PROGRAM

Wednesday, October 23, 2019

13:30-19:00 **Arrival and check in**

Registration at Thai Nguyen University

Gala dinner

Thursday, October 24, 2019

7:30 - 8:30 **Registration**

8:00 - 8:30 **Music Performance**

8:30 - 9:00 **Official Opening**

Welcoming Speech:

Thai Nguyen University

CASEAN President

CASEAN Committee

International Centre of Physics (ICP)

9:00-9:15 **CONFERENCE PHOTOGRAPH**

PLENARY SESSION

Chairperson: Prof. Dinh Van Trung (Vietnam)
Prof. Jakrapong Kaewkhao (Thailand)

A-01-I

9:15 - 9:45 **ENHANCED THZ EMISSION OF SILICON NANOWIRE-COATED GALLIUM ARSENIDE PHOTOCONDUCTIVE ANTENNA** *(Plenary)*

Elmer Estacio

University of the Philippines Diliman

A-02-I

09:45 - 10:15 **MODIFIED STRUCTURE AND IMPEDANCE ATTRIBUTES OF HOLMIUM IONS INCLUDED BORO-PHOSPHATE MEDIA: SYNERGISM OF AMORPHOUS AND CRYSTALLINE PHASES** *(Plenary)*

S. K. Ghoshal

Universiti Teknologi Malaysia

10:15- 10:30 **COFFEE BREAK**

A-03-I

10:30 - 11:00 **TOWARDS THE DEVELOPMENT OF FLUORINE-BASED CRYSTAL AND GLASS SCINTILLATORS** *(Plenary)*

Marilou Cadatal-Raduban

Institute of Natural and Mathematical Sciences, Massey University

A-04-I

11:00 - 11:30 **INFLUENCE OF SURFACE PLASMON EFFECT FROM GOLD NANOPARTICLES ON FLUORESCENCE EMISSION OF Cy3 DYE** *(Plenary)*

Chu Viet Ha

Thai Nguyen University

A-05-I

11:30 - 12:00 **SYNTHESIS AND CHARACTERIZATION OF COPPER DOPPED TITANIUMDIOXIDE THIN FILM** *(Plenary)*

Hla Toe

Department of Physics, University of Yangon, Yangon,Myanmar

12:00-13:30 **LUNCH**

REPORT SESSION B1

Chairperson: Prof. Juniastel Rajagukguk (Indonesia)

Prof. Nguyen Van Dang (Vietnam)

B-01-I

13:30 - 13:55 **COMPARATIVE STUDY OF INTERMETALLIC COMPOUND FORMED AT THE INTERFACE BETWEEN LEAD-FREE SOLDER AND DIFFERENT PAD METAL FINISHES** *(Invited talk)*

Anusara Srisrual

King Mongkut's University of Technology North Bangkok

B-02

13:55 - 14:10 **EFFECT OF AGING ON INTERMETALLIC COMPOUND FORMATION AT Sn42-Bi58 LOW TEMPERATURE SOLDER/COPPER INTERFACE**

Phakkhaphum Lethaisong

King Mongkut's University of Technology North Bangkok

B-03

14:10 - 14:25 **FABRICATION AND LASING CHARACTERISTICS OF KUDZU STARCH BASED MICROSPHERE BIOLASERS**

Nguyen Van Toan

VNU University of Science

B-04

14:25 - 14:40 **STUDY OF UV VIS AND NIR EMISSION OF MWCNT AND ER3+ DOPED INTO BORATE GLASS FOR PHOTONICS DEVICE APPLICATION**

Eka Sylvianti Rahayu

Institut Teknologi Bandung (ITB)

B-05

14:40 - 14:55 **STRUCTURAL AND SUPERIONIC CONDUCTIVITY OF OLIVINE PHOSPHATE CATHODE MATERIAL DOPED NICKEL WITH DIFFERENT CONCENTRATIONS**

Myo Nay Htet

Kyaukse University

B-06

14:55 - 15:10 **TERAHERTZ EMISSION IN EPITAXIALLY LIFTED I-GaAs/n-GaAs THIN FILMS ON SILICON SUBSTRATES IN THE TRANSMISSION EXCITATION GEOMETRY**

Anthony Francis Montecillo

Materials Science and Engineering Program, University of the Philippines

15:10 - 15:25 **COFFEE BREAK**

REPORT SESSION B2

Chairperson: Prof. Elizabeth Ann Prieto (Philippines)

Dr. Pham Hong Minh (Vietnam)

B-07-I

15:25 - 15:50 **SPECTROCOPIC AND LUMINESCENCE PROPERTIES OF SM3+ DOPED PBNAG GALSSES FOR ORANGE LED APPLICATION** *(Invited talk)*

Juniastel Rajagukguk

Depertment of Physics, Faculty of Mathematics and Natural Sciences, Universitas Negeri Medan

B-07-II

15:50 - 16:15 **GRAZING INCIDENCE X-RAY DIFFRACTION MEASUREMENTS OF HYDROGEN-ION AND DEUTERIUM-ION PLASMA-IRRADIATED BULK ZINC OXIDE SINGLE CRYSTALS** *(Invited talk)*

Melvin John F. Empizo

Institute of Laser Engineering, Osaka University

B-08

16:15 - 16:40 **SIMULTANEOUS MEASUREMENT OF DISPERSION AND ABSORPTION IN A DOUBLE-PRISM CONFIGURATION AND ITS POTENTIAL FOR SCREENING RADIATION-HARD GLASS MATERIALS** *(Invited talk)*

Jacque Lynn Gabayno

Institute of Laser Engineering, Osaka University

B-09

16:40 - 16:55 **PHOTOLUMINESCENCE MAPS AND RADIATIVE LIFETIMES IN NITROGEN-DOPED GRAPHENE QUANTUM DOTS**

Pham Nam Thang

Institute of Materials Science, VAST

B-10

16:55 - 17:10 **MEASUREMENT OF THE ABSOLUTE INTENSITY OF THE ELECTRONIC TRANSITION d3Πg – a3Πu OF C2 SWAN SYSTEM BY CAVITY RING-DOWN SPECTROSCOPY**

Phung Viet Tiep

Institute of Physics, VAST

B-11

17:10 - 17:25 **EFFECT OF THE GROWTH TEMPERATURE ON THE TERAHERTZ EMISSION OF GaAs ON SILICON**

Mae Agatha C. Tumanguil-Quitoras

University of the Philippines

B-12

17:25 - 17:40 **EMPLOYING TiO_2 IN DEGRADING METHYLENE BLUE PHOTOCATALYTICALLY USING SIMPLE SPRAYING METHOD**

Fisca Dian Utami

Bandung Institute of Technology

B-13

17:40 - 17:55 **ELECTROCHEMICAL PLASMA ON IRON ELECTRODES IN WATER ENVIROMENTAL AND INFLUENCING FACTORS**

Van Cong Tran

Military Sciences and Technologies Institute

Friday, October 25, 2019

REPORT SESSION C

Chairperson: Prof. Elmer Estacio (Philippines)
Prof. Nguyen Luong Lam (Vietnam)

C-01-I
08:00 - 08:25 **A COMPACT SPECTROSCOPIC SETUP FOR TEACHING ATOMIC PHYSICS IN UNIVERSITIES** *(Invited talk)*

Nguyen Huy Bang

Vinh University

C-02
08:25 - 08:40 **ARROW-SHAPED EPSILON NEAR ZERO (ENZ) METAMATERIAL FOR ANTENNA GAIN ENHANCING**

Ika Puspita

Dept. Engineering Physics, Institut Teknologi Sepuluh Nopember

C-03
08:40 - 08:55 **COPPER NANOPARTICLES EFFECTS ON ELECTRICAL CONDUCTED NANOFLUID FLOW AT STAGNATION POINT REGION WITH FLUCTUATING GRAVITATIONAL FIELD**

Mohamad Hidayad Ahmad Kamal

Universiti Teknologi Malaysia

C-04
08:55 - 09:10 **MEMBRANE EFFECTS ON EFFECTIVE PROPERTIES AND SOUND ABSORPTION OF FOAM-BASED MATERIALS**

Van-Hai TRINH

Le Quy Don Technical University

C-05
09:10 - 09:25 **COMPRESSIVE AND TENSILE STRESS STUDY OF THE MEMS USED ON A 1060nm HCG TUNABLE VCSEL**

Philippe Martin Tingzon

National Institute of Physics, University of the Philippines Diliman

C-06
09:25 - 09:40 **DETECTION AND IDENTIFICATION OF EXPLOSIVES BY PORTABLE RAMAN SPECTROMETER**

Tien Van Nguyen

Graduate University of Science and Technology

C-07

09:40 - 09:55 **FLUORESCENT ENERGY TRANSFER BETWEEN ORANGE BEAD NANOPARTICLES AND Cy5 DYE AFFECTED BY SURFACE PLASMONS OF SILVER NANOFILM**

Meephonevanh Vaxayneng

Thainguyen University of Education

10:00 – 10:15 **COFFEE BREAK**

REPORT SESSION D1

Chairperson: Prof. Sib Krishna Ghoshal (India)
Dr. Nguyen Minh Hue (Vietnam)

D-01-I

10:15 - 10:40 **3D FORWARD MODELING OF INDUCED POLARIZATION USING THE FINITE ELEMENT METHOD** *(Invited talk)*

Indri Liani Sartika

Bandung Institute of Technology

D-02

10:40 - 10:55 **HOLOGRAPHIC CONDUCTIVITY AND SPATIALLY ANISOTROPIC EFFECT**

Sunly Khimphun

Royal University of Phnom Penh

D-03

10:55 - 11:00 **SATURATION EFFECT OF HYDROGEN RECOMBINATION MASERS OF THE HII REGION AROUND MWC349A**

Tran-Ngoc Hung

Institute of Physics, VAST

D-04

11:10 - 11:25 **THEORETICAL STUDY OF SINGLE-PARTICLE SPECTRA FOR SOME NUCLEI**

Ly Nhat Minh

VNU – HCM University of Science

D-05

11:25 - 11:40 **STUDY CACULATION AND SIMULATION OF PRESSURE DROP THROUGH A SINGLE FIXED BED OF NITROGEN GAS GENERATOR USING PRESSURE SWING ADSORPTION**

Pham Van Chinh

Institute of Technology - General Department of Defense Industry

D-06

11:40 - 11:55 **MICROSTRUCTURE-BASED MODEL FOR PREDICTING ACOUSTIC BEHAVIOR OF GRANULAR LAYERS BASED ON MONO-SIZED SPHERE PACKING**

Dinh-Vu DANG

Le Quy Don Technical University

12:00-13:30 **LUNCH**

REPORT SESSION D2

Chairperson: ***Prof. Marilou Cadatal-Raduban (New Zealand)***
Prof. Nguyen Huy Bang (Vietnam)

D-07-I

13:30 - 13:55 **OPEN ACCESS ASTRONOMICAL DATA: AN OPPORTUNITY FOR ASTRONOMERS FROM DEVELOPING COUNTRY** *(Invited talk)*

Pham Ngoc Diep

Vietnam National Space Center

D-08

13:55 - 14:10 **MACHINE LEARNING FOR SEISMIC SIGNAL PROCESSING BASED ON PERFORMANCE OF EVALUATION BROADBAND NETWORK STATION IN SUMATERA REGION, INDONESIA**

Marzuki Sinambela

Department of Physics, FMIPA, Universitas Sumatera Utara, Medan

D-09

14:10 - 14:25 **THE UPHILL DIFFUSION OF GLYCEROL IN WATER**

Vu Ba Dung

University of Mining and Geology

D-10

14:25 - 14:40 **ACCURACY COMPUTATION OF SEISMIC REFRACTION FOR COMPARING MODELS CRM AND GRM**

Lasmita Sari

Physics of Earth and Complex System, Institute of Technology Bandung, Bandung, Indonesia

D-11

14:40 - 14:55 **ALMA OBSERVATIONS OF A GRAVITATIONALLY LENSED GALAXY RXJ1131-1231 AT REDSHIFT Z=0.7**

Tran Thi Thai

Vietnam National Space Center

D-12

14:55 - 15:10 **GIANT CROSS-KERR NONLINEARITY OF A FOUR-LEVEL N-TYPE ATOMIC GASEOUS MEDIUM UNDER DOPPLER BROADENING**

Le Van Doai

Vinh University

15:10 - 15:25 **COFFEE BREAK**

REPORT SESSION E

Chairperson: Prof. Anusara Srisrual (Thailand)

Dr. Pham Ngoc Diep (Vietnam)

E-02

15:25 - 15:40 **BRAIN TUMOR DETECTION USING CLUSTERING ALGORITHMS AND MORPHOLOGICAL OPERATION**

Nguyen Luong Thien Nhut

University of Science – VNU HCM

E-03

15:40 - 15:55 **THE CIKAPUNDUNG-CITARUM RIVER CLEANSING USING AUTOMATIC TRASH SKIMMER**

K. Arnisti

Institut Teknologi Bandung, Indonesia

E-04

15:55 - 16:10 **IDENTIFICATION OF PHAGE ENDOLYSIN AGAINST VIBRIO PARAHAEMOLYTICUS FROM METAGENOME DNA SEQUENCING DATA OF WATER AT SHRIMP PONDS IN MEKONG DELTA REGION**

Le Hoang Duc

Institute of Biotechnology, VAST

E-05

16:10 - 16:25 **BREAST CANCER DETECTION USING BI-DIMENSIONAL EMPIRICAL MODE DECOMPOSITION AND THRESHOLDING**

Nguyen Hong Giang

Department of Applied Physics, University of Science, VNU HCM

CLOSING SESSION

E-01-I

16:25 - 16:50 **RESEARCH OPPORTUNITIES IN GIST WITH HIGH EXCELLENCE** *(Invited talk)*

Jongseok Lee

Gwangju Institute of Science and Technology (GIST)

E-02-I

16:50 - 17:15 **INTERNSHIP AND PHD RESEARCH AT SOKENDAI AND INTER-UNIVERSITY RESEARCH INSTITUTES IN JAPAN** *(Invited talk)*

Satoshi Mayama

SOKENDAI (The Graduate University for Advanced Studies)

E-03-I

17:15 - 17:45 **RESEARCH OPPORTUNITIES IN DUBNA** *(Invited talk)*

Le Hong Khiem

Institute of Physics, VAST

E-04-I

17:45 - 18:15 **INTRODUCTION TO INTERNATIONAL CENTRE OF PHYSICS UNDER THE AUSPICES OF UNESCO** *(Invited talk)*

Dinh Van Trung

Institute of Physics, VAST

POSTER SESSION
13:00 - 15:00, Friday, October 25

Chairperson: ***Dr. Melvin John Empizo (Japan)***
Dr. Jacque Lynn Gabayno (Japan)
Dr. Nguyen Xuan Ca (Vietnam)

P01 **SCIENTIFIC METHODS FOR ESTIMATING THE STRUCTURE OF PHLEGMATINESS LAYER IN PYROXYLIN PROPELLANT**

Pham Quang Hieu, Pham Van Toai, Chu Chien Huu

Institure of propellants and explosives

P02 **SURVEY OF EFFECTS OF COMPOSITION AND TEMPERATURE ON DYNAMIC VISCOSITY IN COMPOSITE EXPLOSVES**

Nguyen Van Khuong, Ngo Van Giao, Nguyen Tran Hung

Military Sciences and Technologies Institute

P03 **EFFECTS OF ALUMINUM POWDERS ON BLAST WAVE PARAMETERS FOR COMPOSITE EXPLOSIVE DETONATION IN FREE AIR**

Nguyen Van Khuong, Ngo Van Giao, Nguyen Tran Hung

Military Sciences and Technologies Institute

P04 **AN INVESTIGATION OF EXPERIMENTAL CONDITIONS ON VULCANIZATION OF A COMPOSITE BASED LIQUID NATURAL RUBBER AT LOW TEMPERATURE**

Doan Minh Khai, Nguyen Minh Tuan, Phan Duc Nhan, and Nguyen Tuan Anh

Le Quy Don Technical University

P05 **LOW-LEVEL LASER THERAPY FOR SHOULDER TENDINOPATHY**

Huynh Minh Tri, Ngo Thi Thien Hoa, Tran Minh Thai, Can Ngoc Minh, Trinh Tran Hong Duyen, Tran Thi Ngoc Dung

Ho Chi Minh City University of Technology, Vietnam University

P06 **BIOCHAR PRODUCED FROM BIOMASS FUEL AND ITS CHARACTERIZATION FOR DIRECT CARBON FUEL CELL (DCFC) APPLICATION**

Yin Maung Maung, Thinzar Lwin, Than Than Win and Khin Khin Win

Department of Physics, University of Yangon, Yangon,Myanmar

P07 **A SHORT-PULSE AND TUNABLE UV CE3+:LICAALF6 LASER FOR DIAL APPLICATIONS**

Keito Shinohara, Pham Hong Minh, Pham Van Duong, Nguyen Van Diep, Nguyen Xuan Tu, Toshihiko Shimizu, and Nobuhiko Sarukura

Institute of Laser Engineering, Osaka University

P08 **DEVELOPMENT AND INVESTIGATION OF THE COPPER ION GENERATOR FOR WATER RESOURCE TREATMENT**

Trinh Khac Kien, Tran Thi Chung Thuy, Vu Duong, Nghiem Thi Ha Lien, Do Quang Hoa

Thuy Loi University

P09 **PHYSICAL AND MECHANICAL PROPERTIES OF GLASS-CERAMICS DERIVE FROM WASTE GLASS AND FLY ASH**

Kitthisack Keomixay, Sengthong Bounyavong, Lemthong Lathdavong, Bounphanh Tonpheng

National University of Laos

P10 **STUDY ON STERILIZING PLANT MATERIALS AND EFFECTS OF CYTOKININ ON SHOOT FORMATION OF ORTHOSIPHON ARISTATUS PLANTLETS**

Thongkham LAPHASY, Pham Thi Thanh Nhan

Thai Nguyen University of Education

P11 **ISOLATION OF SOME PATHOGENETIC MICROORGANISM STRAINS IN PLANTS AND TESTING TE RESISTANCE ACTIVITY OF SOME BIOLOGICAL PRODUCTS**

Pham Quang Son, Cao Thi Phương Thao, Le Huu Thieng, Pham Thi Thanh Nhan

Thainguyen University of Education

P12 **A STUDY OF ANATOMICAL CHARACTERISTICS AND SEQUENCE OF ITS GENE REGION FROM ADINANDRA LIENII**

Nguyen Huu Quan, Le Phuong Dung, Tu Quang Tan, Sy Danh Thuong, Chu Hoang Mau

Faculty of Biology, Thai Nguyen University of Education

P13 **RESEARCHING ON THE COMPATIBILITY OF POLYOXYMETHYLENE AND ENERGY MATERIAL**

Duong Ngoc Co, Pham Van Toai, Nguyen Manh Tuong, Le Duy Binh

Military Sciences and Technologies Institute

P14 **ABOUT MICROSTRUCTURE AND CRYSTALLIZATION PATHWAY IN IRON NANOPARTICLE UNDER TEMPERATURE**

Giap Thi Thuy Trang, Pham Khac Hung and Pham Huu Kien

Hanoi University of Science and Technology

P15 **STUDY OF THE CRYSTALLIZATION OF AMORPHOUS SILICA UNDER COMPRESSION**

P.H.Kien, P.M.An, D.T.Thanh, L.T.H.Gam and N.Q.Hai

Thainguyen University of Education

P16 **INVESTIGATION OF SENSITIVE AMMONIA SENSOR BASED ON HYBIRD PHOSPHORENE/Au**

Tran Quang Nguyen, Huynh Tran My Hoa, Le Dang Manh, Tran Quang Trung

University of Science

P17 **CHEMOPHOTOTHERMAL THERAPY OF MESOPOROUS SILICA ENCAPSULATED GOLD NANORODS LOADED DOXORUBICIN**

Nghiem Thi Ha Lien, Bui Thi Van Khanh, Nguyen Thi Thuy, Nguyen Trong Nghia, Hoang Thi My Nhung

