SCIENTIFIC PROGRAM & BOOK OF ABSTRACTS

22 – 26 / 10 / 2019

Thai Nguyen, Vietnam

CONTENT

ORGANIZER

Vietnam Academy of Science and Technology

Vietnam National University Ho Chi Minh city

Thai Nguyen University

Hanoi University of Science and Technology

Military Academy of Science and Technology

Institute of Physics, VAST

International Center of Physics, VAST

University of Sciences, TNU

Vietnam Atomic Energy Institute, MOST

National Center for Technological Progress, MOST

Vietnam Society of Physics

Vietnam Medical Equipments Association

Vietnam Applied and Engineering Physics Association

ORGANIZING COMMITEE

President:

Acad. Nguyen Van Hieu

Chairs:

Le Hong Khiem	Vietnam Academy of Science and Technology
Nguyen Dai Hung	Vietnam Academy of Science and Technology
Nguyen Huu Cong	Thai Nguyen University
Huynh Thanh Dat	Vietnam National University Ho Chi Minh City
Le Hung Lan	Nacentech, Ministry of Science and Technology
Huynh Viet Dung	Military Academy of Science and Technology

Organizing committee memmbers:

Le Hong Khiem	Institute of Physics, VAST
Dinh Van Trung	Institute of Physics, VAST
Tran Thanh Van	Thai Nguyen University
Nguyen Khanh Doanh	Thai Nguyen University
Nguyen Van Dang	University of Sciences, Thai Nguyen University
Nguyen Xuan Ca	University of Sciences, Thai Nguyen University
Mai Anh Khoa	Thai Nguyen University
Mai Anh Tuan	ITIMS, Hanoi University of Science and Technology

Giang Manh Khoi	Nacentech, Ministry of Science and Technology
Dang Duc Vuong	Hanoi University of Science and Technology
Le Hoang Hai	Military Academy of Science and Technology
Pham Duc Thang	University of Technology, VNU
Pham Hong Duong	Institute of Material Science, VAST
Pham Thanh Duy	Hanoi University of Science and Technology
Pham Minh Tien	Institute of Physics Ho Chi Minh City, VAST
Huynh Viet Dung	Military Academy of Science and Technology
Chu Xuan Quang	Military Academy of Science and Technology
Ha Viet Hien	Vietnam Medical Equipments Association
Ha Xuan Vinh	Nha Trang Institute of Technology Research and Application
Huynh Quang Linh	University of Technology, VNU HCM
Le Vu Tuan Hung	University of Science, VNU HCM
Ngạc An Bang	University of Science, VNU
Nguyen Trong Tinh	Institute of Applied Physics and Scientific Instrument, VAST
Pham Hong Tuan	Nacentech, Ministry of Science and Technology
Tran Tien Phuc	Nha Trang University
Vo Thanh Tung	University of Sciences, Hue University
Truong Van Chuong	University of Sciences, Hue University
Do Hoang Tung	Institute of Physics, VAST

Secretariat

Do Hoang Tung (Institute of Physics, VAST)
Nguyen Thi Khanh Van (Institute of Physics, VAST)
10 Dao Tan, Ba Dinh, Hanoi, Vietnam
Tel: (84 4) 3756 2017
Email: hnvlktud_caep@iop.vast.ac.vn
Website: http://iop.vast.ac.vn/activities/hnvlktud_caep/2019/index_e.html

SPONSORS

Vietnam Academy of Science and Technology (VAST)

Vietnam National University Ho Chi Minh city

Thai Nguyen University

Institute of Physics, VAST

International Center of Physics, VAST

The Asia Pacific Center for Theoretical Physics (APCTP)

Gold Lite Engineering PTE LTD

Horiba Scientific

Tecotec

BRIEF SCIENTIFIC PROGRAM

	Tuesday, 22/10/2019
13:00 – 15:00	**Get to Thai Nguyen**
15:00 – 17:00	**Registration**
	Wednesday, 23/10/2019
08:00 – 09:00	**Registration**
08:30 – 09:15	**Opening Ceremony** **Opening speech from Institute of Physics** **Opening speech from Vietnam National University HCM city** **Opening speech from International Centre of Physics**
	Photo Session
09:15 – 10:15	**Chair: Prof. Nguyen Dai Hung**
	PL – 01 Dinh Van Trung ..... **09:15 – 09:45** Introduction to Institute of Physics **PL – 02 Pham Hong Duong** ..... **09:45 – 10:15** 5S human centric lighting system
10:15 – 10:30	**COFFEE BREAK**
10:30 – 12:00	**Chair: Prof. Elmer Estacio**
	PL – 03 Jakrapong Kaewkhao ..... **10:30 – 11:00** High density WO_3-Gd_2O_3-B_2O_3 glass doped with Ln^{3+} ion for photonic and radiation detection martial application **PL – 04 Sib Krishna Ghoshal** ..... **11:00 – 11:30** Synergistic Effects of Erbium and Titania Nanoparticles Concoction on Improved Self-cleaning and Spectral Qualities of Amorphous Tellurite Host **PL – 05 Elizabeth Ann Prieto** ..... **11:30 – 12:00** Terahertz emission enhancement in gaas on Si(100) in reflection and transmission excitation geometries
12:00 – 13:30	**LUNCH BREAK**
13:30 – 15:10	**Chair: Prof. Jakrapong Kaewkhao**
	I – 01 Melvin John F. Empizo ..... **13:30 – 13:55** Effects of deuterium-ion plasma irradiation on the optical properties of bulk zinc oxide single crystals. **I – 02 Nguyen Duc Ba** ..... **13:55 – 14:20** Application of liquid dielectric to development of cold atmospheric plasma jet **I – 03 Marilou Cadatal Raduban** ..... **14:20 – 14:45** Development of detectors based on wide band gap fluorides **I – 04 Meng-Hock Koh** ..... **14:45 – 15:10** New Skyrme Parametrization with Inclusion of Nuclear Tensor for Fission-Barrier

