving cars have become an increasingly popular topic of interest in recent years as advances in technology have brought the possibility of fully autonomous vehicles closer to reality. Convolutional Neural Networks (CNNs) have been widely used in various perception and control tasks for self-driving cars and have demonstrated state-of-the-art performance in many areas. Additionally, the use of Internet of Things (IoT) technology in self-driving cars can offer many benefits, including real-time connectivity and remote monitoring and control. This paper proposes a real-time self-driving car prototype using CNN and IoT. The car is designed based on Raspberry Pi 4 and performs three tasks: lane detection with a CNN model, object detection with a YOLO model, and data transmission directly to the server. The web server is built to control and monitor the vehicle over the internet. In the training process, the lane detection achieved the lowest error rate of 7%, and the object detection achieved mean average precision of 99.1% and an average loss of 0.0973. The experimental results demonstrate that the proposed car was able to achieve a reasonable degree of accuracy in lane detection and object detection, with a very low data transmission delay to the server. We can use the web server to control the car's movement forward, backward, left, and right, and obtain information about the object, such as the distance between the car and the object.

Keywords: *Self-driving cars, Convolutional Neural Network, Internet of Things.*

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PII-47

CONTROLLING CROSS-KERR NONLINEARITY OF A DEGENERATE FOUR-LEVEL Y-TYPE ATOMIC SYSTEM BY AN EXTERNAL MAGNETIC FIELD

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Abstract. As we have known that the Kerr nonlinear effects play a crucial role in the nonlinear and quantum optics [1]. The self-Kerr phase modulation (SPM) refers to the phenomenon in which a light beam propagating in a medium interacts with the medium and produces an optical phase modulation on itself. Whereas, the cross-phase modulation (XPM) is the change in the optical phase of a light beam caused by another light beam in a Kerr nonlinear medium. The cross-Kerr effect has some useful applications in optical communications [2], optical Kerr shutters [1], quantum phase gates [3], quantum entanglement of single photons [4], quantum non-demolition measurements [5], and so on.

In recent years, the discovery of electromagnetically induced transparency (EIT) [6] has yielded a simple solution to obtain large Kerr nonlinear coefficients with small absorption in the vicinity of atomic resonance. Using the EIT method, Schmidt *et al,* [7] firstly demonstrated a giant cross-Kerr nonlinear coefficient in an N-type four-level system. Late, several other configurations have also been proposed to get giant cross-Kerr nonlinear coefficient via EIT effect such as five-level M-type [8], four-level inverted-Y type [9], four-level tripod-type [10, 11], and four-level tripod-type systems [12]. More recently, giant cross-Kerr nonlinearity at multiple frequencies in a six-level inverted-Y atomic system has proposed [13].

In this work, we study the enhancement and the control of cross-Kerr nonlinear coefficient in a degenerate four-level Y-type atomic system by the external magnetic field. The influence of laser fields and the external magnetic field on the cross-Kerr nonlinear coefficient for the probe field is also investigated.

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PII-48

ELECTROMAGNETICALLY INDUCED GRATING IN A FOUR-LEVEL INVERTED-Y ATOMIC SYSTEM

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Abstract. Diffraction grating is commonly used as dispersive elements in many optical systems for applications including spectrometers, switching, tuning and trimming elements in dense wavelength-division multiplexing, visual display technology, external cavity lasers, etc., [1]. The diffraction efficiency of grating is an important parameter since it will strongly influence the final energy delivered by the optical diffraction system.

The coherent interaction between the laser fields with the atom can lead to quantum interference of transition probabilities within the atomic system. The consequence of this quantum interference is to suppress (destructive interference) or enhance (constructive interference) the total transition probability and thus radically change the absorption or transmission property of the atomic medium for a light field. The constructive interference of transition probabilities generates electromagnetically induced transparency (EIT) [2]. Under the EIT condition, the medium forms peculiar optical properties and thus it offers unusual applications such as [3] giant nonlinearity, low threshold optical bistability, and so on.

On the other hand, based on the EIT effect, an atom sample can behave like a diffraction grating which is called an electromagnetically induced grating (EIG) [4]. EIG was first proposed in 1998 [4] and experimentally verified in 1999 [5]. Since then, theoretical and experimental studies of EIG have attracted great attentions [6,7] due to their potential applications in many fields, such as angular Talbot effect [8] and giant Goos–Hänchen shifts [9]. Recently, EIG has been interested in four-level systems with the support of other external fields such as microwave field [10] and magnetic field [11], Kerr nonlinearity [12].

In this work, we study the formation of the diffraction pattern of EIG in a four-level inverted-Y atomic system. The influence of laser parameters on diffraction efficiency is also considered.

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PII-49

EXPERIMENTAL OBSERVATION OF EIA EFFECT IN ^{87}Rb FOUR-LEVEL V-TYPE ATOM

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Abstract. Quantum interference and coherence effects inside an atomic system can lead to well-known effects such as electromagnetically induced transparency (EIT) [1] and electromagnetically induced absorption (EIA) [2]. If EIT is a consequence of destructive interference, then the enhanced interference leads to an opposite effect that is EIA. The EIT and EIA have attracted a great deal of attention because they yield a lot of important applications. Apart from the basic science, the number of powerful applications is increasing rapidly, such as determination of molecular transition dipole moments [3], light speed reduction [4], quantum storage [5], lasing without inversion [6], reflective index control [7], nanoscale resolution microscopy [8], enhancement of nonlinear effects [9], and quantum computation and communication [10] and so on.

The EIA is an important quantum interference effect which renders an otherwise producing a large resonance absorption enhancement over a narrow spectral region within an absorption line. The EIA was demonstrated for the first time by Lezama et al… in an atomic system [11]. In this paper, we present the observation results of the formation of EIA effect on the transition D2 [$5^2S_{1/2}(F = 1) \rightarrow 5^2P_{3/2}(F' = 0, 1, 2)$] of the ^{87}Rb atom and present the theoretical model explaining the formation of EIA peaks which is consistent with the experimental observations.

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PII-50

OPTICAL BISTABILITY IN A DEGENARATE FOUR-LEVEL ATOMIC SYSTEM WITH AN EXTERNAL MAGNETIC FIELD

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Abstract. As we known that optical bistability (OB) is essential element in photonic devices such as optical transistors, optical memories, optical logic gates, optical switches, and so on [1]. Response speed and the sensitivity of the optical devices depend on the threshold intensity and width of the OB. Therefore, one is always looking for solutions to change the threshold intensity and the width of the OB, so that the operating characteristics of optical devices can be controlled. In recent years, the discovery of electromagnetically induced transparency (EIT) [2] has provided a simple solution to control both the threshold intensity and width of the OB by external fields [3]. Initially, theoretical and experimental studies on the OB focused on three-level atomic systems including three-level Λ-, V- and ladder-type configurations [4-8]. It is found that, the threshold intensity and width of the OB system are controlled by the intensity and frequency of laser fields. Recently, many studies on optical bistability have been carried out in four- and five-level atomic systems [9-11]. In this paper, we study the formation of a two-channel OB effect in a four-level atomic system under the presence of an external magnetic field. The OB effect is controlled according to the laser parameters and the external magnetic field.

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