Institute of Physics, VAST

P18 **ALL-DIELECTRIC METAMATERIAL FOR ELECTROM-AGNETICALLY INDUCED TRANSPARENCY IN OPTICAL REGION**

Pham The Linh, Bui Xuan Khuyen, Vu Dinh Lam, Bui Son Tung

Graduate University of Science and Technology

P19 **SEVERAL RESULTS OF RESEARCHING, EXPERIMENT ON THERMOBARIC COMPOSITIONS IN VIETNAM**

Tran Quang Phat, Ngo Van Giao, Ninh Duc Ha, Do Dinh Lao

Military Sciences and Technologies Institute

P20 **THE MICRO-HOLES ARRAY AS A CHEMOSENSOR AND BIOSENSOR**

Nguyen Thi Huyen Trang, Kudryashov Sergey Ivanovich, Pham Hong Minh

Ha Tinh Univesity

P21 **A RELIABLE TECHNOLOGICAL PROCESS POLISHING FOR OBTAINING SUPER SMOOTH GERMANIUM SURFACES**

Bui Dinh Bao, Phan Nguyen Nhue, Mai Van Huy

Le Quy Don Technical University

P22 SUPERACTIVATION OF QUANTUM STEERING OF WERNER STATES WITH TWO MEASUREMENT SETTINGS TITLE

T. Ha Duong, H. Chau Nguyen, and H. Viet Nguyen

Graduate University of Science and Technology, VAST

P23 SYNTHESIS AND CHARACTERIZATION OF EUROPIUM OMPLEXES A POTENTIAL MOLECULE FOR FUNCTIONALIZING ELECTORDE WITH CHROMOPHORE

Nguyen Luong Lam, Nguyen Tuan Linh, Nguyen Van Quynh

University of Science and Technology of Hanoi (USTH)

P24 PLANT TISSUE CULTURE OF HUPERZIA SERRATA BY THE SHOOT TIP CULTURE TECHNIQUE

Le Thi Lan Anh, Ho Thi Huong, Ngo Thi Thuy Linh, Ton That Huu Dat, Lê Thi Bich Thuy, Nguyen Duc Thanh

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

P25 DETERMINATION OF SHEAR WAVE VELOCITY AT SAIGON HIGH TECH PARK IN HO CHI MINH CITY BY USING MULTICHANNEL ANALYSIS OF SURFACE WAVE AND BOREHOLE MEASUREMENTS

Nguyen Nhat Kim Ngan, Do Van Luu, Nguyen Thanh Van

Geophysics Department, Faculty of Physics and Engineering Physics, University of Science, Ho Chi Minh City

P26 APPLICATION OF LOW POWER SEMICONDUCTOR LASER IN THE TREATMENT OF VASCULAR DEMENTIA ON POST-STROKE PATIENTS REHABILITATED

Tran Minh Thai, Ngo Thi Thien Hoa, Tran Thuy Bao Chan, Tran Thien Hau, Nguyen Thi Huong Linh, Can Van Be

The Lab of Laser Technology, Ho Chi Minh city University of Technology

P27 GRAFT-TYPE POLYMER ELECTROLYTE MEMBRANES: RELATIVE HUMIDITY DEPENDENCE OF ELECTROCHEMICAL AND MECHANICAL PROPERTIES FOR FUEL CELL VEHICLES

Tran Duy Tap

University of Science, Ho Chi Minh City

P28 **MOLECULAR CLONING OF GME GENE IN CITRUS RECUTILATA FROM BAC SON – LANG SON**

Nguyen Thi Tam, Nguyen Thi Kim Chi, Duong Huu Loc

Thainguyen University of Education

P29 **CHARACTERISTICS OF HAIRS AND STOMATA OF STIXIS LOUR. IN VIETNAM**

Sy Danh Thuong, Nguyen Huu Quan

Thainguyen University of Education

P30 **SURFACE PLASMON RESONANCE SENSOR BASED ON PHOTONIC CRYSTAL FIBER COVERED WITH GOLD FILM**

Dai Van Pham, Son Thanh Pham, Minh Quang Ngo, Vinod Kumar Verma, Veerpal Kaur, Amit Kumar Shakya, Surinder Singh

Institute of Materials Science

P31 **DEVELOPMENT OF SHORT PULSE BROADBAND AND TUNABLE NARROW LINEWIDTH ULTRAVIOLET LASERS USING CE:LICAF CRYSTAL**

Pham Van Duong, Nguyen Xuan Tu, Nguyen Van Diep, Pham Hong Minh, Nobuhiko Sarukura, Marilou Cadatal-Raduban

Institute of Physics, VAST

P32 **SOLVENT VAPOR ANNEALING FOR IMPROVED STABILITY AND EFFICIENCY OF MONOLITHIC HOLE-CONDUCTOR-FREE PEROVSKITE SOLAR CELLS**

Le Ha Chi, Thach Thi Dao Lien, Pham Van Phuc, Nguyen Thi Tu Oanh, Nguyen Si Hieu, Ta Ngoc Bach, Pham Duy Long, Pham Van Hoi

Institute of Materials Science, VAST

P33 **GENERATING VACCINE CANDIDATE STRAIN AGAINST A/H5N1 CLADE 2.3.2.1C VIRUS BY REVERSE GENETICS**

Nguyen Thi Thu Hang, Nguyen Hung Chi, Chu Hoang Ha, Nguyen Trung Nam

Graduate University of Science and Technology

P34 **INFLUENCE OF MESOSCOPIC TIO2 ELECTRON TRANSPORT LAYER THICKNESS ON THE PERFORMANCE OF MIXED ORGANIC - INORGANIC HALIDE PEROVSKITE SOLAR CELLS**

Thach Thi Dao Lien, Pham Van Phuc, Vu Duy Phuong, Nguyen Thi Tu Oanh, Pham Duy Long, Pham Van Hoi, Le Ha Chi

Graduate University of Science and Technology

P35 **SCANNING KNIFE-EDGE METHOD FOR UV LASER SIZE MEASUREMENTS ORIENTATION IN LIDAR TECHNIQUE**

Nguyen Xuan Tu

Institute of Physics, VAST

P36 **EFFECT OF HALIDE ANIONS ON STRUCTURE OF LANGMUIR MONOLAYER-WATER INTERFACE PROBED BY SUM-FREQUENCY VIBRATIONAL SPECTROSCOPY USING A PICO-SECOND LASER**

Nguyen Thi Hue, Nguyen Thi Hong Thoa

Hung Vuong University

P37 **THERMAL TUNABLE PERFECT ABSORPTION BEHAVIOR IN METAMATERIAL ON SUPER-HIGH DIELECTRIC CONSTANT MATERIAL**

Dinh Van Thien, Tran Tien Lam, Le Dac Tuyen, Bui Xuan Khuyen, Vu Dinh Lam

Department of Physics, Hanoi University of Mining and Geology

P38 **INFLUENCE OF THE PARAMETERS ON THE SQUARE-TRIANGULAR STRUCTURE OF METAMATERIALS IN THE FREQUENCY RANGE FROM 0-18 GHZ**

Vu Duy Phuong, Tran Tien Lam, Dinh Van Thien, Tran Quoc Ve, Tran Manh Cuong, Vu Dinh Lam

Faculty of Physics, Hanoi National University of Education

P39 **INFLUENCE OF THE INTEGRATED ELEMENTS ON PERFECT ABSORPTION IN ULTRATHIN METAMATERIAL PERFECT ABSORBER**

Tran Tien Lam, Dinh Ngoc Dung, Dinh Van Thien, Pham The Linh, Le Dac Tuyen, Bui Xuan Khuyen, Bui Son Tung and Vu Dinh Lam

Faculty of Physics, Thai Nguyen University of Education

P40 **INFLUENCE OF THE LASER ON OPTICAL PHONON AMPLIFICATION IN A PARABOLIC POTENTIAL WELL**

Nguyen Tien Dung

School of Engineering and Technology, Vinh University

P41 **INFLUENCE OF THE LASER ON PARAMETRIC RESONANCE OF ACOUSTIC AND OPTICAL PHONONS IN A PARABOLIC POTENTIAL WELL**

Nguyen Tien Dung

School of Engineering and Technology, Vinh University

P42 **STUDIES OF LOCAL DISTRIBUTION OF CALCIUM IN DRY PLASMA DROPS IN PATIENTS WITH BRAIN TUMORS BY OPTICAL MICROSCOPE AND ATOMIC EMISSION LASER SPECTROSCOPY**

Trinh Ngoc Hoang, Pham Hong Minh, Maslova G.T, Zajogin A.P, Patapovich M.P

Vinh University

P43 **PREPARATION OF BENTONITE NANOPLATELETS USING SIMULTANEOUS ULTRASONIC-ASSITED ACTIVATION EXFOLIATION OF CLAY MINERAL CONTAINING BENTONITE**

Ha Xuan Linh, Nguyen Thanh Trung, Nguyen Phuong Chi, Dang Van Thanh, Nguyen Nhat Huy

TNU - University of Medicine and Pharmacy

P44 **ULTRASLOW OPTICAL SOLITONS IN A VEE-TYPE DEGENERATED ATOMIC MEDIUM**

Luong Thi Yen Nga, Nguyen Van Ai, Dinh Xuan Khoa, Nguyen Huy Bang, Nguyen Tuan Anh, and Hoang Minh Dong

Vinh University

P45 **RESEARCH ON DESIGN AND MANUFACTURE OF A MICROSCOPE OBJECTIVE USED TO TEST OPTICAL SYSTEMS WORKING IN THE INFRARED SPECTRAL REGION**

Tran Anh Quang, Le Duy Tuan, Le Hoang Hai

Department of optical engineering, Le Quy Don Technical University

P46 **ASSESSMENT OF SOIL RADIOACTIVITY IN LAO PDR USING GAMMA-RAY SPECTROMETER**

L.D.Nam, Sonexay Xayheungsy

Institute of Physics

P47 **ANALYSIS EFFECTIVE MODE AREA OF SOLID CORE PCFS WITH HEXAGONAL LATTICE INFILTRATED WITH METHANOL FOR OPTICAL FIBER TECHNOLOGY**

Lanh Chu Van, Linh Dang Thuy, Trang Nguyen Thi, Vu Tran Quoc, Trang Chu Thi Gia, Thua Nguyen Thi, Thuy Nguyen Thi, Khoa Dinh Xuan

School of Natural Science Education, Vinh University

P48 **COMPARE DISPERSION OF SOLID CORE PCFS WITH HEXAGONAL LATTICE INFILTRATED WITH WATER AND ETHANOL FOR SG**

Lanh Chu Van, Vu Nguyen Quang, My Linh Nguyen Thi, Vu Tran Quoc, Trang Chu Thi Gia, Huyen Dinh Thi, Thuy Nguyen Thi, Khoa Dinh Xuan

School of Natural Science Education, Vinh University

P49 **DISPERSION AND PHASE REFRACTIVE INDEX MEASUREMENTS OF SOME NEW LIQUID BY BROAD-SPECTRUM LIGHT INTERFEROMETRY**

Le Canh Trung, Nguyen Duy Cuong, Ho Dinh Quang, Dinh Xuan Khoa, Bui Dinh Thuan

School of Natural Science Education, Vinh University

P50 **DYNAMICS OF ALL SOLID - STATE ULTRAVIOLET LASER AMPLIFIER USING Ce:LiCAF CRYSTALS**

Nguyen Van Diep, Pham Van Duong, Vu Van Thu, Pham Hong Minh

Graduate University of Science and Technology

P51 **THE ENHANCEMENT OF DYNAMIC RANGE OF CCD CAMERA BY ANALYZING SHOT NOISE**

Nguyen Trong Nghia, Nguyen Xuan Au, Nghiem Thi Ha Lien

Center for Quantum Electronics, Institute of Physics, VAST

ABSTRACT

ENHANCED THZ EMISSION OF SILICON NANOWIRE-COATED GALLIUM ARSENIDE PHOTOCONDUCTIVE ANTENNA

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1. Introduction

Improving the performance of photoconductive antennas (PCAs) has been of great research interest. Multiple approaches have been used in order to improve the intensity of PCA emitters, among which includes the utilization of nanostructures [1]. In this work, we report on the enhancement of the THz emission intensity of a GaAs PCA fabricated with a bowtie antenna with 10 μm gap upon coating the device with silicon nanowires (SiNWs). Both the fabrication and the application of the SiNWs are very economical processes, which could help lead to low cost, high intensity THz emitters.

2. Methodology

The substrate for the PCA fabricated was a semi-insulating GaAs (SI-GaAs) wafer. The pattern used for the PCA was a bowtie antenna with a 10 μm gap. 70 nm-thick AuGe was deposited onto the sample via resistive evaporation, and the sample was then annealed in ambient N_2 in a furnace set at 400°C for 1 min. to form ohmic contacts. The SiNWs were fabricated using metal-assisted chemical etching [2], wherein a 1cm×1cm p^+-type Si chip was immersed in a solution containing 5.0 M HF and 0.02 M $AgNO_3$ at room temperature. The silver dendrites formed alongside the SiNWs were removed via immersion in a NH_4OH:H_2O_2 solution, and the chips were immersed in dilute HF solution to dissolve any formed oxides. The SiNW-etched chips were sonicated in ethanol in order to harvest the SiNWs. To coat the PCA with SiNWs, the device was heated on top of a hot plate at 100°C. The harvested SiNWs were drop-casted onto the heated PCA, and the ethanol suspending the SiNWs was fully evaporated before the samples were cooled at room temperature. The THz emission waveforms were taken for both samples using a standard reflection geometry THz time-domain spectroscopy setup (THz-TDS) with the fabricated PCA serving as the emitter, and a commercial PCA serving as the detector.

3. Results

The THz emission waveforms and corresponding frequency spectra of both uncoated and SiNW-coated PCA are shown in Fig. 1. The positive peak of the TDS waveform had increased by a factor of 1.5 for the sample coated with SiNW. In the frequency spectrum, there are observable increases in the THz emission intensity, particularly at frequencies greater than 0.1 THz. On the other hand, similar bandwidths of ~1.2 THz were observed for both samples, implying that the dominant emission mechanism of both samples were similar.

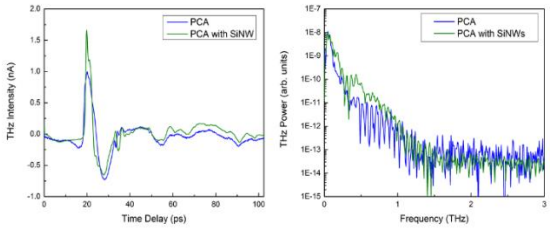

Fig. 1. THz waveforms and corresponding frequency spectra in semilog scale of both the uncoated and SiNW-coated SI-GaAs PCA.

Currently, we attribute the increase of the THz emission intensity to the improved photoabsorption in the SiNW-coated PCA [3]. The SiNWs effectively trap the photons from the pump beam, leading to multiple photocarrier generation processes in the PCA. The increase in the number of the generated photocarriers consequently lead to the increase of the THz emission.

4. Conclusions

We report on the enhancement of the THz emission from a GaAs photoconductive antenna (PCA) coated with silicon nanowires (SiNWs). The increased THz intensity was attributed to improved photoabsorption resulting from the application of the SiNWs.

Acknowledgements

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A-02-I

MODIFIED STRUCTURE AND IMPEDANCE ATTRIBUTES OF HOLMIUM IONS INCLUDED BORO-PHOSPHATE MEDIA: SYNERGISM OF AMORPHOUS AND CRYSTALLINE PHASES

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Visible light emitting features of rare earth ions included varied host materials are decided by their surrounding structures and physical qualities, wherein the synergy between crystalline and amorphous phases play a vital role. In this perspective, an in-depth knowledge on the local structure and impedance correlation effects is essential for the development of diverse optical devises with high performance. Inspired by this rationale, we synthesized a new series of host (amorphous and crystallite phase mixture) of the form $(40\text{-}x)P_2O_5 - 30B_2O_3 - 30ZnSO_4 - xHo_2O_3$ (x = 0.0, 0.4, 0.5, and 0.6 mol%) by melt-quench route. As-prepared samples were characterized (at room temperature) using different analytical tools to determine the influence of holmium ions (Ho^{3+}) on their structure and impedance properties so that an interrelationship between them can be unfolded. XRD patterns verified the glass-ceramic nature of as-quenched samples. FESEM and HRTEM images divulged the presence of irregular crystallites (inferior phase) in the re-eminent amorphous background, confirming the glass-ceramic character of the synthesized host media. The density of the achieved transparent glass-ceramics (with pinkish and yellowish hue) was found to increase with the rise in Ho_2O_3 contents. The calculated N_4 ratio (from the FTIR spectra) showed that the inclusion of Ho_2O_3 into the glass-ceramic network indeed favoured a sizeable conversion of PO_3 and BO_3 to PO_4 and BO_4 structural units. This disclosure was primarily ascribed to the growing number of bridging oxygen in the host network. Both the glassy and crystalline phases were uncovered when the complex impedance plot (in the range of 10^3–10^5 Hz) was fitted using the optimum equivalent circuit model. Meanwhile, the observed reduction in the AC conductivity with the increase in Ho^{3+} level was credited to the formation of quasi-molecular complexes (bridging oxygen) induced by the dopant holmium ions. The sensitiveness of the structural and impedance traits on the Ho^{3+} doping level clearly displayed the existence of a correlation between them, thereby authenticating a strong synergy between glassy and crystalline phases in the proposed boro-phosphate host. In short, the present knowledge may be useful for the progress of efficient photonic devices based on Ho^{3+} doped boro-phosphate glass-ceramics.

A-03-I

TOWARDS THE DEVELOPMENT OF FLUORINE-BASED CRYSTAL AND GLASS SCINTILLATORS

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Scintillators are widely used for radiation detection in various industries such as in medicine, security, nuclear physics and chemistry. Scintillators used in applications involving time-of-flight measurements as well as in imaging devices need to have a fast decay time and a high photon yield. Scintillation decay time becomes faster when the emission wavelength of the scintillator becomes shorter, as the decay time is inversely proportional to the cube of the luminescence wavelength [1]. Therefore, scintillators emitting in the vacuum ultraviolet (VUV, λ = 100 nm to 200 nm) region are being investigated in order to develop fast-response scintillators. Wide band gap fluoride crystals with band gap energies greater than 6 eV has short wavelength emission in the VUV region especially when doped with rare earth (RE) ions such as neodymium (Nd^{3+}) and erbium (Er^{3+}) [2]. Photoluminescence from RE-doped fluorophosphate glass scintillators, such as $20Al(PO_3)_3$-80LiF (APLF80), have also been reported to have fast nanosecond scintillation decay times and sufficient light yield for neutron detection [3]. This talk will present the recent progress in the development of wide band gap fluoride crystals and RE-doped glasses for scintillator applications.