	Calculations
15:10 – 15:25	**COFFEE BREAK**
15:25 – 16:45	**Chair: Prof. Marilou Cadatal Raduban**
	I – 06 Seoyong Shin ..... **15:25 – 15:50** Design of lens for led uniform illumination using freeform optics **I – 07 Md Mokter Hossain** ..... **15:50 – 16:15** High performance of toluen decomposition at low temperature over Pd/ZSM-5 coupled with a dielectric barrier discharge **O – 01 Saud Shirjana** ..... **16:15 – 16:30** Adsorption and plasma-catalytic oxidation of ethylene over zeolite-supported Palladium catalyst using corona discharge-coupled catalytic reactor **O – 02 Bhattarai Roshan Mangal** ..... **16:30 – 16:45** CoMoS@N-doped carbon nanocomposite as a high-performance anode material for lithium-ion batteries
18:00 – 20:30	**Gala dinner**
	Thurday, 24/10/2019
8:00 – 10:15	**Chair: Dr. Jacque Lynnn Gabayno**
	I – 08 Jiri Olejnicek ..... **8:00 – 8:25** Co_3O_4 and TiO_2 films prepared by multi-plasma jet system with hot hollow cathode discharge **O - 03 Ika Puspita** ..... **8:25 – 8:40** Modified Structure Silica Optical Fiber for Detection of Edible Oils Adulterant **O - 04 Mohd Syafiq Elias** ..... **8:40 – 8:55** Graphene Film on Metal Catalyst Substrate Via Chemical Vapor Deposition **O - 05 Maria Herminia Balgos** ..... **8:55– 9:10** Locating the n^+-GaAs/LT-GaAs interface using a cross-sectional scanning tunneling microscope **O - 06 Thin Thin Kyu** ..... **9:10 – 9:25** Characterization of Biochar Materials Manufactured from Agricultural Waste Biomass for Direct Carbon Fuel Cell (DCFC) **O - 07 Nguyen Dinh Vinh** ..... **9:25 – 9:40** Ultrasound-assisted preparation of activated carbon from sugarcane bagasse used for removal of Pb(II) from water **O – 22 Nguyen Thanh Phuong** ..... **9:40 – 9:55** Design and realization of led equipment apply in neonatal jaundice treatment **O – 09 Bui Thi Thu Phuong** ..... **9:55 – 10:10** Using soil hardener dhd-101 in building roads and making adobe bricks
10:15 – 10:30	**COFFEE BREAK**
10:30 – 11:55	**Chair: Dr. Pham Hong Minh**
	I – 09 Tran Minh Thai ..... **10:30 – 10:55** Application of low-level semiconductor laser in treatment of atherosclerosis of internal carotid artery in type 2 diabetes as hemiplegia after cerebrovascular accident **O – 10 Nguyen Nhat Huy** ..... **10:55 – 11:10** Nghiên cứu chế tạo vật liệu graphite ôxit dạng cầu gai từ lõi pin tái chế và ứng dụng làm

	vật liệu hấp phụ xử lí thuốc nhuộm đỏ 120 trong môi trường nước **O – 11 Trinh Ngoc Dieu** ..... **11:10 – 11:25** Kết quả nghiên cứu bước đầu sử dụng từ trường cường độ cao trong phương pháp giâm rễ và chiết cành cây hồng ăn quả không hạt Gia Thanh **O – 12 To Van Chieu** ..... **11:25 – 11:40** Phát triển công nghệ mới và Chế tạo thiết bị lưu trữ năng lượng với dung lượng cao vượt trội **O – 13 Pham Dong Bang** ..... **11:40 – 11:55** Chế tạo gương quang học khẩu độ lớn sử dụng trong hệ đo lidar: các kết quả mới
12:00 – 13:30	**LUNCH BREAK**
13:30 – 15:10	**Chair: Dr. Meng Hock Koh**
	I – 10 Mohd Sanusi Mohamad Syazwan ..... **13:30 – 13:55** Ligand field parameters evaluation of Samarium activated $BaSO_4$-TeO_2-$B2O3$ glasses for laser applications. **O – 14 Nuanthip Wantana**.....**13:55 – 14:10** The near-infrared luminescence of Nd^{3+}-doped tungsten gadolinium borate glasses for photonic material applications **O – 15 Pham Huu Kien** ..... **14:10 – 14:25** The structural transition under compression and structural heterogeneity for liquid SiO_2 system **O – 16 Phan Van Cuong** ..... **14:25 – 14:40** X-ray luminescence comparison of photonic nanomaterials: CdSeS, LaF3:Ce3+/CdSeS, and CsPbI3 **O – 23 Nguyen Nang Dinh** ..... **14:40 – 14:55** Using cross-polarization scheme microscope for photoluminescent application to point-of-care diagnostics **O – 18 Dinh Van Trung** .....**14:55 – 15:10** Proportional and Integral feedback control of a XY nanopositioning device
15:10 – 15:25	**COFFEE BREAK**
15:25 – 16:25	**Chair: Prof. Pham Hong Duong**
	O – 19 Dang Nguyen Ngoc An ..... **15:25 – 15:50** 3d reconstruction of absorbing structure in biological tissue from single 2d near infrared transillumination image - blood vessel phantom study **O – 20 Huynh Truc Phuong** ..... **15:40 – 15:55** Determination of the concentration of Fe, Se and Zn elements in nails of Vietnamese women with breast cancer using k0-INAA method **O – 08 Tran Manh Cuong** .....**15:55 – 16:10** Multiband metamaterial absorber creating by connecting inductance rings in the structure **O – 17 Duong Thi Giang** ..... **16:10 – 16:25** Design and fabrication of led blackboard washing luminaire combined with linear freeform lens
18:00 – 20:30	**Gala dinner**
	Friday, 25/10/2019
8:00 – 09:45	**Chair: Prof. Yin Maung Maung**