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A-04-I

INFLUENCE OF SURFACE PLASMON EFFECT FROM GOLD NANOPARTICLES ON FLUORESCENCE EMISSION OF Cy3 DYE

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This work reports on the result of the influence of surface plasmon effect from colloidal gold nanoparticles on fluorescence emission of Cyanine 3 (Cy3) dye. Due to the surface plasmon effect of gold nanoparticles, the fluorescence of Cy3 dye nearby them can be enhanced or quenched depending on the distance between the Cy3 molecules and the gold nanoparticles. Optimal fluorescence enhancement of Cy3 dye has been observed in the mixture with gold nanoparticles; and the fluorescence enhancement has been observed when the gold concentration increases up a specified value. The gold nanoparticles can enhance or quench the fluorescence of Cy3 dye depending on energy transfer mechanisms, the dominating of surface plasmon coupling emission process or the Förster energy transfer from dye molecules to gold particles exciting absorption plasmon.

Keywords: *Surface plasmon effect, gold nanoparticles, fluorescence emission, fluorescence enhancement, Cy3 dye*

A-05-I

SYNTHESIS AND CHARACTERIZATION OF COPPER DOPPED TITANIUMDIOXIDE THIN FILM

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Titanium dioxide is mainly used in this research and Copper is one of the high thermal and electrical conductivity chemical element. The Copper is doped into Titanium dioxide by thermal diffusion method. The preparation of doping process is mixed and grinding of Titanium dioxide and Copper with aggregate mortar by specified different weight ratios are 5, 10 and 15wt% for two hours. The mixed powder are heat treated by temperature controller furnace with different temperature range are 500°C, 600°C, 700°C, 800°C and 1000°C respectively for two hours. After heating process, characteristic measurements of all samples are examined by X-ray diffraction (XRD). The Copper is successfully doped into Titanium dioxide by thermal diffusion method. Surface morphology of Copper doped Titanium dioxide samples are checked by Scanning Electron Microscopy (SEM).The optical properties of these samples are observed by Ultra Violet spectroscopy (UV-Vis). The Copper doped Titanium dioxide powders are deposited on glass and Si substrate by screen printing method. The Copper doped Titanium dioxide deposited on p-type Si substrate thin films are heating temperature 300°C to 800°C for one hour. The electrical properties of Copper doped Titanium dioxide deposited on Si thin films are measured by standard electrical devices.

B-01-I

COMPARATIVE STUDY OF INTERMETALLIC COMPOUND FORMED AT THE INTERFACE BETWEEN LEAD-FREE SOLDER AND DIFFERENT PAD METAL FINISHES

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The study aims to investigate effect of metal surface finish on intermetallic (IMC) formation. Printed circuit board with FR4 laminate was used. Its pad surface finish was varied as copper and silver/copper. SAC305 lead-free solder was applied on pads, and then pass through reflow soldering process. Subsequent aging process was performed at various temperature and time. The interconnect samples were prepared by cross-section technique to investigate IMC morphology and type by scanning electron microscope (SEM) and energy dispersive x-ray spectroscopy (EDS), respectively. At zero-hour aging time after reflow process, IMC thickness was slightly thicker in case of copper surface finish. However, the results from other aging conditions coincidently showed the thicker IMC layer in case of copper surface finish. Silver layer on copper play a role as the retarder which delay diffusion of copper to molten solder, leading thinner IMC formation in case of silver/copper surface finish. Cu_6Sn_5 intermetallic compound always form at the interface, whereas, Cu_3Sn intermetallic compound was subsequently formed when aging was performed for a longer time. Cu_6Sn_5 nearby solder while Cu_3Sn located in between Cu_6Sn_5 and copper layer because the lack of tin at the Cu_6Sn_5 and copper interface.

B-02

EFFECT OF AGING ON INTERMETALLIC COMPOUND FORMATION AT SN42-BI58 LOW TEMPERATURE SOLDER/COPPER INTERFACE

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The low temperature lead free solder, Sn42-Bi58, is broadly used for portable electronic devices. Intermetallic compound (IMC) formation at the interface plays an important role and relates to reliability of devices. Effect of aging temperature and aging time on IMC formed at the solder/copper pad interface was investigated. Reflow profile were designed with and without aging process. The aging temperature was varied at 80°C, 100°C, and 120°C, while, the aging time was varied from 1 hour to 12 hours. The interconnect samples were prepared in cross-section. Scanning electron microscopy and energy dispersive X-ray spectroscopy were performed to reveal morphology of interconnect and to analyze chemical composition, respectively. The cross-section interconnect micrographs showed irregular shape of IMCs at the interface for the whole samples, however, interconnect with longer aging time can be distinguished with a flatter IMC morphology and a thicker IMC layer. The change of aging temperature in range of 80°C to 120°C slightly affected on IMC morphology and thickness. Element analysis coincidently showed that IMC layers at solder/copper interface always form as Cu_6Sn_5. Either aging temperature or aging time did not have an effect on IMC type at the interface.

B-03

FABRICATION AND LASING CHARACTERISTICS OF KUDZU STARCH BASED MICROSPHERE BIOLASERS

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Over the past decades, lasers have played an important role in many fields ranging from military, healthcare to scientific research and industrial production. Recently, biolasers whose cavity made of biological materials, have received a great of attention due to their potential for biosensing applications. Among many types of biolasers, whispering gallery mode (WGM) microsphere biolasers is a very interesting case due to its superior physical properties such as low threshold, and small volume mode. In this report, we will present microlasers based on processed kudzu starch - a natural material. Using a friendly fabrication process, microspheres biolaser can be obtained which the sizes can vary from 30 to 120 μm. The measurement results show that the fabricated biolasers have a low threshold (2.14 μJ/pulse) and the quality (Q) factor of approximately 2800. Free spectral range (FSR) - an important parameter of WGM biolaser is investigated, showing an agreement with the WGM theory. Our work may have potential applications in biological and chemical sensors.

B-04

STUDY OF UV VIS AND NIR EMISSION OF MWCNT AND ER^{3+} DOPED INTO BORATE GLASS FOR PHOTONICS DEVICE APPLICATION

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For several decades, development of photonics device based on glass material was very attractive. It is because glass gives many advantages such as easy to prepare, low melting temperature, high transparency, and low-cost production. In this work multi wall carbon nanotube (MWCNT) doped into borate glass with Er^{3+} ion as an activator was successfully prepared by melt-quenching technique. The structural properties of glass sample analysed by FTIR instrument. Emission spectra shows several peaks in ultraviolet, visible, and near infrared area which are 311 nm, 612 nm, and 1536 nm respectfully. In visible area, there is also a peak around 412 nm under 275 nm excitation that indicate the presence of MWCNT. The result shows that MWCNT and Er^{3+} doped into borate glass has many potential applications.

B-05

STRUCTURAL AND SUPERIONIC CONDUCTIVITY OF OLIVINE PHOSPHATE CATHODE MATERIAL DOPED NICKEL WITH DIFFERENT CONCENTRATIONS

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Three different concentrations of Ni (5 mol%, 10 mol% and 15 mol%) doped Lithium Iron Phosphate, $LiFePO_4$, have been prepared by solvothermal method. Analytical Reagent (AR) grade Nickel Sulphate Heptahydrate ($NiSO4.7H_2O$), Lithium Hydroxide (LiOH), Ferrous Sulphate Heptahydrate ($FeSO_4.7H_2O$) and Phosphoric Acid (H_3PO_4) with desired stoichiometric compositions were used to synthesis the samples. The as-prepared samples were characterized by X-ray diffraction (XRD).Structural properties of phase formation, crystal structure, lattice parameters and crystallite size of the samples were investigated. The as-prepared samples were made pellets by hydraulic pellet-maker using 70 MPa. For the application of fuel cell materials in rechargeable batteries, temperature dependent electrical conductivities of the samples were investigated in the temperature range 303 K – 773 K to study the electrical conductivities of the samples. It was found that the samples exhibited as superionic conductors throughout the measurement. The activation energies were evaluated by using the slopes of the ln σ versus 1000/T graphs.

Keywords: Ni doped Lithium Iron Phosphate, solvothermal, Structural properties, superionic conductors.

B-06

TERAHERTZ EMISSION IN EPITAXIALLY LIFTED *I*-GAAS/*N*-GAAS THIN FILMS ON SILICON SUBSTRATES IN THE TRANSMISSION EXCITATION GEOMETRY

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We report on the terahertz (THz) emission properties of intrinsic gallium arsenide (*i*-GaAs) on silicon doped gallium arsenide (*n*-GaAs) thin films on silicon substrates in the transmission excitation geometry. Thin film *i*-GaAs/*n*-GaAs was grown via molecular beam epitaxy. Epitaxially lift-off (ELO) [1] was performed on the thin films by etching the sacrificial layer and then bonded to silicon substrates [2]. Samples with different thicknesses were fabricated and characterized via photoluminescence (PL) and Raman spectroscopy. PL results denote peaks at 1.425 eV which is the typical band gap of GaAs. The presence of Raman optical phonon peaks at 265.5 cm^{-1} and 290.4 cm^{-1} representative of GaAs [3] signify that the fabricated samples have thin films that are relaxed and free from strain. THz time-domain spectroscopy in the transmission geometry were performed and results indicate that all show strong THz emission. The strongest THz intensity was exhibited by the sample with a thickness of 990 nm which corresponds to the penetration depth of the pump laser allowing for optimum excitation of the entire thickness of the GaAs thin film. The ELO process is deemed to be a viable process for the fabrication of thin film THz materials.

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B-07-I

SPECTROCOPIC AND LUMINESCENCE PROPERTIES OF SM^{3+} DOPED PBNAG GALSSES FOR ORANGE LED APPLICATION

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Glasses treated with rare earth are very interesting because of their wide application in fields such as laser and optical fibers. Various hosts such as glass, crystal and poly crystalline are treated with soil ions. In this research the medium of glass was made with composition (70-x) P_2O_5 - $10Bi_2O_3$ - $10Na_2O$ - $10Gd_2O_3$ - xSm_2O_3 with x = 0; 0.05; 0,1; 0, 5; 1.0; 3.0 (mol%) doped by active ion xSm_2O_3 All powdered chemical compounds with a total mass of 20 grams are mixed in alumina crucible and prepared by melt-quenching method. The optimum glass sample is cut to size (w x h x d = 1,0 x 0,2 x 1,5) mm^3. Physical properties such as density, molar volume, refractive index, Sm^{3+} ion concentration, molar reactivity and susceptibility for each doping concentration are calculated and reported. The optical properties of glass samples Sm^{3+} with different concentrations were determined by measuring the absorption and luminance spectrum in the visible region. UV-Vis-NIR spectrophotometer analysis showed that there were nine non-homogeneous transition bands in various positions and intensity with hypersensitive transitions at 1233 nm ($^6H_{5/2}$-$^6F_{1/2}$) wavelength. Emission spectrum in glass medium Sm: Phosphate was observed using an excitation wavelength of 550 nm resulting in four emission band transitions namely $^4G_{5/2}/^6H_{5/2}$ (562 nm), $^4G_{5/2}/^6H_{7/2}$ (597 nm), $^4G_{5/2}/^6H_{9/2}$ (644 nm) and $^4G_{5/2}/^6H_{11/2}$ (703 nm), Emission intensity increases at Sm 1.0 mol%.

Keywords: Glass, phosphate, samarium, PBNaG:Sm

B-07-II

GRAZING INCIDENCE X-RAY DIFFRACTION MEASUREMENTS OF HYDROGEN-ION AND DEUTERIUM-ION PLASMA-IRRADIATED BULK ZINC OXIDE SINGLE CRYSTALS

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Hydrothermal-grown bulk zinc oxide (ZnO) single crystals have been suggested to be used as scintillator materials for radiation detectors because the crystals' emission lifetimes are similar regardless of the incident excitation [1] and sample temperature [2]. However, inside actual radiation environments, energetic ions and gamma-rays can penetrate a material, generate some defects, and damage the material's crystal lattice leading to modified optical, electrical, and structural properties. To better understand radiation effects especially at the material surface, we then perform grazing incidence x-ray diffraction (GIXRD) measurements of hydrogen-ion (H-ion) and deuterium-ion (D-ion) plasma-irradiated bulk ZnO single crystals [3]. Both the H-ion and D-ion-irradiated crystals exhibit the (100) reflection of hexagonal wurtzite ZnO similar to the non-irradiated sample but with asymmetric and shifted peaks, broader rocking curves, larger *a*-axis lattice constants, and positive Cauchy strains along the *a*-axis. These structural properties are attributed to the presence of a strained lattice on the irradiated surface of the bulk crystals. Ion plasma irradiation of the ZnO (100) surface leads to a lattice expansion along the crystals' *a*-axis and in-plane compression along the *c*-axis. These results show the specific effects of H-ion and D-ion plasma irradiation on the ZnO crystal along with the interaction of ions with the ZnO surface.

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SIMULTANEOUS MEASUREMENT OF DISPERSION AND ABSORPTION IN A DOUBLE-PRISM CONFIGURATION AND ITS POTENTIAL FOR SCREENING RADIATION-HARD GLASS MATERIALS

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An optical system consisting of a two-element, reference and sample, prism-pair in combination with an imaging spectrograph is described for simultaneous measurements of dispersion and absorption [1]. A single shot image using the spectrograph records the prism-pair deflection over multiple wavelengths thus providing spectrally-rich information of the wavelength-dependent refractive index of the sample. The absorption is deduced simultaneously from the transmittance and effective thickness of the prism-pair. Standard catalog glasses comprised of fused silica and borosilicate were used for evaluation of the system. The Sellmeier equations were derived by least-square fitting of the measured refractive indices. Moreover, the wavelength-dependent refractive index change exhibited in borosilicate glass was evaluated using the system to measure radiation-hardness in the glass after gamma-ray irradiation. Direct measurement of such properties has the potential to enable rapid screening of candidate glass materials that can withstand strong ionizing radiation or designed for scintillator applications.

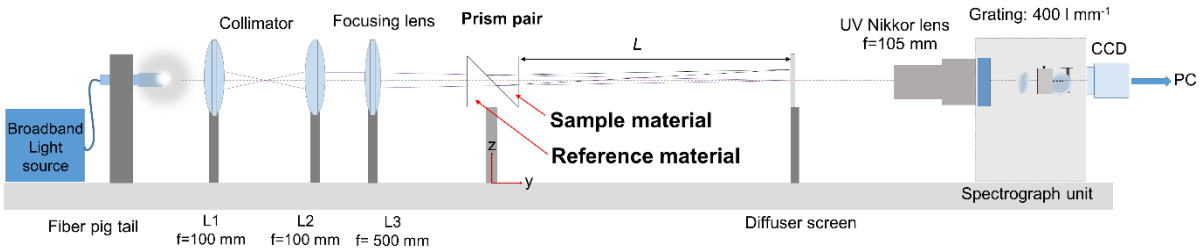

Fig. 1. Optical system consisting of a two-element prism pair and imaging spectrograph configuration for simultaneous measurement of dispersion and absorption of optical materials.

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B-09

PHOTOLUMINESCENCE MAPS AND RADIATIVE LIFETIMES IN NITROGEN-DOPED GRAPHENE QUANTUM DOTS

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Graphene quantum dots (GQDs) have gotten much interest for research in recent years, after being first fabricated and published by Ponomarenko and Geim in 2008 [1], and blue fluorescence properties first published by Pan [2] and Yan [3] in 2010, due to its quantum confinement effect. GQDs are considered a new kind of quantum dots (QDs), as they are chemically and physically stable because of its intrinsic inert carbon property. Furthermore, GQDs are environmentally friendly due to its non-toxic and biologically inert properties, which have attracted worldwide interests from academic and industry [4]. Graphene is a 2-dimensional honeycomb lattice of sp^2-bonded carbon atoms and GQDs are small fragments of graphene, with sizes of several nm, usually < 20 nm. GQDs possess many potential applications such as bio-imaging, fluorescence probe, light-emitting diodes (LEDs), photocatalysis, supercapacitors, and lithium-ion batteries [5-8]. In this report, we will present research results on photoluminescence (PL) maps according to different excitation wavelengths, relative to the absorption of two types of graphene quantum dots (GQDs) samples: one containing low nitrogen quantity and one being nitrogen-doped graphene quantum dots (N-GQDs). The results on quantum yield (QY) and PL decays of these samples will also be presented. The Raman spectral recordings have also been carried out to identify the GQD nature of studied samples.

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B-10

MEASUREMENT OF THE ABSOLUTE INTENSITY OF THE ELECTRONIC TRANSITION $D^3\Pi_G - A^3\Pi_U$ OF C_2 SWAN SYSTEM BY CAVITY RING-DOWN SPECTROSCOPY

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C_2 radical is a significant and well-known molecule in the various fields such as combustion science, plasma chemistry, materials science, astronomy and astrophysics. The electronic spectra of C_2 have been observed since the beginning of 19th century and was first defined by William Swan in 1857 which results from transitions between the $d^3\Pi_g$ and $a^3\Pi_u$ electronics states. This molecule has widely been observed in comets and in other astronomical environments, for instance interstellar clouds, ending part of stars and the sun. The reactions of this molecule are attributed to be involved in the hydrocarbons' formation as well as of other organic compositions in interstellar clouds. C_2 has also been discovered created in flames and found from the irradiation of soot. In this paper, the absolute densities of the electronic transition $d^3\Pi_g - a^3\Pi_u$ of C_2 Swan system will be presented. These results were investigated by cavity ring down technique, with different precursors leading to the optimization of the yield of conversion into C_2.

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B-11

EFFECT OF THE GROWTH TEMPERATURE ON THE TERAHERTZ EMISION OF GAAS ON SILICON

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Gallium Arsenide (GaAs) on Silicon (Si) is an appropriate photoconductive substrate for emission and detection of terahertz (THz) radiation [1]. In photoconductive antenna the Silicon lens is normally used to focus the THz beam to the active layer. Growing GaAs on top of Si enhances the outcoupling of THz radiation since difference in the index of refraction of GaAs and Si aided in the index guiding of the THz wave [2]. One challenge however is the 4.1% lattice mismatch between GaAs and Si leading to formation of anti-phase domains (APDs) in the GaAs surface [3]. In this work we present the effect of growth temperature of GaAs on Si on the formation of APDs and its corresponding THz emission efficiency. We found that the optimum growth temperature of GaAs is at 520° where the THz emission is maximum.

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B-12

EMPLOYING TIO_2 IN DEGRADING METHYLENE BLUE PHOTOCATALYTICALLY USING SIMPLE SPRAYING METHOD

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Nowadays, the employing solar illumination to promote the transformation of organic chain has attracted intense attention. Here, we have demonstrated an extremely easy and inexpensive TiO_2 immobilization on transparent plastic by simple spraying method. The spray method was found as a convenient method to immobilize the TiO_2 particles onto the transparent plastic buffer. This method was initiated by a spray-coating technique followed by a heat-treatment process. When 30 ml of 25 mg L^{-1} methylene blue (MB) was used as wastewater model, it was successfully cleaned after 4 hours illumination. Reusable of the TiO_2-coated plastic also showed an effectively photodecomposition ability by removing 99% of the organic compound after 5 times usable.