I – 11 Eakgapon Kaewnuam ..... **8:00 – 8:30**
Judd-ofelt analysis and infrared laser potential of lithium bismuth aluminium borate glass doped with Er^{3+}

O - 24 Dang Nguyen Ngoc An ..... **8:30 – 8:45**
Development of diagnostic device using near infrared light - preliminary researc

O - 25 Nguyen Quoc Chien ..... **8:45 – 9:00**
Optimal design of a multimode-interference for application in photonics interconnects

O - 26 Nguyen Tuan Tai **9:00– 9:15**
Simulation design of a micro-heater for application in integrated microsystems

O – 29 Bui Van Hai ..... **9:15 – 9:30**
Resolving the bistatic lidar images in range for measurment of the lower atmosphere in Hanoi

O – 28 Nguyen Van Thanh ..... **9:30 – 9:45**
Study on effect of technical parameters in liquid nitriding process to the structure and mechanical properties of AISI 420 stainless steel

O – 27 Huynh Dinh Chuong ..... **9:45 – 10:00**
A semi-empirical approach based on virtual point detector concept to calculate the efficiency of nai(tl) detector for measurements of point source on the detector's symmetry axis

10:00 – 10:15 **COFFEE BREAK**

10:15 – 11:30 **Chair: Prof. Juniastel Rajagukguk**

O – 30 Le Quang Vuong ..... **10:15 – 10:30**
Validation of coincidence summing corrections computed by the etna software and mcnp-cp code

O – 31 Min Maung Maung ..... **10:30 – 10:45**
Modification and nanostructural characterization of Myanmar coal

O – 32 Ulwiyatus Sa'adah ..... **10:45 – 11:00**
Preparation of Electrospinning Polyacrylonitrile/Titanium Dioxide Nanofibers and Their Optical Properties as a Candidate Material For Natural Dye Sensitized Solar Cells

O – 33 Viengthong Xayavong ..... **11:00 – 11:15**
Study the possibility of applying the advanced 2d multi-electrode electrical exploration method to find groundwater in vientiane province, Laos

O – 34 Tran Minh Thai ..... **11:15 – 11:30**
Application of low-level laser in treatment fatty blood disease

12:00 – 13:30 **LUNCH BREAK**

15:15 – 15:30 **COFFEE BREAK**

15:30 – 16:25 **Poster session**
Chair: Prof. Anusara Srisrual, Prof. Elizabeth Ann Prieto

16:25 – 18:05 **Plenary Session**
Chair: Prof. Nguyen Dai Hung

PL – 06 Jongseok Lee ..... **16:25 – 16:50**
Research opportunities in GIST with high excellence

PL – 07 Satoshi Mayama ..... **16:50 – 17:15**
Internship and PhD research at Sokendai and Inter-University research institute in Japan

PL – 08 Le Hong Khiem ..... **17:15 – 17:40**
Research opportunities in Dubna

PL – 09 Dinh Van Trung ..... **17:40 – 18:05**

	Introduction to International Centre of Physics under the auspices of UNESCO **Closing Ceremony**
18:30 – 20:30	**Farewell party**
	Saturday, 26/10/2019
08:00 – 16:00	**Thai Nguyen tour**

DETAIL SCIENTIFIC PROGRAM

	Tuesday, October 22, 2019 **Afternoon**
13:00 – 15:00	**Get to Thai Nguyen**
15:00 – 17:00	**Registration**
	Wednesday, October 23, 2019 **Morning**
08:00 – 09:00	**Registration**
08:30 – 09:15	**Opening Ceremony**
09:00 – 09:15	Opening speech from International Centre of Physics Opening speech from Vietnam National University HCM city Opening speech from Institute of Physics
	Photo session
09:15 – 10:15	**Plenary session**
	Session chair: Prof. Nguyen Dai Hung
PL – 01 **09:15 – 09:45**	**Introduction to Institute of Physics** Prof. Dinh Van Trung Institute talk ***(Plenary talk)***
PL – 02 **09:45 – 10:15**	**5S human centric lighting system** *Pham Hong Duong, Duong Thi Giang and Pham Hoang Minh* Institute of Materials Science, Vietnam Academy of Science and Technology (VAST) **(Plenary talk)**
10:15 – 10:30	**COFFEE BREAK**
10:30 – 12:00	**Plenary session**
	Chair: Prof. Elmer Estacio
PL – 03 **10:00 – 11:00**	**High density WO_3-Gd_2O_3-B_2O_3 glass doped with Ln^{3+} ion for photonic and radiation detection martial application** *Nuanthip Wantana[1,2], Natthakridta Chanthima[1,2], Yotsakit Ruangthaweep[1,2], Yamanoi Kohei[3], Pham Hong Minh[4], Damir Valiev[5] HongJoo Kim[6], Jakrapong Kaewkhao[1,2]** [1]Physics Program, Faculty of Science and Technology, Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand [2]Center of Excellence in Glass Technology and Materials Science (CEGM),

Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand
[3]Institute of Laser Engineering, Osaka University, Japan
[4]Institute of Physics (IOP), Vietnam Academy of Science and Technology (VAST), Hanoi, Vietnam
[5]National Research Tomsk Polytechnic University, Lenin Avenue 30, Tomsk, 634050, Russia
[6]Department of Physics, Kyungpook National University, Daegu, Republic of Korea
(Plenary talk)

PL – 04
11:00 – 11:30

Synergistic Effects of Erbium and Titania Nanoparticles Concoction on Improved Self-cleaning and Spectral Qualities of Amorphous Tellurite Host

S. K. Ghoshal[a,], N. N. Yusof[a], R. Arifin[a] and Areej S. Alqarni[a,b]*
[a]Department of Physics, Faculty of Science, Universiti Teknologi Malaysia, Johor, Malaysia.
[b]Department of Physics, Faculty of Science, Taibah University, Madinah, Saudi Arabia.
(Plenary talk)

PL – 05
11:30 – 12:00

Terahertz emission enhancement in gaas on Si(100) in reflection and transmission excitation geometries

Elizabeth Ann P. Prieto[1], Karl Cedric P. Gonzales[2], Alexander De Los Reyes[2], Armando S. Somintac[1,2], Arnel A. Salvador[1,2], Elmer S. Estacio[1,2]
[1]Materials Science and Engineering Program, College of Science, University of the Philippines Diliman,
[2]National Institute of Physics, University of the Philippines Diliman
(Plenary talk)

12:00 – 13:30 **LUNCH BREAK**

Wednesday, October 23, 2019
Afternoon

13:30 – 15:10 **Contribution Session**

Chair: Prof. Jakrapong Kaewkhao

I – 01
13:30 – 13:55

Effects of deuterium-ion plasma irradiation on the optical properties of bulk zinc oxide single crystals.

Melvin John F. Empizo[1], Kohei Yamanoi[1], Toshihiko Shimizu[1], Nobuhiko Sarukura[1], Bess G. Singidas[2], Roland V. Sarmago[1,2], Arnel A. Salvador[1,2], and Tsuguo Fukuda[3]

[1]Institute of Laser Engineering, Osaka University, 2-6 Yamadaoka, Suita, Osaka 565-0871, Japan
[2]National Institute of Physics, University of the Philippines Diliman, Diliman, Quezon City 1101, Philippines
[3]Fukuda Crystal Laboratory Co., Ltd., 6-6-3 Minami-Yoshinari, Aoba-ku, Sendai, Miyagi 989-3204, Japan
(Invited talk)

I – 02 **13:55 – 14:20**	**Application of liquid dielectric to development of cold atmospheric plasma jet** *Duc Ba Nguyen[1,2] and Young Sun Mok[1]* [1]Department of Chemical and Biological Engineering, Jeju National University, Jeju 63243, Republic of Korea. [2]Center for Advanced Chemistry, Institute of Research and Development, Duy Tan University, 03 Quang Trung, Da Nang 550000, Vietnam. ***(Invited talk)***
I – 03 **14:20 – 14:45**	**Development of detectors based on wide band gap fluorides** *Marilou Cadatal-Raduba[1,2]* Centre for Theoretical Chemistry and Physics, Institute of Natural and [1]Mathematical Sciences, Massey University, Albany, Auckland 0632, New Zealand [2]Institute of Laser Engineering, Osaka University, 2–6 Yamadaoka, Suita, Osaka 565-0871, Japan ***(Invited talk)***
I – 04 **14:45 – 15:10**	**New Skyrme Parametrization with Inclusion of Nuclear Tensor for Fission-Barrier Calculations** *Meng-Hock Koh[1,2]* [1]Department of Physics, Faculty of Science, Universiti Teknologi Malaysia, 81310 Johor Bahru, Malaysia [2]UTM Centre of Industrial and Applied Mathematics, 81310 Johor Bahru, Malaysia ***(Invited talk)***
15:10 – 15:25	**COFFEE BREAK**
15:25 – 16:45	**Contribution session**
	Chair: Prof. Marilou Cadatal Raduban
I – 06 **15:25 – 15:50**	**Design of lens for led uniform illumination using freeform optics** *Pham Thanh Tuan[1], Seoyong Shin[2]* [1]Faculty of Vehicle and Energy Engineering, HCMC University of Technology and Education [2]Department of Information and Communication Engineering, Myongji University, Yongin Campus, 116 Myongji-ro, Nam-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea ***(Invited talk)***

I – 07 **15:50 – 16:15**	**High performance of toluen decomposition at low temperature over Pd/ZSM-5 coupled with a dielectric barrier discharge** *Md. Mokter Hossain, Duc Ba Nguyen, M.S.P. Shdhakaran, Young Sun Mok** Department of Chemical and Biological Engineering, Jeju National University, Jeju 63243, Korea ***(Invited talk)***
O – 01 **16:15 – 16:30**	**Adsorption and plasma-catalytic oxidation of ethylene over zeolite-supported Palladium catalyst using corona discharge-coupled catalytic reactor** *Saud Shirjana[1], Bhattarai Roshan Mangal[1], Young Sun Mok[1]** Department of Chemical and Biological Engineering, Jeju National University, Jeju-do, South Korea ***(Contribution talk)***
O – 02 **16:30 – 16:45**	**CoMoS@N-doped carbon nanocomposite as a high-performance anode material for lithium-ion batteries** *Bhattarai Roshan Manga[1], MSP Sudhakaran, Md. M. Hossain, Saud Shirjana and Y.S. Mok** Department of Chemical and Biological Engineering, Jeju National University, Jeju, South Korea ***(Contribution talk)***
18:00 – 20:30	**Gala dinner**
	Thursday, October 24, 2019 **Morning**
8:00 – 10:15	**Contribution session**
	Session chair: Dr. Jacque Lynnn Gabayno
I – 08 **8:00 – 8:25**	**Co_3O_4 and TiO_2 films prepared by multi-plasma jet system with hot hollow cathode discharge** *Jiří Olejníček, Jiří Šmíd, Petra Kšírová and Zdeněk Hubička* Department of Low-temperature plasma, Institute of Physics CAS, Na Slovance 2, Prague, Czech Republic ***(Invited talk)***
O – 03 **8:25 – 8:40**	**Modified Structure Silica Optical Fiber for Detection of Edible Oils Adulterant** *Ika Puspita[1], Aliefa Tasya[1], Zuhaida Hilmiana[1], A.M. Hatta[1], Sekartedjo[1], F. Kurniawan[2]* [1]Dept. Engineering Physics, Institut Teknologi Sepuluh Nopember, Kampus ITS Sukolilo, Surabaya, Indonesia [2]Dept. Chemistry, Institut Teknologi Sepuluh Nopember, Kampus ITS

Sukolilo, Surabaya, Indonesia
(Contribution talk)

O – 04
8:40 – 8:55

Graphene Film on Metal Catalyst Substrate Via Chemical Vapor Deposition

Mohd Syafiq Elias, Madzlan Aziz, Zaiton Abdul Majid, Norikazu Nishiyama
Faculty of Science, Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor Malaysia
Department of Chemical Engineering, Graduate School of Engineering Science, Osaka University 560-8531 1-3 Machikaneyama, Toyonaka City, Osaka, Japan
(Contribution talk)

O – 05
8:55– 9:10

Locating the n^+-GaAs/LT-GaAs interface using a cross-sectional scanning tunneling microscope

Maria Herminia Balgos[1,2], Elizabeth Ann Prieto[2], Rafael Jaculbia[1], Masahiko Tani[3], Elmer Estacio[2], Arnel Salvador[2], Armando Somintac[2], Norihiko Hayazawa[1,2], Yousoo Kim[1,2]
[1]Surface and Interface Science Laboratory, RIKEN, 2-1 Hirosawa, Wako, Saitama 351-0198, Japan
[2]National Institute of Physics, University of the Philippines, Diliman, Quezon City 1101, Philippines
[3]Research Center for Development of Far-Infrared Region, University of Fukui, Fukui 910-8507, Japan
(Contribution talk)

O – 06
9:10 – 9:25

Characterization of Biochar Materials Manufactured from Agricultural Waste Biomass for Direct Carbon Fuel Cell (DCFC)

Thin Thin Kyu[1], Yin Maung Maung[1], Than Than Win[2] and Khin Khin Win[1]
[1]Department of Physics, University of Yangon, Yangon, Myanmar
[2]Department of Physics, Panglong University, Panglong, Myanmar
(Contribution talk)

O – 07
9:25 – 9:40

Ultrasound-assisted preparation of activated carbon from sugarcane bagasse used for removal of Pb(II) from water

Nguyen Dinh Vinh, Bui Minh Quy, Nguyen Thi Ngoc Linh, Nguyen Thi Hong Hoa, Luu Tuan Duong*
Faculty of Chemistry, Thai Nguyen University of Sciences, Tan Thinh Ward, 251580 Thai Nguyen, Vietnam
(Contribution talk)

O – 22
9:40 – 9:55

Design and realization of led equipment apply in neonatal jaundice treatment

Kieu Ngoc Minh[1], Tong Quang Cong[1], Tran Quoc Tien[1], Nguyen Duc Thinh[2], Nguyen Thanh Phuong[2]*
[1]Institute of Materials Science, Vietnam Academy of Science and Technology,
18 Hoang Quoc Viet, Cau giay, Hanoi, Vietnam,
[2] School of Engineering Physics, Hanoi University of Science and Technology,
No. 1 Dai Co Viet Rd. Hai Ba Trung, Hanoi, Vietnam
(Contribution talk)

O – 09
9:55 – 10:10

Using soil hardener dhd-101 in building roads and making adobe bricks

Bui Thi Thu Phuong[1], Doan Ba Tuan[2], Nguyen The Hung[3]
Center for Technical Physics, Institute of Physics, 18 Hoang Quoc Viet, Cau Giay, Ha Noi,
(Contribution talk)

10:15 – 10:30 **COFFEE BREAK**

10:30 – 11:55 **Contribution session**

Chair: Dr. Pham Hong Minh

I – 09
10:30 – 10:55

Application of low-level semiconductor laser in treatment of atherosclerosis of internal carotid artery in type 2 diabetes as hemiplegia after cerebrovascular accident