B-13

ELECTROCHEMICAL PLASMA ON IRON ELECTRODES IN WATER ENVIROMENTAL AND INFLUENCING FACTORS

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The influencing factors of electrochemical reactions by high-voltage DC on iron electrodes were investigated at apply voltage of 5kV, 10 kV and 15 kV, distance between two electrodes from 200 mm to 300 mm, electrical conductivity of solution from 20 µS to 200 µS, pH value from 5 to 10 , solvent temperature from 20 degree to 50 degree as well as ratio of electrodes area to the appearance of electrode plasma, the process of dissolving the iron anode and the total volume of gas formed from the reactions. The results indicated that the plasma appeared on the iron electrode at distance smaller than 250 mm when apply voltage were 15 kV and 10 kV. The electrical conductivity of solution depend on the pH value. The electrochemical reactions also make increasing the conductivity of solution follows reaction $Fe - ne \rightarrow Fe^{n+}$, $2H_2O \rightarrow O_2 + 4H^+$ and $2H_2O \rightarrow H_2 + 2OH^-$. The temperature and electrical conductivity are high leading to the apperance plasma processes are easier. It was possible to control the appearance of plasma on the iron electrode by how increasing the voltage value, reducing the distance between two electrodes, increasing the conductivity and the temperature of the solvent to accelerate gas generation on the electrodes to the appropriate value for the appearance of electrode plasma. The plasma processes will occur on anode and cathode to dissociate water by the original mechanisms [1] like that $2H_2O \rightarrow 2H^{\bullet}+2OH^{\bullet}$, $H^{\bullet}+H^{\bullet}\rightarrow H_2$, $2OH^{\bullet}+2OH^{\bullet}\rightarrow 2H_2O\rightarrow O_2$, $OH^{\bullet}+OH^{\bullet}\rightarrow H_2O_2$, $2H_2O\rightarrow H_2O_2+H_2$. Electrochemical reactions at high voltages with plasma appearance also formed a high iron solution concentration follow reactions as $Fe \rightarrow Fe^{n+} + ne$, $Fe^{ne+} + n/2H_2 \rightarrow Fe^{o} + nH^+$ and $nFe^{o}\rightarrow$ FeNPs .The state of ionization with free radicals such as OH•, O•, H•, ... [2, 3] when the plasma appears on the electrode with capacity of strong oxidation reactions can also be used to treat environmental pollutants [4]. Beside, the iron particles had nano size, the zeta potential value was hight and an ionizing environment with free radicals that facilitate for environmental treatment.

C-01-I

A COMPACT SPECTROSCOPIC SETUP FOR TEACHING ATOMIC PHYSICS IN UNIVERSITIES

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Atomic physics is the fundamentals of several recent research topics in modern physics, chemistry, biology, and material sciences, thus it is an indispensable subject in universities. However, teaching atomic physics always faces a challenge because of tiny-size of atoms which are not visualized directly with human eyes. Therefore, the atomic structure is normally studied by spectroscopic techniques.

Recently, the advent of electromagnetically induced transparency (EIT) [1,2] has opened new research topics [3] concerning to quantum interferences between transition paths inside the atomic system, as EIT-enhanced Kerr nonlinearity [4], slowing light [5], optical bistability [6], optical switching [7]. Construction of a setup for teaching atomic physics including high resolution spectroscopic techniques and EIT phenomena is therefore of interest for current needs at universities.

Growing of the above interest, this work introduces a compact setup for both high resolution spectroscopic techniques and EIT generation in Rb atomic gaseous cell. The setup incorporates interferometric technique to measure dispersive profile of saturated absorption transitions and EIT spectrum which is developed from our previous works [8,9]. The setup can be utilized to teach saturation spectroscopy, polarization spectroscopy, cross-over signal, EIT formation, and interferometric technique for measurement of dispersive profile of atomic resonances.

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C-02

ARROW-SHAPED EPSILON NEAR ZERO (ENZ) METAMATERIAL FOR ANTENNA GAIN ENHANCING

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As the trend of miniaturing wireless communication device, antenna size has been succesfully reduced up to 75%. However, it comes with gain reduction [1]. Metamaterial is an artificial material which immensely used for enhancing the gain of antenna [2]. Some researches were conducted to achieve high gain by using different metamaterial structure of split ring resonators [3-4]. However, it cannot achieve 3 dB of gain and it uses costly substrate. In this paper, a novel of arrow-shaped ENZ metamaterial structure was designed by using Ansoft HFSS. This structure used low cost FR-4 substrate. The gain enhanced up to 4.3 dB at 5.2 GHz.

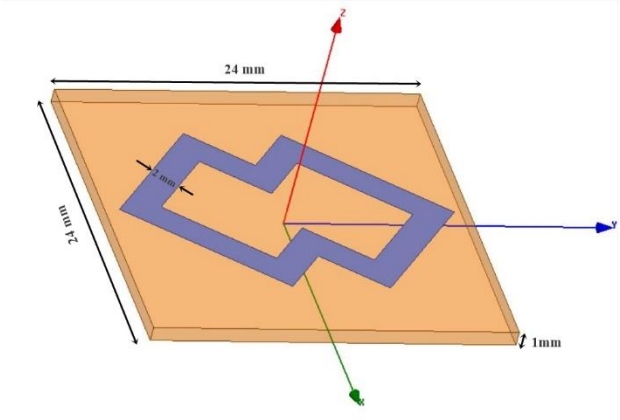

Fig. 2. Arrow-shaped ENZ metamaterial unit cell

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C-03

COPPER NANOPARTICLES EFFECTS ON ELECTRICAL CONDUCTED NANOFLUID FLOW AT STAGNATION POINT REGION WITH FLUCTUATING GRAVITATIONAL FIELD

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A study on boundary layer nanofluid flow are conducted numerically near a three-dimensional stagnation point region. The nanofluid is then electrically conducted which occurs under a microgravity environment and produced a fluctuating gravitational field behavior. Copper nanoparticles were chosen and mathematically formulated based on Tiwari and Das nanofluid model which focusing on nanoparticles volume fraction. The dimensional system of partial differential equations was transformed into dimensionless equations using semi-similar transformation technique after simplified via boundary layer and Boussinesq approximation. Keller box method were used in analyzing part in term of physical quantities of principal interest known as skin friction coefficient and heat flux on the wall. The result of analysis show stagnation point parameter affects much on the flow behavior which different values of curvature ratio produce a different types of stagnation point case flow such as plane stagnation case flow and asymmetry stagnation point case flow. Fluctuating gravitational field due to g-jitter effect show that there are exist of singularity flow and the flow passing through at least one critical point. Conducting electrical field on the flow slowing down fluid flow due to the opposed Lorentz force hold by current density or Ohm' Law. An enhancement on conventional fluid occurs with additional of small amount copper nanoparticles. Results of rate of heat transfer are increase as values of nanoparticles volume fraction increases which then contribute heat transfer properties occurs on the boundary layer flow.

Keywords: g-Jitter, Stagnation Point Region, Nanofluid, Magnetohydrodynamics.

C-04

MEMBRANE EFFECTS ON EFFECTIVE PROPERTIES AND SOUND ABSORPTION OF FOAM-BASED MATERIALS

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The acoustic performance of absorbing materials (e.g., foam, fibrous, granular) is governed by the mechanisms of acoustic energy dissipation when the air propagates within porous media. The functional property of foam-based absorbers within a given thickness is highly dependent on their configuration of pore connectivity (i.e., pore size and throat size). In this paper, we demonstrate a microstructure-based approach to characterize the effect of membrane level in foam materials on their effective acoustic properties (e.g., effective density, effective bulk modulus, and sound absorption). Firstly, the local foam material is idealized perfectly regular based on the Kelvin pattern within a given ratio of closured membrane in the cell walls. The homogeneous computational technique is then employed to calculate the effective acoustic properties of membrane foam structure. After a validation step, the proposed numerical framework is finally adapted to systematically investigate the membrane-induced effect on their effective acoustic properties of foam absorbers. The obtained results indicate that, for a given scale of cell size, the tuned membrane content shows interesting effective properties as well as sound absorbing performance.

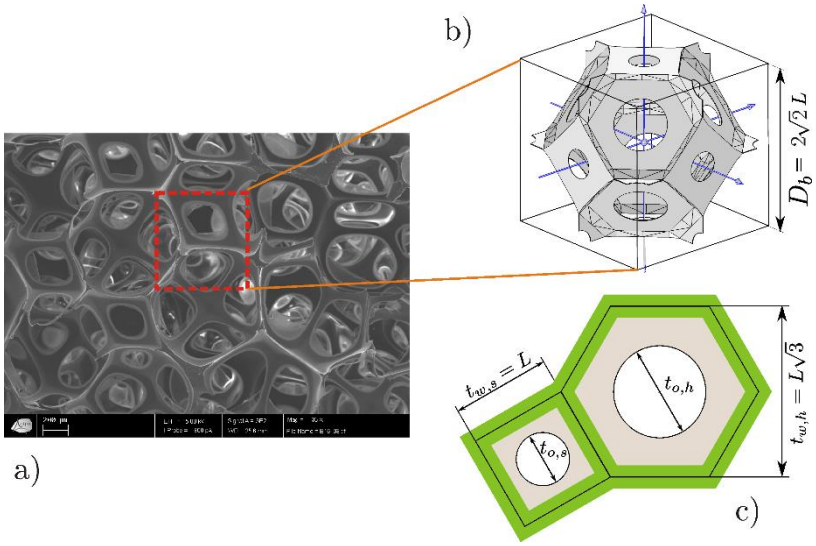

Figure 1. Foamy structure: a) SEM image of real foam sample; (b) well-ordered Kelvin unit cell with (c) a detailed view about ratio of closured membrane on cell walls [1].

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C-05

COMPRESSIVE AND TENSILE STRESS STUDY OF THE MEMS USED ON A 1060NM HCG TUNABLE VCSEL

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We utilized a micro-Raman Spectroscopy set-up to study the compressive and tensile stress experienced by the microelectromechanical system (MEMS) of a 1060 nm high contrast grating (HCG) mirror on a vertical cavity surface emitting laser (VCSEL). We supplied a reverse-bias voltage to actuate the MEMS inducing several stress values at the fulcrum, the arm and frame of the MEMS. The Raman peak of the GaAs-like LO phonon observed at 260 cm^{-1} shifted to lower frequency at the fulcrum and shifted to higher frequency at the frame, elucidating an increasingly tensile and compressive stress respectively as the reverse bias voltage of 0 to 10 V is supplied. Furthermore, as we scan the fulcrum, to the arm, and to the frame, we observed an increasing tensile stress yielding stress values ranging from -0.5 to 0.4 GPa suggesting that the MEMS already experienced stress at its equilibrium position.

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C-06

DETECTION AND IDENTIFICATION OF EXPLOSIVES BY PORTABLE RAMAN SPECTROMETER

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Rapid and accurate on-site detection of explosives is highly required by counter-terrorism forces to effectively prevent and fight against terrorist attacks. Raman spectroscopy has been a well-known and proven method for chemical analysis and identification in the laboratory. Over the last few years, new generations of compact, portable Raman spectrometers are making this method become popular for the applications on the field. However, many works still need to be done to find a robust and effective algorithm to identify spectrum of suspected chemicals especially when working with multi component samples. In this talk, we will present the results of our work on developing portable Raman spectrometer for detection of explosives with a focus on chemometric algorithms.

Fig 1. Portable Raman spectrometers for detection of chemicals
a) Instrument developed in our lab
b,c) Commercial instruments (internet sources)

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C-07

FLUORESCENT ENERGY TRANSFER BETWEEN ORANGE BEAD NANOPARTICLES AND CY5 DYE AFFECTED BY SURFACE PLASMONS OF SILVER NANOFILM

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The fluorescent resonance energy transfer (FRET) experiment between orange bead (OB) nanoparticles (NPs) (as donors) and Cy5 dye molecules (as acceptors) had been set up onto the surface of silver nanofilms in order to observe the influence of surface plasmon effect on the FRET. The silver nanofilms were prepared by e-beam deposition method with 50-100 nm in thickness and a 10 nm silica layer on the surface. The fluorescence intensity of fluorophores increased linearly with the film thickness. The FRET effect between the OB NPs and the Cy5 dye on silver nanofilms have been observed at the distance of about ⌠m due to the propagation of surface plasmon waves. The experiments confirmed the effect of the propagation of surface plasmons on the energy transfer effect which exhibited that the emission intensity of the donor and acceptor at the grain position on silver films of different thicknesses after a while of illumination due to the decrease in the acceptor fluorescence around the donor particles. The results affirm the role of surface plasmon waves in the energy transfer at far distance.

Keywords: *Surface plasmon effect, silver nanofilms, fluorescence emission, FRET, Cy5 dye*

D-01-I

3D FORWARD MODELING OF INDUCED POLARIZATION USING THE FINITE ELEMENT METHOD

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Induced polarization (IP) method is part of the geoelectric methods that is often used in metal exploration. Data interpretation from induced polarization survey requires a fast and efficient forward modeling algorithm. In this study, a forward modeling of induced polarization scheme for 3D environment was developed. The finite element method (FEM) was used for calculating the IP responses for a 3D subsurface resistivity model. The FEM was implemented in the scheme by using the Galerkin approach. The boundary value problems with the Galerkin approach was resolved in seven steps of completion. This step includes discretize the domain using finite elements to postprocess the results. This is done to get efficient and proven results. In addition, the induced polarization survey using the fractal model as intrinsic property of the medium is a promising method for environmental investigation.

Keywords: Induced polarization, finite element method, earth science

D-02

HOLOGRAPHIC CONDUCTIVITY AND SPATIALLY ANISOTROPIC EFFECT

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We study the conductivity in an anisotropic medium from the point of view of AdS/CFT correspondence. Two gravitational models [1, 2] will be discussed regarding the effects of anisotropic parameter playing a role of symmetry breaking in gravity side in order to mimic the impurity of lattice structure in field theory side.

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D-03

SATURATION EFFECT OF HYDROGEN RECOMBINATION MASERS OF THE HII REGION AROUND MWC349A

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Saturation of masing recombination lines is an important property to understand the physical conditions of the maser medium. We focus on studying this effect in the HII region around MWC349A one of the strongest hydrogen recombination sources. Using our 3D radiative transfer code to model the envelope of the star, we obtain simultaneously the profiles and the degree of saturation on each grid point. We make the simulation for the cases of H26α, H30α and H35α analyzed in detail in the last observations. Fitting the model profiles to the observed spectra, we find the most suitable model for determination of the degree of saturation. The results are consistent with previous estimations published by some authors.

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D-04

THEORETICAL STUDY OF SINGLE-PARTICLE SPECTRA FOR SOME NUCLEI

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In this paper, we calculated single-particle levels of some spherical and near spherical nuclei with mass range from 40 to 208. Our calculation used the independent particle model (IPM) and phenomenological potential to describe the nucleus in form of Schrodinger equation. The single-particle levels are derived by solving the equation with Numerov's method. The calculation results are compared and evaluated with experimental data taken from [2], [3] and data of Hartree – Fock method with Skyrme interaction from the work of Chabanat et al [1].

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STUDY CACULATION AND SIMULATION OF PRESSURE DROP THROUGH A SINGLE FIXED BED OF NITROGEN GAS GENERATOR USING PRESSURE SWING ADSORPTION

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Pressure drop through a fixed adsorption bed is an issue that needs to be considered for calculation and simulation. Because it is not simply a hydraulic drop through a fixed particle layer but also a drop due to the adsorption and desorption process in micropore. This calculation is usually based on the Ergun's equation, which is a very complicated task when it is necessary to determine the porosity of the column and the velocity of gas in the bed in addition it depends on the size and shape particle. This study will solve the problem of calculating and simulating pressure drop through the adsorption bed in the N_2 gas generator working according to the pressure swing adsorption cycle. In Vietnam, this equipment has been researched, calculated, designed and manufactured at the Institute of Technology - the General Department of Defense Industry, has installed some pressure sensors according to the height of the bed. The results of calculation and simulation studies can be completely verified by experiment on this equipment.

Fig. 3. The nitrogen gas generator working follow pressure swing adsorption

D-06

MICROSTRUCTURE-BASED MODEL FOR PREDICTING ACOUSTIC BEHAVIOR OF GRANULAR LAYERS BASED ON MONO-SIZED SPHERE PACKING

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In porous granular media, the sound energy can be absorbed significantly due to viscous and thermal effects when an acoustic wave propagating through the pore connectivity of particle packing. The present work investigates numerically acoustic behavior (e.g., effective properties, sound absorption coefficient) of granular materials made from random close packing of mono-sized rigid spheres. Firstly, we employ molecular dynamics simulation to generate the Representative Elementary Volume (REV) of porous granular media based on assemblies of mono-sized spherical particles towards close-packed density. Then, a set of three different problems in three-dimensional space (e.g., Stokes, Laplace, and diffusion-controlled reaction equations) is numerically solved in such media by the finite element method, and estimations of the transport parameters are derived from these obtained solution fields. Then, the visco-inertial and thermal response functions governing the long-wavelength acoustic wave propagation in rigid-frame porous materials are deduced from semi-phenomenological models (i.e., Johnson-Champoux-Allard-Lafarge model). Finally, the influence of the particle size and the layer thickness on the sound absorption capacity of absorbers made from mono-sized sphere packings is proposed.

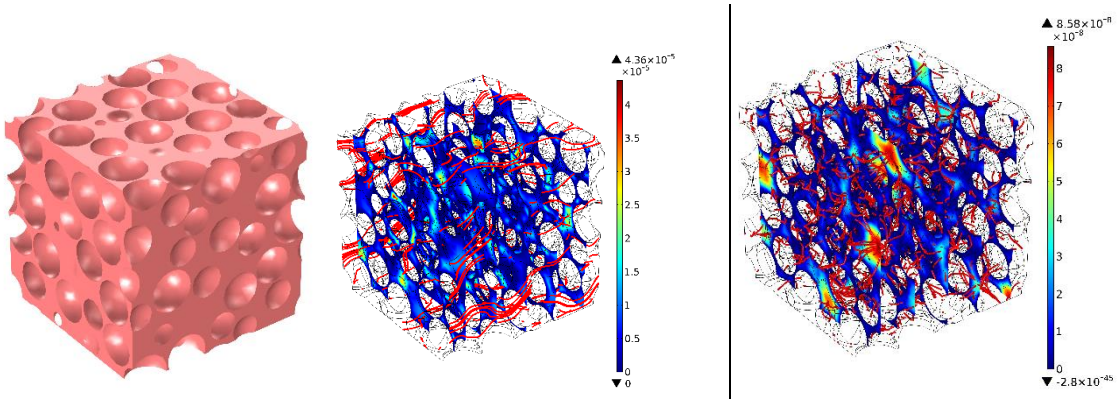

Figure 1. Generated REV within an open porosity of 0.39 (left) and scaled velocity fields [m²] at low frequencies (middle) and high-frequencies (right).

D-07-I

OPEN ACCESS ASTRONOMICAL DATA: AN OPPORTUNITY FOR ASTRONOMERS FROM DEVELOPING COUNTRY

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Astronomy and Astrophysics (A&A) is one of the oldest science but very dynamically developed. It hosts the most puzzling questions of today's physics such as dark matter, dark energy, and inflation. Building most modern equipment of the filed usually requires a huge amount of expertise, financial and human resources, hence, contribution from many different countries. To pay back to the society, the data taken by these equipments should be reached by as many researchers as possible. In fact, this is the practice of many observatories who open their data to public after a proprietary period. Emblematic of that is the Atacama Large Millimetre/sub-Millimetre Array (ALMA) which is the most sensitive and highest resolution equipment of the world of its type. This is really a precious opportunity for astronomers to do frontier science, in particular, the ones from developing countries which are not financially prepared to join such an endeavour yet. In this presentation, I will discuss the opportunity and give an example of the research which extensively uses ALMA archival data at our Department of Astrophysics.