Tran Minh Thai [1], Ngo Thi Thien Hoa [2], Tran Thien Hau [1], Can Ngoc Minh [1]
[1] Laser Technology Laboratory - Ho Chi Minh City University of technology- Viet Nam National University HCM City
[2] Tan Chau Rehabilitation Treatment Department - An Giang Province
(Invited talk)

O – 10
10:55 – 11:10

Nghiên cứu chế tạo vật liệu graphite ôxit dạng cầu gai từ lõi pin tái chế và ứng dụng làm vật liệu hấp phụ xử lí thuốc nhuộm đỏ 120 trong môi trường nước

Hà Xuân Linh[1], Đặng Văn Thành[2], Nguyễn Phương Chi[2], Trần Quốc Toàn[3], Nguyễn Thị Kim Ngân[4], Nguyễn Nhật Huy[5,]*
[1]Khoa Quốc tế, Đại học Thái Nguyên
[2]Trường Đại học Y-Dược, Đại học Thái Nguyên
[3]Trường Đại học sư phạm, Đại học Thái Nguyên
[4]Trường Đại học Khoa học, Đại học Thái Nguyên

	[5] Trường Đại học Bách Khoa, ĐHQG-HCM ***(Contribution talk)***
O – 11 **11:10 – 11:25**	**Kết quả nghiên cứu bước đầu sử dụng từ trường cường độ cao trong phương pháp giâm rễ và chiết cành cây hồng ăn quả không hạt Gia Thanh** *Trịnh Đình Trung[1*], Trịnh Ngọc Diệu[2)]; Hoàng Thị Huyền Trang[3], Nguyễn Khắc Hưng[3], Phạm Bích Ngọc[3], Nguyễn Thị Xuyên[4]* [1]Trung tâm Phát triển công nghệ cao,Viện Hàn lâm Khoa học và Công nghệ Việt Nam [2] Trung tâm Ứng dụng Vật lý y sinh và Kỹ thuật môi trường, Liên hiệp các Hội khoa học và KTVN [3] Viện Công nghệ sinh học, Viện Hàn lâm Khoa học và Công nghệ Việt Nam [4] Viện Kỹ thuật Nhiệt đới, Viện Hàn lâm Khoa học và Công nghệ Việt Nam ***(Contribution talk)***
O – 12 **11:25 – 11:40**	**Phát triển công nghệ mới và Chế tạo thiết bị lưu trữ năng lượng với dung lượng cao vượt trội** *To van Chieu* The TVC private Enterprise - Hung Yen, Vietnam. ***(Contribution talk)***
O – 13 **11:40 – 11:55**	**Chế tạo gương quang học khẩu độ lớn sử dụng trong hệ đo lidar: các kết quả mới** *Phạm Đồng Bằng[1], Đinh Văn Trung[1], Trần Ngọc Hưng[1], Bùi Văn Hải[2]* [1]Institute of Physics, Vietnam Academy of Science and Technology. [2]Le Quy Don Technical University ***(Contribution talk)***
12:00 – 13:30	**LUNCH BREAK**
	Thursday, October 24, 2019 **Afternoon**
13:30 – 15:10	**Contribution session**
	Chair: Dr. Meng Hock Koh
I – 10 **13:30 – 13:55**	**Ligand field parameters evaluation of Samarium activated $BaSO_4$-TeO_2-B_2O^3 glasses for laser applications.** *S. Hashim[1,2*] and I. Abdullahi[1,3]* [1]Department of Physics, Faculty of Science, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia. [2]Centre for Sustainable Nanomaterials (CSNano), Ibnu Sina Institute for Scientific and Industrial Research (ISI-SIR),

Universiti Teknologi Malaysia, 81310 UTM Skudai, Johor, Malaysia
[3]Department of Physics Federal University Gusau, Zamfara State Nigeria
(Invited talk)

O – 14
13:55 – 14:10

The near-infrared luminescence of Nd^{3+}-doped tungsten gadolinium borate glasses for photonic material applications

*Nuanthip Wantana[1,2], Natthakridta Chanthima[1,2], Yotsakit Ruangthaweep[1,2], Yamanoi Kohei[3], Pham Hong Minh[4], HongJoo Kim[5], Jakrapong Kaewkhao[1,2]**
[1]Physics Program, Faculty of Science and Technology, Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand
[2]Center of Excellence in Glass Technology and Materials Science (CEGM), Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand
[3]Institute of Laser Engineering, Osaka University, Japan
[4]Institute of Physics (IOP), Vietnam Academy of Science and Technology (VAST), Hanoi, Vietnam
[5]Department of Physics, Kyungpook National University, Daegu, Republic of Korea
(Contribution talk)

O – 15
14:10 – 14:25

The structural transition under compression and structural heterogeneity for liquid SiO_2 system

P.H.Kien[1,], D.T.Thanh[1], P.M.An[1], N.T.M.Thuy[1], N.H.Linh and L.T.H.Gam[1]*
Department of Physics, Thainguyen University of Education, 20 Luong Ngoc Quyen road, Thainguyen, Vietnam
(Contribution talk)

O – 16
14:25 – 14:40

X-ray luminescence comparison of photonic nanomaterials: CdSeS, LaF3:Ce3+/CdSeS, and $CsPbI_3$

Phan Van Cuong[1], Tran Thi Kieu[2]
[1]Department of Physics, Nha Trang University, 02 Nguyen Dinh Chieu Street. Nhatrang, Vietnam
[2]Ngo Gia Tu high school, Camranh, Vietnam
(Contribution talk)

O – 23
14:40 – 14:55

Using cross-polarization scheme microscope for photoluminescent application to point-of-care diagnostics

Nguyen Nang Dinh[1], Nguyen Thi Dung[1], Nguyen Phuong Hoai Nam[1], Nguyen Duc Cuong[1], Nguyen Dinh Lam[1], Trương Thi Ngoc Lien[2]
[1] University of Engineering and Technology, Vietnam National University, Hanoi
144 Xuan Thuy Road, Hanoi, Vietnam

[2] Hanoi University of Science and Technology, 1 Dai Co Viet, Hanoi, Vietnam
(Contribution talk)

O – 18
14:55 – 15:10

Proportional and Integral feedback control of a XY nanopositioning device

Dinh Van Trung, Nguyen Thi Thanh Bao
Institute of Physics, Vietnam Academy of Science and Technology
(Contribution talk)

15:10 – 15:25 **COFFEE BREAK**

15:25 – 16:25 **Contribution session**

Chair: Prof. Pham Hong Duong

O – 19
15:25 – 15:50

3D reconstruction of absorbing structure in biological tissue from single 2D near infrared transillumination image - blood vessel phantom study

Ngoc An Dang Nguyen[1, 3], Minh Quang Nguyen[1], Hoang Nhut Huynh[1], Anh Tu Tran[1], Phuong Anh Bui[2], Trung An Dang Nguyen[3], Van Chinh Nguyen[3], Trung Nghia Tran[1]
[1]Faculty of Applied Science, Ho Chi Minh City University of Technology, 268 Ly Thuong Kiet St., ward 14, Dist. 10, Ho Chi Minh City, Vietnam
[2]Department of Science and Technology, Vietnam National University Ho Chi Minh City, Linh Trung ward, Dist. Thu Duc, Ho Chi Minh City, Vietnam
[3]University of Medicine and Pharmacy Ho Chi Minh City, 217 Hong Bang St., ward 11, Dist. 5, Ho Chi Minh City, Vietnam
(Contribution talk)

O – 20
15:40 – 15:55

Determination of the concentration of Fe, Se and Zn elements in nails of Vietnamese women with breast cancer using k0-INAA method

Huynh Truc Phuong[1], Tran Pham Ngoc Trinh[2], Dinh Thanh Binh[2], Nguyen Thi Truc Linh[3], Truong Thi Hong Loan[3], Tran Tuan Anh[4], Ho Manh Dung[4], Nguyen Van Dong[5]
[1]Department of Nuclear Physics, University of Science, VNU-HCM, 227 Nguyen Van Cu, Distr. 5, Ho Chi Minh City, Vietnam.
[2]Department of Oncology, Dong Nai General Hospital, 2 Dong Khoi, Bien Hoa City, Vietnam.
[3]Nuclear Technique Labolatory, Building B23, Linh Trung Campus, University of Science, VNU-HCM.
[4]Institute of Nuclear Research (VINATOM), 1 Nguyen Tu Luc, Dalat City, Vietnam.

[5]Department of Analytical Chemistry, University of Science, VNU-HCM, 227 Nguyen Van Cu, Distr. 5, Ho Chi Minh City, Vietnam.
(Contribution talk)

O – 08 **15:55 – 16:10**	**Multiband metamaterial absorber creating by connecting inductance rings in the structure** *Tran Manh Cuong[1], Do Hoang Tung[2], Nguyen Duy Cuong[3], Nguyen Thi Thuy[1], Pham Van Hai[1].* [1]Hanoi National University of Education [2]Institute of Physics, Vietnam Academy of Science and Technology [3]Hanoi University of Science & Technology ***(Contribution talk)***
O – 17 **16:10 – 16:25**	**Design and fabrication of led blackboard washing luminaire combined with linear freeform lens** Duong Thi Giang, Tran Quoc Tien, and Pham Hong Duong Institute of Materials Science, Vietnam Academy of Science and Technology (VAST) 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam **(Contribution talk)**
18:00 – 20:30	**Gala dinner**
	Friday, October 25, 2019 **Morning**
8:00 – 09:45	**Contribution session**
	Chair: Prof. Yin Maung Maung
I – 11 **8:00 – 8:30**	**Judd-ofelt analysis and infrared laser potential of lithium bismuth aluminium borate glass doped with Er^{3+}** *Eakgapon Kaewnuam[1*], Nuanthip Wantana[2,3] and Jakrapong Kaewkhao[2,3]* [1]Physics Program, Faculty of Science and Technology, Muban Chombueng Rajabhat University, Ratchaburi, 70150, Thailand [2]Physics Program, Faculty of Science and Technology, Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand [3]Center of Excellence in Glass Technology and Materials Science (CEGM), Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand ***(Invited talk)***
O – 24 **8:30 – 8:45**	**Development of diagnostic device using near infrared light - preliminary research** *Ngoc An Dang Nguyen[1, 3], Phuong Anh Bui[2], Trung An Dang Nguyen[3],*

Van Chinh Nguyen[3], Trung Nghia Tran[1]
[1]Faculty of Applied Science, Ho Chi Minh City University of Technology, 268 Ly Thuong Kiet St., ward 14, Dist. 10, Ho Chi Minh City, Vietnam
[2]Department of Science and Technology, Vietnam National University Ho Chi Minh City, Linh Trung ward, Dist. Thu Duc, Ho Chi Minh City, Vietnam
[3]University of Medicine and Pharmacy Ho Chi Minh City, 217 Hong Bang St., ward 11, Dist. 5, Ho Chi Minh City, Vietnam
(Contribution talk)