D-08

MACHINE LEARNING FOR SEISMIC SIGNAL PROCESSING BASED ON PERFORMANCE OF EVALUATION BROADBAND NETWORK STATION IN SUMATERA REGION, INDONESIA

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Machine learning of seismic signal waveform is an essential component to realize the characteristics of the signal. The processing of the waveform signal is broadly used for the analysis of the real-time seismic signal. The numerous wavelet filters are developed by spectral synthesis using machine learning python to realize the signal characteristics. Our research aims to generate the performance of seismic signal and processing the waveform from Broadband Network Station by using Wavelet-Based on Machine Learning. In this case, we use Continuous Wavelet Transform (CWT) on Morlet. CWT is also clearly to identify spectral amplitudes and frequency-energy from the component of signal seismic performed by Broadband Network in Indonesia. The characteristic of the digital broadband network in Indonesia is variance. In general, Indonesia had been deployed more than 170 seismic stations in Indonesia. Our project tries to evaluate the Broadband Seismic Network which deployed in Sumatera Region, Indonesia by using Power Spectral Density Probability Density Function (PSDPDF).

Keywords: Machine Learning, Morlet, Broadband Network, Performance, PSDPDF

D-09

THE UPHILL DIFFUSION OF GLYCEROL IN WATER

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Most of the uphill diffusion occurs in multicomponent systems and their cause is the diffusion flux of any species is coupled with that of its partner species (couple diffusion effect) [1]. However, the uphill diffusion can occur in single component systems (single uphill diffusion), which is explained by the theory and simulation [2, 3]. In this paper, studies of the single uphill diffusion of glycerol are presented and discussed. Results showed that: i) The uphill diffusion of glycerol can occur in single component systems; ii) the cause of single uphill and osmotic diffusion is thermal velocity of molecules in low concentration region is larger than that in high concentration region.

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ACCURACY COMPUTATION OF SEISMIC REFRACTION FOR COMPARING MODELS CRM AND GRM

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Seismic refraction method has been proven as a useful geophysical tool for investigating. The major objective of this study are to introduce the application of the generalized reciprocal method (GRM), to address the issues of detailed spatial resolution and to compare the result with the conventional reciprocal method (CRM). The conventional reciprocal method (CRM) is one of the most convenient methods for processing and interpreting near-surface seismic refraction data. The advantage of using the CRM is that it is able to conveniently accommodate and resolve simple departures from plane interfaces and homogeneous velocities. The generalized reciprocal method (GRM) is a technique for delineating undulating refractors, at any depth, from in-line seismic refraction data consisting of forward and reverse traveltimes. Now the steps for Generalized Reciprocal method is determining the value of Time Velocity analysis, XY Optimum distance, Time Depth analysis value, and depth. The training and testing process of the CRM is successfully accomplished using the synthetic data. Furthermore, we evaluated the CRM using observed data. The result indicates that the GRM can compute velocity and elevation corresponding to arrival times. The similarity of those models shows the success of GRM as a good alternative in seismic refraction data interpretation.

Keywords: *Seismic Refraction, GRM, CRM*

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D-11

ALMA OBSERVATIONS OF A GRAVITATIONALLY LENSED GALAXY RXJ1131-1231 AT REDSHIFT Z=0.7

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We present high angular resolution ALMA observations of the 2mm continuum and CO(2-1) emission line of a gravitationally lensed galaxy RXJ1131-1231 at redshift z=0.7, one of the closest known gravitationally lensed quasar host (ALMA Partnership et al.2015[1]). While the dust component is very compact, the gas is much more extended, displaying a clear velocity gradient across the Einstein ring. The lensing configuration, constrained by Hubble Space Telescope images, shows a typical case of a quasar point source close to a cusp of the lens caustic. We have constructed the map of the molecular gas emission of the host galaxy in the source plane, which reveals a rotating disc of 9 kpc diameter (FWHM) inclined by 50 degree with respect to the plane of the sky. Results are discussed in the general context of galaxy formation and evolution in this range of redshifts.

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D-12

GIANT CROSS-KERR NONLINEARITY OF A FOUR-LEVEL N-TYPE ATOMIC GASEOUS MEDIUM UNDER DOPPLER BROADENING

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The cross-Kerr nonlinearity or the so-called cross-phase modulation (XPM) refers to the phenomenon that phase of an optical field is modulated by another field. An excellent proposal to get large Kerr nonlinearity is to use lights working in vicinity of atomic resonances under electromagnetically induced transparency (EIT) [1]. The first scheme to obtain giant XPM via EIT in an N-type four-level system was proposed by Schmidt *et. Al.* [2] in 1996. Late, Kang *et al*. [3] experimentally demonstrated a large cross-phase shift for a probe field caused by a weak signal field in such an N-type system in a cold Rb atomic medium. Since then, several schemes have been extensively studied theoretically and experimentally to obtain an enhanced XPM [4-7].

Growing of interest on the giant cross-Kerr nonlinearity is also extended to hot gaseous media due to it is close to normal condition [5,6]. Moreover, as in several applications related to such Kerr medium, a precise knowledge of the Kerr nonlinear coefficient as a function of the parameters of laser fields and temperature is needed to optimize nonlinear optical processes. Up to date, to our best knowledge, nevertheless, the cross-Kerr nonlinear coefficient of the four-level N-type system in the presence of Doppler broadening has not yet been investigated.

In order to meet the above need, this work studies influences of Doppler broadening on cross-Kerr coefficient of the four-level N-type atomic medium by using analytical method. An expression for cross-Kerr nonlinear coefficient is found as a function of parameters of laser fields and temperature. The influences of intensity and frequency of coupling field and temperature on cross-Kerr coefficient are investigated.

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E-02

BRAIN TUMOR DETECTION USING CLUSTERING ALGORITHMS AND MORPHOLOGICAL OPERATION

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Brain tumor is an abnormal mass of tissue in which cells grow and multiply uncontrollably, jeopardizing the patient's life. Hence, the tumor detection in the early stage is immensely important and the MRI image is the leading choice in the diagnosis of brain tumor. The aim of this paper is to detect tumors from MRI images using K-means and Watershed algorithms. The method is divided into two main steps. In the first step, tumor segments are extracted by K-means and Watershed algorithms (two independent methods). The second step is to detect the tumors from the upper segment based on the morphology operations. This method was applied to analyze MRI images of the benign and malignant tumors. The results of the K-means algorithm showed that in addition to the segment containing the tumors, there were other segments of the brain such as gray matter, white matter, cerebrospinal fluid; while those of the Watershed algorithm only demonstrated the tumor segments, but its image is clear and beautiful. Using the analysis results of these two algorithms can help physicians improve the interpretation quality.

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E-03

THE CIKAPUNDUNG-CITARUM RIVER CLEANSING USING AUTOMATIC TRASH SKIMMER

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Plastic pollution of the Cikapundung-Citarum river is out of control. The impact of these plastic wastes disrupts aquatic ecosystems and causes aquatic living things to become extinct. Therefore, it is necessary to reduce the waste population in the water. This research develops a prototype of an automatic trash skimmer. This prototype is utilizing electrical energy sources from solar cells. The prototype controlled by a radio-frequency modules, transmitter and receiver. Transmitter consists of a joystick component, it is used to send command data to the receiver so that it can drive two brushless motors for motion control and a 12 V DC motor that drives the conveyor. In this prototype, water level sensor is used to detect the depth of the body that is immersed in water. It will provide information to the user that the maximum capacity of waste collected have been fulfilled. The water level sensor is integrated with a buzzer.

Keywords: plastic pollution, pollution control, trash skimmer

E-04

IDENTIFICATION OF PHAGE ENDOLYSIN AGAINST VIBRIO PARAHAEMOLYTICUS FROM METAGENOME DNA SEQUENCING DATA OF WATER AT SHRIMP PONDS IN MEKONG DELTA REGION

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Vibrio parahaemolyticus, belonging to *Vibrio* genus, is a causative agent of acute hepatopancreatic necrosis, early mortality syndrome in shrimp. They have ability to form the biofilms that help them to against the of antibiotics and other treatments. The abuse of antibiotics in the treatment of shrimp diseases has led to the formation of antibiotic-resistant strains of *Vibrio parahaemolyticus*. Bacteriophage is a natural and safe solution to control bacterial diseases in aquaculture. The method of using phage to control shrimp bacteria is widely used and the effectiveness of this method has been confirmed. Currently, many researchers are interested in enzymes derived from phage as a promising tool to reduce dependence on antibiotic use. In particular, endolysins are of interest to the scientific community because they have the role of dissolving the cells of pathogenic bacteria, including the *Vibrios* group. In this study, we present the results on the identification of phage endolysin against *Vibrio parahaemolyticus* from metagenome DNA sequencing data of water at three shrimp ponds (ST1, ST3, BL3) collected in Soc Trang and Bac Lieu province. The results showed that a total of 5.615.322 sequences were obtained in three samples. Sequences belonging to *Vibrio parahaemolyticus* in ST1; ST3; BL3 are 68; 40; and 605, respectively. The number of contigs belonging to phage endolysin in ST1; ST3; BL3 are 25; 41; and 186, respectively. 5 sequences of bacteriophage-derived lytic enzyme was retrieved from CAZy database to design probes. Using the probe designed, we filtered five coding sequences for phage endolysin against *Vibrio parahaemolitycus* from metagenome DNA sequencing data of bacteria in water of shrimp ponds. Spatial structure estimation with Phyre2 has only one sequencing (Prokka_35025) with 100% sequence identity and 90% query coverage with phage endolysin. Our study could provide a comprehensive background for futher studies of expression of recombinant endolysins that have lytic activity against of *Vibrio parahaemolyticus*, and their application in the treatment of aquatic diseases.

Keywords: endolysin, insilico analysis, antibiotic resistant, *Vibrio parahaemolyticus*, gram-negative bacteria

E-05

BREAST CANCER DETECTION USING BI-DIMENSIONAL EMPIRICAL MODE DECOMPOSITION AND THRESHOLDING

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Breast cancer is the first leading cause of death for women, and the mortality can be reduced if the cancer is detected at its early stages. Therefore, the purpose of this work is to detect tumors from mammograms, which enables physicians to diagnose tumors easily. There are many different methods to detect tumors from mammograms. In this paper, using Bi-Dimensional Empirical Mode Decomposition and thresholding to detect and segment tumors. The method is divided into three steps. The first step, the Bi-Dimensional Empirical ModeDecomposition(BEMD) is used to decompose mammogram into different frequencies components that called intrinsics mode functions (IMFs), then using the sum of three IMFs: IMF2, IMF3 and IMF4 as input image for analysis. Second step, tumors are extracted and segmented by using image quantization method with multithreshold. The last step, boundary smoothing and the tumorsize are performed based on morphological operation. This method is applied to mammograms of Malignant cancer and Benign cancer; the results showed that the tumors are well detection.

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Closing-01-I

RESEARCH OPPORTUNITIES IN GIST WITH HIGH EXCELLENCE

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As being government-supported, Gwangju Institute of Science and Technology (GIST) was founded in 1993, and has been firmly committed to fulfilling its foundational goals of advancing the nation's science and technology and educating students to have excellent talents in those fields. As a result, it has grown into a world-class research university in a relatively short period of just over two decades. In this talk, I will show why and how you be a part of GIST joining our academic and research programs. It includes introductions about:

(i) excellent research opportunities in several areas of engineering and natural science

(ii) rich fellowships and financial supports

(iii) practical information about your application for the admission.

Closing-02-I

INTERNSHIP AND PHD RESEARCH AT SOKENDAI AND INTER-UNIVERSITY RESEARCH INSTITUTES IN JAPAN

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SOKENDAI (The Graduate University for Advanced Studies) is the national university to exclusively offer doctoral programs in Japan. SOKENDAI is unique in concept in the world as a university affiliated with 17 Inter-University Research Institutes (IURIs), which are the world-class research institutes in Japan. For example, high Energy Accelerator Research Organization (KEK), Showa station in Antarctica, Institute for Molecular Science (IMS) and so on are part of SOKENDAI campus. Most professors and students work on their research and study as members of IURIs.

In this talk, SOKENDAI and IURIs research activities, internship programs, facilities, financial supports which are open to students, postdocs and professors in the world are introduced. As expected, SOKENDAI welcome international collaboration of students and faculties. When introducing SOKENDAI research activities, physics in particular astrophysics is emphasized as the presentator is specialized in that field.

P01

SCIENTIFIC METHODS FOR ESTIMATING THE STRUCTURE OF PHLEGMATINESS LAYER IN PYROXYLIN PROPELLANT

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Phlegmatization pyroxylin propellant to control the rate of combustion of grains, creating a combustion process that increases the speed of the projectile while maintaining the pressure of the propellant. The rate of combustion propellant grains depends not only on the content of the phlegmatizer, but also on its profile in the grain granule. With the development of science and technology, today there are many methods that can additionally study the structure of layers of materials, but in the field of military launchers there is little research and mention. In this article, the authors use three methods to evaluate the structure of phlegmatizer layers containing camphor, such as the optical imaging, the SEM / EDX, and the Raman spectroscopy method. From there, compare the pros and cons of each method in assessing the quality of phlegmatization.

Fig.1. The image shows is camphor layer contained in the Phlegmatic propellant

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P02

SURVEY OF EFFECTS OF COMPOSITION AND TEMPERATURE ON DYNAMIC VISCOSITY IN COMPOSITE EXPLOSIVES

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This survey shows some results about the effects of compositon, size of Aluminum powder (Al) and temperature on dynamic in the composite explosive containing Hexogen (RDX), Trinitrotoluene (TNT), Aluminum powder (Al) and phlegmantizers, carried out on Brookflied spinning viscometer under several temperature conditions. The dynamic viscosity significantly increases when decreasing temperature conditions, as well as lowering Aluminum powder size. It also rises up when simultaneously adding more Al and decreasing TNT content. These results contribute a direction to determine an appropriate temperature in founding the composite eplosive into projectile.

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P03

EFFECTS OF ALUMINUM POWDERS ON BLAST WAVE PARAMETERS FOR COMPOSITE EXPLOSIVE DETONATION IN FREE AIR

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This article shows some effects of content and size of Aluminum powder in the composite explosive containing Hexogen (RDX), Trinitrotoluene (TNT), Aluminum powder (Al) and phlegmatizer on several characteristic parameters of an incident blast wave such as the velocity, the overpressure, the pressure pulse at some distances away from the center of explosion. The explosions were carried out in the air with 400 g of explosive. The paramerters were obtained from overpressure measurement device PCB 482A16 with a piezo sensor. It is clear that when increasing Al content the positive overpressure and shockwave velocity decreases, however the pressure pulse rises. A noticable result is that size of Al powder (at 1,0 μm; 10,0 μm and 30,0 μm in average) seems not to affect to those parameters. Finally, oxygen balance as well as Al/O ratio are directly proportional to positive overpressure and inverse proportion to pressure pulse.

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P04

AN INVESTIGATION OF EXPERIMENTAL CONDITIONS ON VULCANIZATION OF A COMPOSITE BASED LIQUID NATURAL RUBBER AT LOW TEMPERATURE

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The hydroxyl-terminated polyisoprene (HTPI), which is a liquid natural rubber, is depolymerized from natural rubber for producing a composite with a high quantity of filler. The liquid natural rubber is often vulcanized by sulfur at a temperature from 135 to 150 ^{o}C. The composite with ammonium perchlorate (AP) filler needs to be vulcanized at a lower temperature by safety. In this paper, the conditions of vulcanization of the composite based on HTPI and AP were investigated at a temperature from 70 to 90 ^{o}C. The Young's modulus, stress strength and maximum compression of the sample were determined by H10K-S equipment. The results show that the composite is fully vulcanized by sulfur with tetramethyl thiuram monosulfide at the temperature from 70 to 90 ^{o}C. The conditions of vulcanization are found as follows: 0.24÷0.36% of sulfur, 0.036÷0.048% of tetramethyl thiuram monosulfide, 9 days at 70 ^{o}C or 7 days at 80 ^{o}C or 2 days at 90 ^{o}C.

Keywords: *liquid natural rubber, vulcanization, ammonium perchlorate.*

P05

LOW-LEVEL LASER THERAPY FOR SHOULDER TENDINOPATHY

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The shoulder joint is an important joint and it participates in many body activities. Shoulder joint pain is a common disease, it directly affects human motor function. Although there are many different methods for treating shoulder pain, there are no methods that are considered perfect. Therefore, we propose the shoulder joint pain treatment with low-power semiconductor lasers. This treatment includes: first - using intravenous low-power semiconductor laser working at 650nm wavelength - to improve blood circulation available in the body, with the aim of improving blood circulation, provide high-quality blood for shoulder joint, recovery treatment due to lesions of shoulder joint degeneration and external effects on shoulder joint; second - using a two-wavelength effect simultaneously illuminating the shoulder joint (including glenoid cavity and head of humerus) - working semiconductor lasers at 780nm and 940nm wavelengths - make biological responses due biological stimulation effects occur quickly and strongly; third – using the opto-acupuncture laser at 940nm wavelength impact on acupuncture points in traditional acupuncture to treat shoulder arthritis (Jian Gu, Jian Liao, Tian Zong, Zhong Zhu, Yang Ling Quan). We use the intravenous low-power semiconductor laser device and the opto-acupuncture low-power semiconductor laser device – having 12 channels to perform clinical treatment according to the stated treatment modalities. Patients in treatment include 36 people, including 06 patients with shoulder pain due to heavy porters, 30 people with shoulder pain due to degeneration. A course of treatment consists of 20 days, each patient has two courses. The assessment of treatment results is based on the Numerical Rating Pain Scale (NRPS) of the shoulder joints before and after the end of treatment; the Western Ontario and McMaster Universities Arthritis Index (WOMAC) to assess the mobility of shoulder joint. We noted the following results: before treatment - mean NRPS score was 7.22 points - severe pain, average WOMAC score was 3.14 points - severe pain; after the end of the two treatment courses - the average NRPS score was 0.723 points - no pain, the average WOMAC score was 0.22 points - no pain. We noted: among 36 patients who treated shoulder pain, 28 treatment patients had good results - accounting for 77.78%, 08 patients with good treatment results - 22.22%; There are no adverse side effects to patients. These treatment results show that the treatment of shoulder joint pain with low-power semiconductor lasers perfectly preserves the physiological function of the shoulder joint.

P06

BIOCHAR PRODUCED FROM BIOMASS FUEL AND ITS CHARACTERIZATION FOR DIRECT CARBON FUEL CELL (DCFC) APPLICATION

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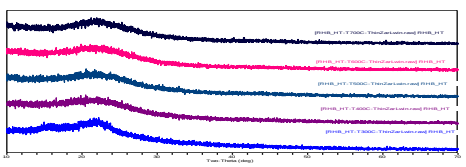
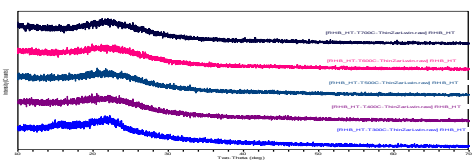
In this study, investigations were carried out on proximate analysis of rice husk biomass and physical properties of rice husk biochar (RHBs) from rice husk. The rice husk biomasses (RH-HT and RH-PT) were heated at 300˚C-700˚C for 1h and sieved to the average particle size. The proximate analysis of rice husk biomass and physical properties of RHBs were undertaken by direct measurements and calculations. The proximate analysis gave the following results; moisture content 10.516 wt%, volatile matter 84.05%, ash content 0.16% and Fixed Carbon 15.79% for RH-HT and moisture content 11.067 wt%, volatile matter 84.28%, ash content 0.158% and Fixed Carbon 15.562 % for RH-PT. Both biomasses (RH-HT and RH-PT) were thermally degraded through thermogravimetry (TG-DTA). Three stages were outlined as: (i) drying and evaporation of light components occurs at temperature below 150˚C, (ii) devolatilization starts from 150˚C to 500˚C, stage consist of two exothermic simultaneous processes and (iii) decomposition of lignin is attained at temperature above 500˚C. RHBs (RHB-HT and RHB-PT) were characterized by analyzing the chemical composition mainly based on X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and surface morphology from Field emission SEM (FE-SEM) and energy dispersive X-ray micro-analysis (EDXA). The XRD showed the carbon amorphous structure of rice husk biochars (RHB-HT and RHB-PT). The carbon C content of RHBs (RHB-HT and RHB-PT) was observed by Energy Dispersive X-ray Fluoresces spectroscopy (EDXRF). The porous nature of RHBs (RHB-HT and RHB-PT) were studied by scanning electron microscopy (SEM) and the carbon (C), oxygen (O) and silica (Si) were observed by Energy Dispersive X-ray spectroscopy (EDX). Fourier transform infrared spectroscopy (FTIR) analysis showed the presence of a variety of functional groups for RHBs (RHB-HT and RHB-PT). The results of the physical and chemical properties of the rice husk biochars

Fig. XRD Patterns of RHB-HT and RHB-PT at 300ºC to 700ºC





P07

A SHORT-PULSE AND TUNABLE UV Ce^{3+}:$LiCaAlF_6$ LASER FOR DIAL APPLICATIONS

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Differential absorption LIDAR (DIAL) [1], where LIDAR stands for "Light Detection and Ranging", is a remote sensing technique that is implemented to measure air pollutants. However, some pollutants such as ozone (O_3) and sulfur dioxide (SO_2) have strong absorption in the ultraviolet (UV) region. A short-pulse, narrow-linewidth, and tunable UV lasers are then necessary to measure the amount of O_3 and SO_2 in the air. Conversely, short UV laser pulses are typically generated using excimer lasers or through the harmonic generation of wide band gap semiconductors which are not widely tunable. In this regard, we develop a short pulse, narrow width, and tunable cerium (Ce^{3+})-doped $LiCaAlF_6$ (Ce:LiCAF) laser oscillator for LIDAR applications. Among all solid-state laser media, Ce:LiCAF is more advantageous because of its wider UV gain and smaller solarization effect. For the laser oscillator, the pulse duration is investigated as a function of output coupler reflectivity (R), cavity length (L), and pump power (P), while the tunability and linewidth are explored with the use of a blazed grating. We have successfully obtained short (450 to 510 ps), narrow (0.18 to 0.70 nm), and tunable (281 to 299 nm) UV laser pulses from a gain-switched laser cavity with low reflectivity (14 %), short cavity length (2.0 cm), and low pump power (80 mW average) and with 2400 grooves/mm grating in Littrow configuration. Our Ce:LiCAF laser oscillator also has an average output power of ~ 7.0 mW and a slope efficiency of ~ 8.0 %. These results indicate that the Ce:LiCAF laser oscillator can be used for future DIAL measurements of O_3 and SO_2 in the air.

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P08

DEVELOPMENT AND INVESTIGATION OF THE COPPER ION GENERATOR FOR WATER RESOURCE TREATMENT

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Copper ions have been well known as an active depollution method for environment treatment. Copper ions generated by electrolysis machine play better points not only because of the effectively cleaning ability but also the friendliness to environment. The generator operates with two dissolved electrodes basing on the alternate revesed polars principle. It is applied with two main works: (i): control the proliferation of the bacterias, mosses living in the closed water sourses, for example: tank, pond, swimming pool,…; (ii): kill the parasites causing disease for fish in both salt water and soft water. However, the optimise parameters strongly depend on the applying target. In this study, we develop a compact system which can apply on water resouce contructions. The structure, operation and parameters of device are illustrated detail in this paper.

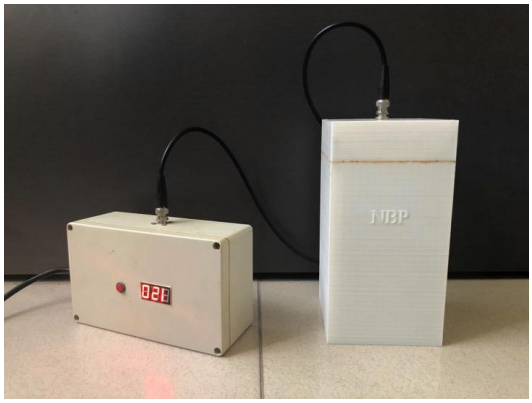

Fig. 4. The Cooper Ion Genarator for water treatment fabricated by authors

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P09

PHYSICAL AND MECHANICAL PROPERTIES OF GLASS-CERAMICS DERIVE FROM WASTE GLASS AND FLY ASH

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Manufacturing the glass-ceramics have been proposed as a useful choice to recycle fly ash from the power plant and bottle glass. In this work, the glass-ceramic system was synthesized by mixing waste glass powder and fly ash from Hongsa power plant, Xayaboury Province, Laos. The powder mixtures consisting of waste glass powder (75micro) and replaced partitive proportion by 20, 30, 40 and 50 wt.% fly ash. The specimen was uniaxial pressed into a 13 mm in diameter and 15 mm in length without using a binder. The green specimen was heated treatment in an electric furnace with a heating rate of 5 ºC /min at different temperatures of 800, 900 and 1000 ºC for 1 h. Physical and mechanical properties were determined bulk density, water absorption, compressive strength, and electrical resistivity. X-ray diffraction and scanning electron microscopy were employed to identify crystalline and microstructural properties. The glass-ceramic content of 30 wt.% fly ash and heat treatment at 1000 ºC exhibited the highest electrical resistivity of 18.43 GΩ and water absorption of 11.30%. The mineral phase of this glass-ceramics are consists of cristobalite, diopside, and wollastonite.

Keywords: Hongsa power plant, fly ash, glass-ceramics, waste glass, uniaxial press

P10

STUDY ON STERILIZING PLANT MATERIALS AND EFFECTS OF CYTOKININ ON SHOOT FORMATION OF *ORTHOSIPHON ARISTATUS* PLANTLETS

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Orthosiphon aristatus is well- known for a popular medical plant with the uses to treat kidney stones, hypoglycemia, acute and chronic nephritis, gout, rheumatism, hepatitis , diabetes mellitus, cancer … This article presents the results of sterilizing plant materials and on shoot formation, growth and development of *Orthosiphon aristatus* from Laos in order to contribute to finding a *in vitro* multiplication process to develop this plant in Vietnam.

The suitably sterilizing protocol is to wash *Orthosiphon aristatus* trunk segments by tap-water. After soaking samples in the weak soapy solution for 30 minutes, they were shaked in alcohol 70 degree for 1 minute and then in 0,1% $HgCl_2$ for 7 minutes. The optimum medium fomula for for rapid shoot organogenesis from segments of the trunk is the basal MS medium supplemented with 3% sucrose, 0.9% agar, 200 $ml.L^{-1}$ coconut water and 3,5 $mg.L^{-1}$ BAP (10.12 shoots/sample, the mean height of shoots is 2.96 cm).

Keywords: *BAP, kinetin, Orthosiphon aristatus, regeneration, shoot formation.*

P11

ISOLATION OF SOME PATHOGENETIC MICROORGANISM STRAINS IN PLANTS AND TESTING TE RESISTANCE ACTIVITY OF SOME BIOLOGICAL PRODUCTS

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Tea tree (*Camellia sinensis*), Bac Son tangerine (*Citrus reticulata Blanco*) and black sticky canarium (*Canariumtramdenum*) are the plants bringing the high economic value to farmers. However, Vietnam has a tropical climate, it is often damp. This is the favourable condition for growth of pathogenic microorganisms in plants. This paper presents the research results about isolation of some pathogenic microorganisms strains in tea, tangerine and black sticky canarium trees and testing the resistance activity of some biological products.

There are 05 strains of bacteria and 02 strains of fungi causing disease in tea, tangerine and black sticky canarium isolated. The extract from different parts of *Picria felterrae Lour* by ethanol for 72 hours has ability to inhibit Q2 bacterial strains in tangerines (concentration of 200 $g.L^{-1}$) and N1 fungi strain in tea (concentration of 150 $g.L^{-1}$). The complex $Er(Asp)_3phenCl_3.3H_2O$ (concentration of 10 $\mu g.mL^{-1}$) is capable of inhibiting 5 bacterial strains isolated including: C1 strain in tea, T1 and T2 strains in black sticky canarium, Q1 and Q2 strains in tangerine.

Keywords: *extract, resistance activity, isolation, complex, pathogenic microorganisms.*

P12

A STUDY OF ANATOMICAL CHARACTERISTICS AND SEQUENCE OF *ITS GENE* REGION FROM *ADINANDRA LIENII*

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Plant species belonging to the Adinandra genus, Theaceae family have been reported to contain several secondary compounds which have antimicrobial, anti-inflammatory, antioxidant, free radicals, and anticancer activities. This work presents the results of the first study on the geographic distribution and matK gene sequence of the Adinandra lienii specie belonging to Adinandra genus found in Van Ban district, Lao Cai province, Vietnam. To study the anatomical structure of this plant, thin slices of young stems and leaves were collected and placed in dye twice before observing on a microscope. The ITS gene region of Adinandra lienii species was isolated with a size of 506 bp. The gene sequence comparison results using BLAST in NCBI databases showed that the sequence of ITS gene region of Adinandra lienii specie similar to the sequence of ITS gene regions of some other species of the Adinandra genus. The results of this study provided information on the use of DNA barcodes with the sequence of ITS gene regions in order to identify species belonging to the Adinandra genus.

Keywords: *Anatomy, Adinandra lienii, ITS, Theaceae, sequence*

P13

RESEARCHING ON THE COMPATIBILITY OF POLYOXYMETHYLENE AND ENERGY MATERIAL

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The article presents the results of the research in which DSC and TGA were used to study the compatibility of γ-POM and nitroxelulo and nitroglyxerin-based energy material. The results show that, γ-POM is completely compatible with this energy material.

The findings act as an important foundation for designing and manufacturing nitroxelulo and nitroglyxerin-based energy material.

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P14

ABOUT MICROSTRUCTURE AND CRYSTALLIZATION PATHWAY IN IRON NANOPARTICLE UNDER TEMPERATURE

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This present work, we reported a simulation of iron nanoparticle (NP) at temperatures ranging from 300 to 750 K. The structure evolution is considered through pair radial distribution function (PRDF), bond angle distribution and dynamical local structure parameters. The simulation indicated that at temperature of 300, 450 and 650K, amorphous NP contains a large number of ico-type atoms which plays a role of preventing to crystallization. Meanwhile, at 750 K, amorphous NP is crystallized through transformations of amorphous type to bcc-type atoms. We found that the growth of crystal cluster happens parallel with changing its microstructure. The fully crystallized NP consists of three separate regions with amorphous, crystal-like and bcc-crystal structure.

Keywords: nanoparticle, crystallization, molecular dynamics, amorphous iron.

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P15

STUDY OF THE CRYSTALLIZATION OF AMORPHOUS SILICA UNDER COMPRESSION

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In this work, we use molecular dynamic (MD) simulation to study the crystallization of amorphous silica under compression. The structural evolution is explained through radial distribution function, coordination-number, bond-angle distributions, bond length distribution and 3D visualization. We found that there is a structural transformation from tetrahedral- to octahedral-network via SiO_5-units. In the 5-15 GPa pressure range, structural transformation occurs strongly and there are three structural phases corresponding to SiO_4-, SiO_5-, and SiO_6 ones. At 15 GPa, octahedral-network is dominant. When pressure are higher than 20 GPa, octahedral-network tends to transform to crystalline phase.

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P16

INVESTIGATION OF SENSITIVE AMMONIA SENSOR BASED ON HYBIRD PHOSPHORENE/Au

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Recent reports on the successful preparation of phosphorene or few - layers black phosphorus which have raised interesting prospects of an outstanding two – dimensional (2D) material, applied to fabricated electronic devices. Here we synthesized black phosphorus material by chemical vapor deposition. Moreover, we studied by the adsorption of ammonia (NH_3) gas molecules on multi – layers phosphorene and the hybrid phosphorene/Au. Our results predicted that the ammonia sensitivity ($\Delta R/R_0$) of the hybrid phosphorene/AuNRs (~ 600 %) and phosphorene/AuNPs (~ 300 %) were better than a pristine phosphorene (~ 90 %) with fixed concentrative solution parameters at room temperature. The combined phosphorene (2D) with gold metal (0D, 1D) not only show sensitive changes to adsorption of ammonia gas molecules, but significantly also reduced the chemical degradation of pristine phosphorene in air. These results make phosphorene a promising candidate for gas sensing application.

Key word: *Phosphorene, gas sensor, black phosphorus, 2D materials, …*

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P17

CHEMOPHOTOTHERMAL THERAPY OF MESOPOROUS SILICA ENCAPSULATED GOLD NANORODS LOADED DOXORUBICIN

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Gold nanorods (GNRs) have been coated with mesoporous silica have great potential both in photothermal therapy and drug delivery. In this work, we prepared the gold nanorods with the surface plasmon resonance absorption in the NIR region. The gold nanorods were encapsulated with mesoporous silica using the precursor tetraethoxylsilane. The drug loading and releasing in the mesoporous silica encapsulated gold nanorods were studied via using their optical properties. The ablation of tumor in vivo has been investigated by the combination of photothermal therapy and chemotherapy using doxorubicin linked GNRs@SiO2. Significantly greater tumor destroying was observed in sarcoma tumors, which directly injected with DOX-linked GNRs@SiO2 and irradiated with near-infrared (NIR) illumination using laser at power of 3.25 W.cm-2. Compared with photothermal treatment alone, the combined treatment showed a synergistic effect, resulting in higher therapeutic efficacy.

P18

ALL-DIELECTRIC METAMATERIAL FOR ELECTROMAGNETICALLY IDUCED TRANSPARENCY IN OPTICAL REGION

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Metamaterial (MM) [1] is emerging as a promising approach to manipulate electromagnetic wave, spanning from radio frequency to optical region. In this paper, we employ an effect called electromagnetically-induced transparency (EIT) [2] in all-dielectric MM structure to create a narrow transparent window in a opaque broadband of optical region (580-670 nm). Using dielectric materials instead of metals can mitigate the large non-radiative ohmic loss on the metal surface. The unit-cell of MM consists Silicon (Si) bars on Silicon dioxide (SiO_2) substrate, in which two bars are directed horizontally and one bar is directed vertically. By changing the relative position and dimension of the Si bars, EIT effect could be archived. Optical properties of the proposed MM are investigated numerically using finite difference method with commercial software Computer Simulation Technology (CST). Then, characteristic parameters of MM exhibiting EIT effect (EIT-MM), including Q-factor, time-delay, figure of merit (FOM), are calculated to evaluate the applicability of EIT-MM to sensing and light confinement.

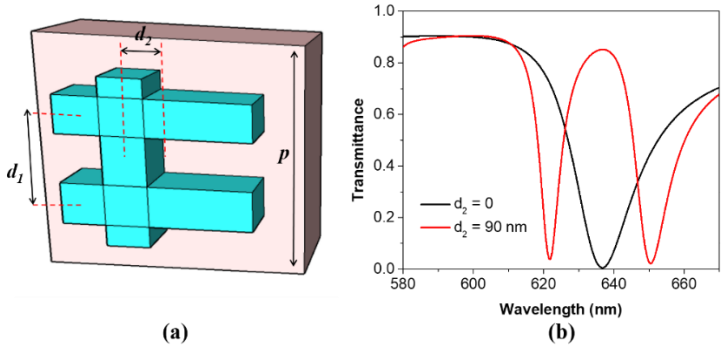

Fig. 5. (a) Designed unit-cell of EIT-MM structure. (b) The transmittance spectra of EIT-MM corresponding to symmetric structure ($d_2 = 0$) and asymmetric structure ($d_2 = 90$ nm).

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P19

SEVERAL RESULTS OF RESEARCHING, EXPERIMENT ON THERMOBARIC COMPOSITIONS IN VIETNAM

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In Vietnam, thermobaric compositions (TBC) recently are researched for advantage weapons. Through experiments authors realize that using curent parameters as VOD, Hess, and Ballistic mortar test does not reflect prominent characteristics of TBC. In [2], authors studied on selecting of method for measurement of parameters of power of TBC. This paper presents several results of researching, experiment on thermobaric compositions in VietNam

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P20

THE MICRO-HOLES ARRAY AS A CHEMOSENSOR AND BIOSENSOR

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Selective IR absorption at 1261 cm^{-1} enhanced by 455 times, was demonstrated for rhodamine 6G molecules, covering a 2D-photonic crystal, represented by a regular array of 4-micron wide holes in a 30 nm thick silver film on a CaF_2 substrate. The reference absorption lines were taken near 2900 cm^{-1}, where the IR radiation is freely channeling through the microholes, indicating the reference substrate coverage by the dye molecules for its relative internal calibration. The limit of background-free detection for the analyte was determined at the level ~10^{-2} monolayer [1, 2]. Using a micro-hole grating in a supported silver film as a laser-fabricated novel optical platform for surface-enhanced IR absoprtion spectroscopy, characteristic absorption bands of Staphylococcus aureus, in particular, its buried carotenoid fragments, were detected in FT-IR spectra with 10-fold analytical enhancement, paving the way for the spectral express-identification of pathogenic microorganisms [1, 2].

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P21

A RELIABLE TECHNOLOGICAL PROCESS POLISHING FOR OBTAINING SUPER SMOOTH GERMANIUM SURFACES

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Germanium (Ge) is one of the fundamental materials in thermal imaging devices. However, as Ge is very hard, the surface of Ge optical components is easily be scratched during fabrications process [1], which strongly affects the image quality of optical systems. As a result, exploring a suitable technological process for processing Ge is essential for improving the image quality of optical devices. There are various processing processes for Ge that have been developed and widely used in many developed countries in the world [2], but in Vietnam, this research area is still new and has not received enough attention. In this work, we investigate the influence of several technological factors, such as origin materials and the size of polished particles, polishing time on the surface quality of a Ge substrate. The result provides an optimal technological process which can be applied for polishing Ge to obtain excellent surface quality.

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P22

SUPERACTIVATION OF QUANTUM STEERING OF WERNER STATES WITH TWO MEASUREMENT SETTINGS TITLE

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Einstein-Podolsky-Rosen (EPR) steering, together with quantum entanglement and Bell nonlocality, is a basic notion of quantum nonlocality. In the steering scenario, Alice and Bob share a pair of particles and, by performing measurements on her side, Alice can steer state of Bob's particle to different assemblage. Bob however is not necessarily to believe Alice could do so if he can explain his measurement results by an ensemble of states of his particle only – the so-called local hidden state (LHS) model. In this case, the shared state can not be used to demonstrate steering, thus is called *unsteerable*. The situation might change if Alice and Bob share many identical copies and Alice can make collective measurements on several particles at the same time. Although the state of each pair of particles is unsteerable, the state of many identical pairs, which is just the tensor product of state of single pair, can still be used to demonstrate steering. In this case, one says that the steerability of this unsteerable state can be *superactivated*. In this work, we show the superactivation of quantum steering with two measurement settings for the case of two-copy of Werner state. Our work is the first step towards the determination of the two-superactivation with arbitrary measurement settings.

P23

SYNTHESIS AND CHARACTERIZATION OF EUROPIUM COMPLEXES A POTENTIAL MOLECULE FOR FUNCTIONALIZING ELECTORDE WITH CHROMOPHORE

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Europium organometallic complexes contain beta-disketonate ligands that are interesting in highly luminescent properties[1]. In this work, the europium organometallic complexes were designed and synthesized to coordinate with the beta-disketonate ligands and an ionic ligand contains amine-group like as 5-amino-1,10-phenanthioline (Figure 1). The as-prepared complexes were characterized and studied by UV-Vis, FT-IR, NMR and photoluminescence techniques. The presence of amine-groups allows for the electro-grafting of synthesized complexes on the electrode surfaces by diazonium electrode-reduction process[2]. It yields to the covalent grafting of organic layers with strong luminescent properties on electrode surfaces. This strategy is an original way to obtain well-controlled and robust layer of chromophore for functionalizing electrode surface, which may towards to potential applications related to the photo-physical properties.

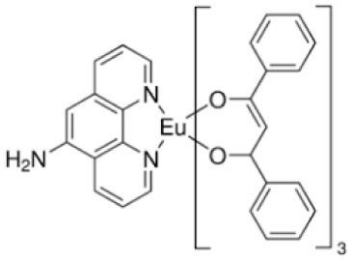

Figure 1. Proposed structure of Europium complexes

Keywords: Europium complexes, luminescent molecules, diazonium; electro-grafting.

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P24

LANT TISSUE CULTURE OF *HUPERZIA SERRATA* BY THE SHOOT TIP CULTURE TECHNIQUE

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Huperzia serrata (Thunb.) Trevs is a rare medicinal plant species in the world. However, this plant often grows very slowly in the natural environment. The plant contains the main active ingredient Huperzine A (HupA) which is effective in treating memory disorders, especially Alzheimer's disease in oldster. In this study, we used the shoot tips of *H. serrata* as culture materials. For disinfection, the culture materials treated with 70% C_2H_5OH for 30 seconds, followed by 0.1% $HgCl_2$ for 5 minutes and 20% Javen for 7 minutes showed the best disinfection effectiveness with a non-infected sample rate of 13.61% and germination rate of 46.08%. The shoots rooted in the medium supplemented by 1 mg/l of IBA showed the best rooting effectiveness. The rate of rooted shoots reached 24.92%, number of roots/shoot reached 2.33, root length reached 1.17 cm, and the rhizome was large and strong.

Keywords: *Huperzine A, Huperzia serrata, in vitro, root formation, tissue culture*

P25

GRAFT-TYPE POLYMER ELECTROLYTE MEMBRANES: RELATIVE HUMIDITY DEPENDENCE OF ELECTROCHEMICAL AND MECHANICAL PROPERTIES FOR FUEL CELL VEHICLES

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Poly(styrenesulfonic acid)-grafted poly(ethylene-*co*-tetrafluoroethylene) polymer electrolyte membranes (ETFE-PEMs) were prepared by pre-irradiation grafting method, in which polymer ETFE substrates are irradiated using a quantum beam, immersing them into a monomer solution for graft polymerization, and then carrying out the subsequent sulfonation on the graft polymers. Proton conductivity and tensile strength of ETFE-PEMs with a wide range of IEC, which is controlled by a grafting degree (GD), were investigated in detail in the range of 30–100% relative humidity (RH) at 80 °C. The proton conductivity of ETFE-PEMs can be controlled in a wide range (0.001 – 0.013 S/cm) even at low RH (30% RH). The tensile strengths of ETFE-PEMs were relatively constant (28 MPa) in entire range of the grafting degree under dry condition; however, they gradually decreased with increasing the grafting degree under 100% RH, which is a severe condition comparable to flooding. Compared with aromatic hydrocarbon type PEMs, the proton conductivity of ETFE-PEMs have less dependence to RH. As the results, the ETFE-PEM with a GD of 79% exhibited comparable conductivity (0.009 S/cm) under 30% RH and tensile strength (11 MPa) under 100% RH at 80 °C to those of Nafion-212. The graft-type fluorinated PEM offers the PEM having well-balanced conductance and mechanical properties for fuel cell applications.

Keyword: ETFE, radiation grafting, fuel cell, mechanical property, low RH

P26

APPLICATION OF LOW POWER SEMICONDUCTOR LASER IN THE TREATMENT OF VASCULAR DEMENTIA ON POST-STROKE PATIENTS REHABILITATED

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Objective: The study investigated whether patients with mild to moderately severe vascular dementia with Standardized Mini-Mental State Exam (SMMSE) [1] Baseline scores of 6–20 would improve when treated with low power semiconductor laser therapy.

Background: Vascular dementia is caused by reduced blood supply to the brain due to diseased blood vessels. This death of brain cells can cause problems with memory, thinking or reasoning. Together these three elements are known as cognition. When these cognitive problems are bad enough to have a significant impact on daily life, this is known as vascular dementia.[2][5]

Material and method:

A treatment course includes:

Day 1: Using intravenous laser wavelength 650nm, power of 2-3mW, exposure 45-60 minutes to improve quality of blood cells and blood vessels and to provide enough nutrition for brain cells therefore that can help recover injured brain cells by stroke.

Day 2: Using biomedical laser with 2 wave-lengths together 780nm and 940nm [3][4], exposure 60 minutes (has 3 stages) with special treatment course in every day to apply on head acupuncture points hence phototherapy can help increase cellular activities such as increases cell metabolism, improves cell regeneration, invokes an anti-inflammatory response, reduces fibrous tissue formation and stimulates nerve function…

A treatment course consists of 20 days. After completing three treatment courses, patients were included in the evaluation of treatment results.

Results: 36 patients were assessed on the SMMSE scores before treatment SMMSE scores from (18-23) points - 06 patients have mild dementia, 16.67%. SMMSE scores from (10-17) points - 22 patients have moderate dementia, 61.11%. SMMSE scores from (0-9) points -08 patients have severe dementia, 22.22%. After 03 low-power semiconductor laser treatment courses, there was a big change in the level of dementia. Specifically, 02 patients achieved SMMSE scores from (18-23) points - corresponding to the level of dementia, 5.56%. 34 patients achieved SMMSE scores from (24-30) points - no dementia, 94.44%.

Conclusion: The therapeutic was an effective and safe treatment for vascular dementia patients by improving cognitive function.

Keywords: *Vascular dementia, low power semiconductor laser, SMMSE, post-stroke*

P27

DETERMINATION OF SHEAR WAVE VELOCITY AT SAIGON HIGH TECH PARK IN HO CHI MINH CITY BY USING MULTICHANNEL ANALYSIS OF SURFACE WAVE AND BOREHOLE MEASUREMENTS

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The correlation among values of shear wave velocity (V_S) measured by multichannel analysis of surface wave (MASW) and N values measured by standard penetration test (N-SPT) from seventeenth boreholes at Saigon High Tech Park in Ho Chi Minh city is investigated. The obtained correlation function (i.e., exponential function showing the relationship between V_S and N-SPT) is then compared with that from other reports. The proposed correlations in this study can be used for further geotechnical measurements at other area in Ho Chi Minh City, especially at ground motion area and site characterization for improving seismic design considerations. Note that the obtained results in this study can significantly contribute to not only the further development of MASW analysis but also a detailed understanding of geophysical features in Ho Chi Minh City.

Keyword: V_S, MASW, N-SPT.

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P28

MOLECULAR CLONING OF *GME* GENE IN *CITRUS RECUTILATA* FROM BAC SON – LANG SON

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Cirus recutilata which has been grown for long in Northern mountainous area of Viet Nam, has limited ecological adaptation. Its fruit contains high level of ascorbic acid. Ascorbic acid, also well known as vitamin C or ascorbate, is an essential water-soluble micronutrient for both animals and plants. As a general antioxidant and a cofactor for enzymes, Ascorbic acid plays important roles in the process of sustaining biological activities in living organisms. However, level of ascorbic acid in each breed varies, thus putting affect on the taste, and sweet or sour intensity of each specific breed. At least four biosynthetic pathways have been identified in plants, including L-galactose pathway, L-gulose pathway, D-Galacturonate pathway and myo-Inositol pathway. Among these four pathways, the L-galactose pathway has been fully elucidated and is regarded as the primary route of ascorbate biosynthesis in most plant species. Nine structural genes are involved in L-galactose pathway and all of them have been identified and cloned from various plants. GDP - D - mannose - 3'.5'- epimerase (GME) coordinates the transition process from GDP - L - galactose to GDP - D – manose, one of the ground stones out of the synthesis progression of ascorbic acid in plant. Bac Son *Citrus recutilata* is an endemic product with outstanding smell and taste in limestone moutainous area of Bac Son ditrict, Lang Son province. In the previous study, we have evaluated some morphological and biochemical characteristics of some tangerine samples. In which, there was an assessment of the vitamin C content in the Bac Son - Lang Son. In this research, we will present the characteristics of the *GME* gene isolated from Bac Son-Lang Son *Citrus recutilata*. The *GME* gene isolated from Bac Son-Lang Son *Citrus recutilata* has 1083 nucleotides, in which there are 282 Adenines, 294 Thymines, 212 Cytozines and 295 Guanines. Protein encoded from this gene has 361 amino acids. The nucleotide sequence of *GME* gene isolated from Bac Son-Lang Son *Citrus recutilata* sample is 99% homologous with that of *GME* gene coded as HQ224946. Sequence of deduced amino acid of *GME* gene of Bac Son – Lang Son *Citrus recutilata* is 99% homologous with that of HQ224946.

Keywods: *Cirus recutilata*; *Bac Son-Lang Son*; GME; *ascorbic acid*; nucleotide; *amino acid*

P29

CHARACTERISTICS OF HAIRS AND STOMATA OF STIXIS LOUR. IN VIETNAM

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Stixis Lour. is a genus of Capparaceae. This genus has 7 species, distribution in Asia including India, Bhutan, Malaysia, Myanmar, Thailand, China [1]. In Vietnam, there are 4 species, distribution in some region [2]. For identification these species, we can identify base on character of habit, stem, leaf, inflorescence, flower and fruit.

Beside, we can use character of hairs and stomata to identify species of this genus. The hairs of *Stixis* is trichomes with 4-6 branches. Stomata is anomocytic type. The position of stomata is parallel with epidemics. The stomata is around by different size of cells. The differents between species is number and size of filler cells.

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P30

SURFACE PLASMON RESONANCE SENSOR BASED ON PHOTONIC CRYSTAL FIBER COVERED WITH GOLD FILM

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The high sensitivity surface plasmon resonance (SPR) sensor based on the photonic crystal fiber (PCF) covered with gold (Au) film is proposed and analyzed in this work. The optical characteristics and performance of the designed sensor are simulated and investigated by using the finite element method (FEM) with circular perfectly matched layer (PML) boundary condition. In this design, the sensing liquid filled into the air holes in cladding, which offers the high confinement loss and acts as an analyte core mode and background acts as silica mode. The proposed sensor exhibits the birefringent behavior leading to the sensitive enhancement. By optimizing the structural parameters, the sensitivity could reach to 5,000 nm/RIU for the analyte refractive index range of 1.34-1.39. The obtained result reveals that the proposed structure has seen widespread use in implementing biochemical and chemical sensing applications.

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DEVELOPMENT OF SHORT PULSE BROADBAND AND TUNABLE NARROW LINEWIDTH ULTRAVIOLET LASERS USING Ce:LiCAF CRYSTAL

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We report the development of all-solid state lasers based on Ce^{3+}:$LiCaAlF_6$ (or Ce:LiCAF) crystal as gain medium. These Ce:LiCAF lasers are pumped by 7 ns pulses at 10 Hz from the fourth harmonics (266 nm) of a Nd:YAG laser. The effects of output coupler reflectivity, resonator length and pump energy on the Ce:LiCAF laser characteristics were explored. With the broadband laser configuration, the Ce:LiCAF laser achieved a maximum output pulse energy of 3.4 mJ and a slope efficiency of about 33%. Single UV laser pulses of 450 ps were generated from a low-Q and short resonator under a near threshold pump. With narrow linewidth laser configuration, where the end mirror is replaced by a grating, tunability of the Ce:LiCAF laser emission from 281 nm to 299 nm is also obtained achieving a linewidth narower than 0.2 nm.

Keywords: *ultraviolet laser; short pulse laser; tunable laser; resonator transient; rare earth-doped fluoride.*

P32

SOLVENT VAPOR ANNEALING FOR IMPROVED STABILITY AND EFFICIENCY OF MONOLITHIC HOLE-CONDUCTOR-FREE PEROVSKITE SOLAR CELLS

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In the last few years, perovskite solar cells have attracted enormous interest in the photovoltaic community due to their low cost of materials, tunable band gap, excellent photovoltaic proprties and easy process ability at low temperature. In this work, we fabricated hole-conductor-free carbon-based perovskite solar cells with the monolithic structure: glass/FTO/bl-TiO_2/mp-TiO_2/mp-ZrO_2/carbon electrode. The mixed 2D/3D perovskite precursor solution composed of PbI_2, methylammonium iodide (MAI), and 5-ammoniumvaleric acid iodide (5-AVAI) was drop-casted through triple mesoporous TiO_2/ZrO_2/carbon electrode films. We found that the isopropyl alcohol (IPA) solvent vapor annealing strongly influenced on the growth of mixed 2D/3D perovskite on triple mesoscopic layers. It resulted in the better pore filling, better crystalline quality of perovskite layer, thus the improved stability and efficiency of perovskite solar cell was attributed to lower defect concentration and reduced recombination.

P33

GENERATING VACCINE CANDIDATE STRAIN AGAINST A/H5N1 CLADE 2.3.2.1C VIRUS BY REVERSE GENETICS

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Avian influenza A/H5N1 clade 2.3.2.1c virus has been circulating since 2012 in Vietnam [1]. In this paper, we present the generation a vaccine candidate virus strain against highly pathogenic A/H5N1 virus clade 2.3.2.1c by reverse genetics.

The protocol to generate the strain of reverse genetics-derived A/H5N1 clade 2.3.2.1c vaccine virus (rg-A/H5N1 clade 2.3.2.1c) was optimized and shown in Figure 1. Firstly, recombinant viruses were obtained after transfection of the eight-plasmid system into 293T cells. Recombinant virus contains six internal gene segments of A/PR/8/34 virus and two modified HA and NA surface antigen gene segments of the circulating A/duck/Viet Nam/HT-02/2014(H5N1) (clade 2.3.2.1c) strain. Secondly, infectious virus particles are harvested and passed into 10-day-old embryonated chicken eggs for selecting high-growth H5N1 strain as vaccine candidate.

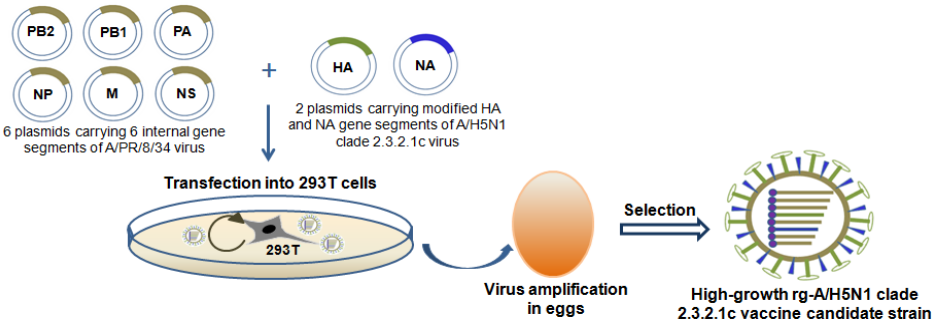

Fig. 6. Diagrammatic representation of the reverse genetics process in generating vaccine candidate strain against A/H5N1 clade 2.3.2.1c virus

The safety of vaccine candidate virus strain has been confirmed. Then, we tested the genetic stability and HA titer of virus strain in five generations of breeding in eggs. The results showed that candidate strain was genetically stable and had high-yield (HA titer ≥ 1: 1024) in virus generations. Inactivated rg-A/H5N1 clade 2.3.2.1c virus with oil-emulsion induced immunogenicity to produce specific antibodies in 3-day-old pathogen-free chickens injected with one or two doses of this inactivated virus (1024 HAU). Four weeks after vaccination, over 80% of chickens had HI antibody titers > 1: 64.

Summarily, we mastered reverse genetics technology to generate vaccine candidate strain against any influenza A viruses including H5N1, H5N6 or HxNy.

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P34

INFLUENCE OF MESOSCOPIC TIO_2 ELECTRON TRANSPORT LAYER THICKNESS ON THE PERFORMANCE OF MIXED ORGANIC - INORGANIC HALIDE PEROVSKITE SOLAR CELLS

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Hybrid organic - inorganic halide perovskite solar cells have developed rapidly in recent years due to their cost-effective processability, adjustable band gap and excellent photovoltaic performance. Mesoporous TiO_2 layers are known as an efficient electron transport layer of perovskite solar cells (PSCs). Herein, we investigated the impact of mesoporous TiO_2 layer thickness in the range of 100 nm to 1800 nm on the performance of mixed organic – inorganic halide perovskite solar cell. The mesoporous TiO_2 layer thickness was adjusted by changing the TiO_2 precursor concentration and spin-coating times. In this work, we fabricated perovskite solar cells with the conventional device configuration: glass/FTO/bl-TiO_2/mp-TiO_2/perovskite/Spiro-OMeTAD/Au. The triple cation mixed halide perovskite $Cs_{0.1}MA_{0.17}FA_{0.83}Pb(I_{0.83}Br_{0.17})_3$ was prepared by one-step deposition method under ambient air condition. The mesoscopic metal oxides/perovskite light absorbing films and solar cells were characterized by FE-SEM, XRD, UV-Vis absorption spectrum, photoluminescence and photocurrent-photovoltage characteristics. We found that the optimization of the mesoporous TiO_2 layer thickness is required to improve performance perovskite solar cells.

P35

SCANNING KNIFE-EDGE METHOD FOR UV LASER SIZE MEASUREMENTS ORIENTATION IN LIDAR TECHNIQUE

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We report some results of UV laser beam quality measurements by scanning knife-edge method. For many laser applications, the beam quality is cardinal because it defines the smallest possible beam area in the focal point. The determination of the M^2 parameter belongs to fundamental measurement for the laser output characterization. Several methods for the M^2 parameter determination ware developed and the knife-edge method belongs to the widely used. Its main advantage is the simplicity and possibility to use for wide range of radiation wavelengths. In this application, the UV laser cavity designed to use with application of lidar on air pollutant monitoring, it requirements a line width of laser around 1 nm and beam divergent less more 0.5, wavelength range can be within 289 – 302 nm.

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EFFECT OF HALIDE ANIONS ON STRUCTURE OF LANGMUIR MONOLAYER-WATER INTERFACE PROBED BY SUM-FREQUENCY VIBRATIONAL SPECTROSCOPY USING A PICO-SECOND LASER

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In this report, we studied the effect of I^-, Br^-, Cl^- and F^- anions on Arachidic Acid (AA) Langmuir monolayers formed on salt solutions, such as NaI, NaBr, NaCl, and NaF by using a Sum-Frequency Generation Vibrational Spectroscopy (SFG-VS). These spectra indicate that halide anions have different effects on the structure of AA monolayer/water interfaces. The obtained SFG spectra suggest that the I^- anions mostly disturb the surface structure due to their largest anion size among those investigated.

Key word: Langmuir monolayer, interfacial structure, halide ions, Sum-frequency vibrational spectroscopy.

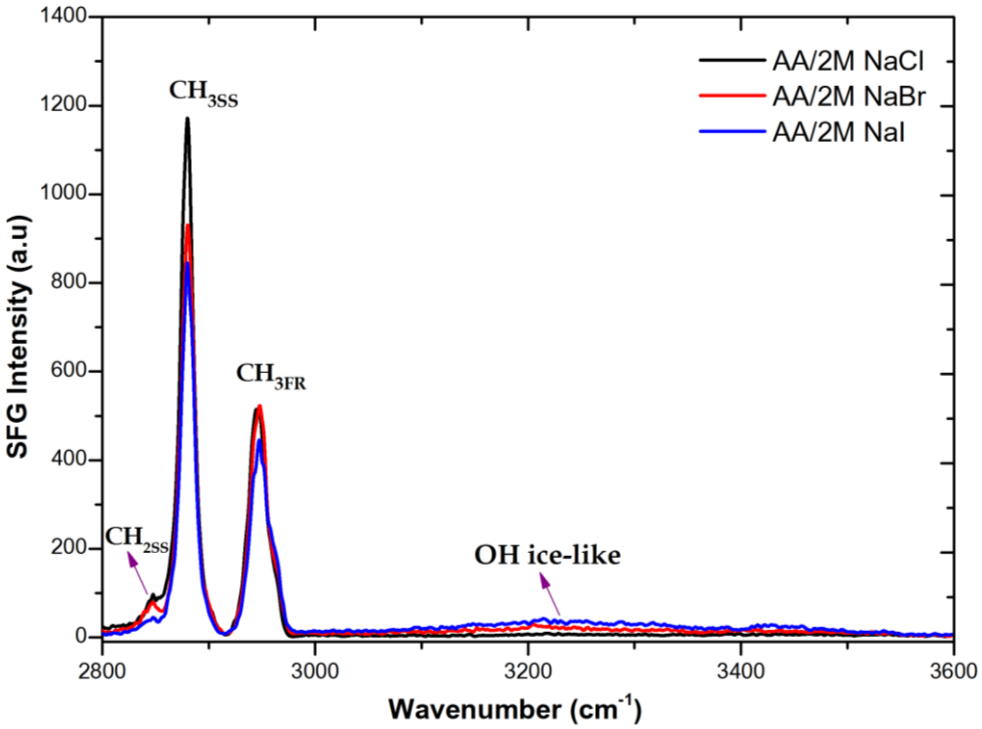

Fig. 1. SFG spectra of the AA monolayers on aqueous NaCl and NaBr and NaI solutions.

P37

THERMAL TUNABLE PERFECT ABSORPTION BEHAVIOR IN METAMATERIAL ON SUPER-HIGH DIELECTRIC CONSTANT MATERIAL

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More recently, the exotic advantages on subwavelength unit cells are also applied to pave the way for developing optoelectronic applications [1-3]. In this work, we investigated a metamaterial perfect absorber (MPA) designed by using the CST Microwave Studio software in the THz range. The proposed MPA structure, which is integrated with a super-high dielectric constant material (strontium titanate – STO), contains four lumped inductors (with L = 1nH) to thermally control absorption behavior. The STO undoped-MPA can maintain an absorption rate over 90% at 2.0 GHz in a wide incident angle of electromagnetic wave. By doping STO in the dielectric layer of initial design, absorption peak is raised and effectively tuned in the THz region. Since the temperature of STO is changed from 300 to 450 K, the absorption peak is blue-shifted (from 0.1 to 0.3 THz). Furthermore, the main absorption mechanism is also clearly clarified through the combination between the strong magnetic resonance and the impedance matching phenomena. Our results are useful for future applications at THz frequencies and promising for fabricating high-frequency MPAs based on cost- and performance-effective, large-size meta-surface.

Keywords: Strontium titanate, Metamaterials, Perfect absorption, Tunable

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INFLUENCE OF THE PARAMETERS ON THE SQUARE-TRIANGULAR STRUCTURE OF METAMATERIALS IN THE FREQUENCY RANGE FROM 0-18 GHZ

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In recent years, the exotic ability to perfectly absorb electromagnetic (EM) wave of the artificial structures (metamaterials) is promising candidates for many practical purposes, espicially, in the rapid growth of telecommunication decices. By the association between perfectly-matched impedance and trong resonance phenomena, the incoming EM wave is completely absorbed inside a size far smaller than that of the traditional absorbers. In this paper, we propose a metamaterial perfect absorber with a square-triangular structure in the GHz region. It demonstrated that the coupling interaction between the square and triangular cut leads to absorbing properties. In this research, we have performed the simulation by means of CST simulation software. By changing the structural parameters, the simulation show that the MPA can maintain an absorption rate over 90% as well as wider absorption bandwidth. Additionally, we also simulate electric polarization and magnetic polarization. The mechanism of the absorption results was explained by induced current, magnetic and electric distributions. Furthermore, LC equivalent circuit was used to elucidate resonant frequencies. Finally, we perform experiment using vector network analysis method, then compare experimental result with simulated result.

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INFLUENCE OF THE INTEGRATED ELEMENTS ON PERFECT ABSORPTION IN ULTRATHIN METAMATERIAL PERFECT ABSORBER

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In recent years, the exotic ability to perfectly absorb electromagnetic (EM) wave of the artificial structures (metamaterials) is promising candidates for many practical purposes, especially, in the rapid growth of telecommunication devices. By the association between perfectly-matched impedance and strong resonance phenomena, the incoming EM wave is completely absorbed inside a size far smaller than that of the traditional absorbers. Unfortunately, in the Bluetooth/WiFi bands, most recent metamaterial perfect absorbers (MPAs) are too thick, large and expensive to be easily integrated in real devices. Hence, many efforts have been proposed for creating the MPA structures with smaller unit cell [1-3]. In this work, an ultrathin MPA is simulated by using the CST Microwave Studio software to estimate perfect absorption property based on lumped elements. In this model, we improved common MPAs by integrating four embedded inductors with L = 200 nH or replacing four embedded capacitors with C = 200 pF in the same compact structure. The obtained results confirmed that the lumped capacitors-MPA can maintain an absorption rate over 90% at 110.5 MHz in a wide incident angle of EM wave up to 50^o with an extreme thickness $t = \lambda/1350$, where λ is operating wavelength. Besides, by replacing these capacitors by inductors in the initial designed-MPA structure, we obtained an absorption peak over 90% at higher frequency (2.0 GHz) for an incident angle of 50^o with an effective thickness of $t = \lambda/50$. Furthermore, we explained the absorption mechanism in terms of the induced surface currents, the magnetic-electric energy distributions and the impedance-matching effect (between MPA with the surrounding environment). Our work is further expected to realize a next generation of ultrathin-MPAs operating in the Bluetooth/WiFi bands.

Keywords: Metamaterials, Perfect absorption, Low frequency

P40

INFLUENCE OF THE LASER ON OPTICAL PHONON AMPLIFICATION IN A PARABOLIC POTENTIAL WELL

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In this paper, we establish the kinetic equation for optical phonons in semiconductor quantum well with parabolic potential under intense laser field. Using this equation, we find expression for the rate coefficient for the case non-degenerate electron gas, the condition of the optical phonon increase and the influence of the parameters of laser on the rate coefficient.

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INFLUENCE OF THE LASER ON PARAMETRIC RESONANCE OF ACOUSTIC AND OPTICAL PHONONS IN A PARABOLIC POTENTIAL WELL

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In this paper, we analytically investigate the possibility of parametric resonance of acoustic and optical phonons in a semiconductor quantum well with parabolic potential. We obtaine a general dispersion equation for parametric amplification and transformation of phonons. The dispersions of the resonant acoustic phonon modes and the threshold amplitude of the field for acoustic phonon parametric amplification are obtained. The parametric amplification for acoustic phonons in a parabolic potential well can occur under the condition that the amplitude of the laser field is higher than the threshold amplitude. We consider the effect of laser field parameters on this threshold amplitude.

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P42

STUDIES OF LOCAL DISTRIBUTION OF CALCIUM IN DRY PLASMA DROPS IN PATIENTS WITH BRAIN TUMORS BY OPTICAL MICROSCOPE AND ATOMIC EMISSION LASER SPECTROSCOPY

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We study the morphology of dried blood plasma drops of patients with different grades (astrocytoma and glioblastoma) of brain tumors and the local spatial distribution of calcium by volume in the facies analyzed. The structural peculiarities of dried blood drops from the patients with different grades of brain tumors and with metastatic brain tumors have been revealed. Results show that a healthy person is characterized by a uniform distribution of calcium on the surface of the dried droplet with a maximum concentration in the marginal protein roller due to the uniform diffusion of the solution to the edges during evaporation. On the other hand, all patients have characteristic radial morphological types of facies. As for patients in critical condition, the structuring of dried blood plasma droplets of these patients, first of all, is characterized by such a feature as a pronounced wrinkling of the facies surface, the presence of an abundant number of plaques and wide plaques. Secondly, the total calcium content in the facies of such patients is low, and its relative concentration is higher in the deep layers. The possibility to use the features of the dried drop structural formation and of the local spatial calcium distribution as an additional source of information for diagnosis and elucidation has then been estimated. The proposed methods enable one to control the course of treatment and to check up the dynamics of the developing pathology.

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PREPARATION OF BENTONITE NANOPLATELETS USING SIMULTANEOUS ULTRASONIC-ASSITED ACTIVATION–EXFOLIATION OF CLAY MINERAL CONTAINING BENTONITE

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This study reports on the preparation of bentonite nanoplatelets by simultaneous ultrasonic-assited activation–exfoliation method using clay mineral containing bentonite as a precursor. The materials were then characterized by scanning electron microscopy, transmission electron microscopy, atomic force microscopy, BET- BJH Analyses, and X-ray diffraction and were employed for removal of methylene from aqueous solution by batch method. Results showed that the ultrasonic irradiation not only exfoliates the bentonite layers but also enriches the montmorillonite composition of the bentonite material. In addition, mechanism for preparation of bentonite nanoplatelets by simultaneous ultrasonic-assisted activation–exfoliation of natural bentonite was also proposed.

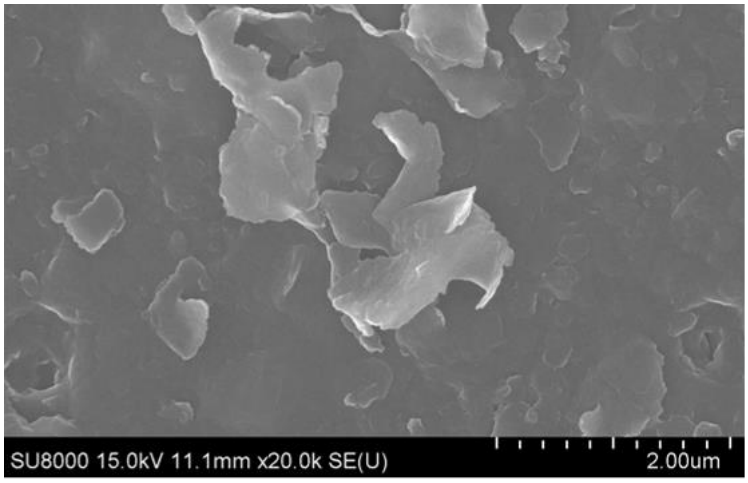

Fig. 7. SEM image of synthesized bentonite nanoplatelets

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ULTRASLOW OPTICAL SOLITONS IN A VEE-TYPE DEGENERATED ATOMIC MEDIUM

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In the past few decades, a large number of nonlinear optical phenomena based on atomic coherence and quantum interference have been comprehensively studied by many researchers. One of the most significant phenomena is optical soliton-a kind of special preserved-shape wave propagation phenomenon in nonlinear media, which originates from the balance between the nonlinear effects and the dispersion properties of the media under excitation. Optical soliton is of exceptional interests to the researchers due to its wide range of potential applications in optical communication, optical computing, and information processing [1-2]. During past several decades, many kinds of optical solitons have been reported in passive materials, i.e. glass-based optical fibers in which far-off resonance driving schemes were used for avoiding optical resonant absorption but strong laser intensity was needed. Recently, the discovery of electromagnetically induced transparency (EIT) effect [3] has possible to solve effectively the above contradiction. In addition to a large suppression of optical absorption, EIT effect can be used to substantially enhance the efficiency of nonlinear optical processes [4]. The studies have shown that optical solitons, which have ultraslow propagation velocity and ultraslow generation power, can be generated in the system via EIT and can be stored and retrieved with high efficiency and fidelity [5-9]. In this report, we proposed a simple model for ultraslow soliton propagation via external magnetic field control in a vee-type degenerated atomic medium. We have shown a formation of the bright and dark solitons with controllable ultraslow group velocities. Furthermore, one can switch between bright and dark soliton by reversing the direction of the magnetic field.

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P45

RESEARCH ON DESIGN AND MANUFACTURE OF A MICROSCOPE OBJECTIVE USED TO TEST OPTICAL SYSTEMS WORKING IN THE INFRARED SPECTRAL REGION

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Microscope objectives are one of the most important components in the image quality evaluation system of optical systems. It magnifies the diffraction mark to a large spatial size to ensure that matrix-type sensors can record the feature information to the image quality of the tested optical system. The microscope objectives should be high quality whose requirement of wave error is less than λ/10 in the test system. Commercial microscope objectives are mainly manufactured for the visible spestral region, but are not much attended for infrared spectra.

In this paper, the results of design, manufacture of a microscope objective are presented. In addition, we show experimental testing techniques using the microscope objective to assess the image quality of the optical systems in the infrared spectrum of 8-12 μm.

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SSESSMENT OF SOIL RADIOACTIVITY IN LAO PDR USING GAMMA-RAY SPECTROMETER

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Result of the first investigation of the activity concentration of the surface soil samples collected at various locations of Thoulakhom district of Vientiane province of Laos people's Democratic Republic (PDR) are presented in this work. The activity concentration of natural radionuclides ^{226}Ra, ^{232}Th and ^{40}K in the soil samples were determined by gammar spectrometer using high energy resolution semiconductor detector HPGe. The result indicate that the radiation hazard from natural ^{226}Ra, ^{232}Th and ^{40}K radionuclides in all investigated soil samples taken from area under investigation in this work was not significant

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ANALYSIS EFFECTIVE MODE AREA OF SOLID CORE PCFS WITH HEXAGONAL LATTICE INFILTRATED WITH METHANOL FOR OPTICAL FIBER TECHNOLOGY

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In this paper, we analyzed effective mode area of solid core photonic crystal fiber (PCF) with hexagonal cladding infiltrated with methanol. We have determined that the largest effective mode area is 367.9970 μm^2 with the diameter of air hole d is equal to 1μm and the smallest effective mode area is 21.1393 μm^2 with air hole diameter is 1μm. We have compared these results with the previous publication. These results are very good for optical fiber technology applications.

Keywords: photonic crystal fibers; dispersion; nonlinear optics, supercontinuum generation

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COMPARE DISPERSION OF SOLID CORE PCFS WITH HEXAGONAL LATTICE INFILTRATED WITH WATER AND ETHANOL FOR SG

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In this paper, we compared dispersion of solid core photonic crystal fiber (PCF) with hexagonal cladding infiltrated with water and ethanol. We compared the flatness of the dispersion curves. At the same time, we compare the value of dispersion and zero dispersion wavelength at 1.55μm wavelength. The obtain results to optimize the structure and fluid to be applied for supercontinuum generation (SG) applications.

Keywords: *photonic crystal fibers; dispersion; nonlinear optics, supercontinuum generation*

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DISPERSION AND PHASE REFRACTIVE INDEX MEASUREMENTS OF SOME NEW LIQUID BY BROAD-SPECTRUM LIGHT INTERFEROMETRY

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We constructed an experimental Michelson interferometer which use broad-spectrum light and set up at Vinh University. We conducted a survey to measure the group refractive index and phase refractive index of water by using this system. That is the basis for us to continue this experiment. We continue to use this research to measure the phase refractive index of some new liquids while calculating the dispersion and phase velocity of the materials. The sets of parameters for the phase refractive index of the new liquids are really helpful for us to carry out of the next projects that can be used to inject the photonic fiber into supercontinuum generation.

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DYNAMICS OF ALL SOLID - STATE ULTRAVIOLET LASER AMPLIFIER USING Ce:LiCAF CRYSTALS

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We present results on the amplifier dynamics of multi-pass all solid-state ultraviolet laser. The Ce:LiCAF crystals as an active amplifier medium and pumped by the fourth harmonic of Q-switched Nd:YAG laser (7-ns, 10Hz). The investigations were carried out theoretically using rate equations. The influences of parameters (pumping, amplification configuration, input pulse …) on gain have been investigated. Basing on the computed results, the all solid-state, multi-pass, simple, ultraviolet laser amplifier has been proposed.

Keywords: Ce:LiCAF, amplification, ultraviolet laser, all solid-state laser

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THE ENHANCEMENT OF DYNAMIC RANGE OF CCD CAMERA BY ANALYZING SHOT NOISE

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The new method was developed to extend the upper limit of the dynamic range of CCD camera by analyzing shot noise. Shot noise histogram in saturation range was analyzed to get its mean value that directly represented the intensity of the light reaching the CCD sensor.

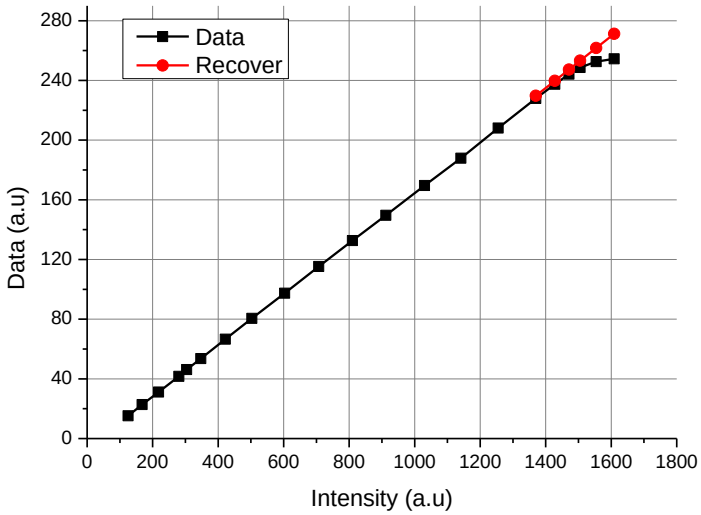

Fig: The dependence of the average of numerical values on light intensity.
The black color was the value from camera, the red color was the recover value