O – 25
8:45 – 9:00

Optimal design of a multimode-interference for application in photonics interconnects

Nguyen Quoc Chien[1], Truong Cao Dung[2], Chu Manh Hoang[1]
[1]International Training Institute for Materials Science, Hanoi University of Science and Technology, No. 1, Dai Co Viet, Hai Ba Trung, Hanoi, Vietnam
[2]Posts and Telecommunications Institute of Technology, Km10, Nguyen Trai, Ha Dong, Ha Noi
(Contribution talk)

O – 26
9:00– 9:15

Simulation design of a micro-heater for application in integrated microsystems

Nguyen Tai Tuan[1,2], Truong Cao Dung[3], Chu Manh Hoang[1]
[1]International Training Institute for Materials Science, Hanoi University of Science and Technology, No. 1, Dai Co Viet, Hai Ba Trung, Hanoi, Vietnam
[2]School of Mechanical Engineering, Hanoi University of Science and Technology, No. 1, Dai Co Viet, Hai Ba Trung, Hanoi, Vietnam
[3]Posts and Telecommunications Institute of Technology, Km10, Nguyen Trai, Ha Dong, Ha Noi
(Contribution talk)

O – 29
9:15 – 9:30

Resolving the bistatic lidar images in range for measurment of the lower atmosphere in Hanoi

B. V. Hải[1], P. M. Tiến[2], N. X. Tuan[3], T. N. Hung[3], D. V. Trung[3]
[1]Le Quy Don Technical University, 236 Hoang Quoc Viet, North Tu Liem Dist, Hanoi.
[2] Ho Chi Minh City Institute of Physics, 1 Mac Dinh Chi Str., Dist. 1, Ho Chi Minh City
Institute of Physics - VAST, 10 Dao Tan, Ba Dinh Dist, Hanoi
(Contribution talk)

O – 28
9:30 – 9:45

Study on effect of technical parameters in liquid nitriding process to the structure and mechanical properties of AISI 420 stainless steel

Thanh Nguyen Van[1,2], Trung Trinh Van[1] , Son Nguyen Anh[1], Tuan Pham Hong[3], Hop Nguyen Thanh[3]

[1]School of Materials Science and Engineering, Hanoi University of Science and Technology, No.1, Dai Co Viet, Hai Ba Trung, Ha Noi, Viet Nam

[2]Laboratory of Technology and Casting alloys, Research Institute of Technology for Machinery, No. 25, Vu Ngoc Phan, Dong Da, Ha Noi, Viet Nam

[3]Centre for Optoelectronics, National Center for Technological Progress, C6 Building, Thanh Xuan Bac, Thanh Xuan, Ha Noi, Viet Nam

(Contribution talk)

O – 27
9:45 – 10:00

A semi-empirical approach based on virtual point detector concept to calculate the efficiency of nai(tl) detector for measurements of point source on the detector's symmetry axis

Huynh Dinh Chuong[1], Le Thi Ngoc Trang[1], Tran Thien Thanh[1,2]

[1]Nuclear Technique Laboratory, University of Science, VNU-HCM, 227 Nguyen Van Cu Street, District 5, Ho Chi Minh City, Vietnam

[2]Department of Nuclear Physics, Faculty of Physics and Engineering Physics, University of Science, VNU-HCM, 227 Nguyen Van Cu Street, District 5, Ho Chi Minh City, Vietnam

(Contribution talk)

10:00 – 10:15 **COFFEE BREAK**

10:15 – 11:30 **Contribution session**

Chair: Prof. Juniastel Rajagukguk

O – 30
10:15 – 10:30

Validation of coincidence summing corrections computed by the etna software and mcnp-cp code

Le Quang Vuong[1,4], Phan Long Ho[3], Le Cong Hao[1,2], Tran Thien Thanh[1,2], Chau Van Tao[1]

[1]Department of Nuclear Physics, Faculty of Physics & Engineering Physics, VNUHCM-University of Science, Vietnam

[2]Nuclear Technique Laboratory, VNUHCM-University of Science, Vietnam

[3]Institute of Public Health in Ho Chi Minh City, Vietnam

[4]Faculty of Physics, Ho Chi Minh City University of Education, Vietnam

(Contribution talk)

O – 31
10:30 – 10:45

Modification and nanostructural characterization of Myanmar coal

Min Maung Maung[1], *Thein Tun Linn*[2], *Aung Min*[2]
Department of Physics, University of Yangon, Kamayut 11041, Yangon, Yangon Region, Myanmar
(Contribution talk)

O – 32 **10:45 – 11:00**	**Preparation of Electrospinning Polyacrylonitrile/Titanium Dioxide Nanofibers and Their Optical Properties as a Candidate Material For Natural Dye Sensitized Solar Cells** *Ulwiyatus Sa'adah*[1], *Markus Diantoro*[1,2], *Thathit Suprayogi, Nasikhudin*[1,2], *Arif Hidayat*[1], *Siti Wihdatul Himmah, Hari Wisodo* [1]Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Negeri Malang, Jalan Semarang 5 Malang 65145, Indonesia [2]Center of Advanced Materials for Renewable Energy, Universitas Negeri Malang, Jalan Semarang 5 Malang 65145, Indonesia ***(Contribution talk)***
O – 33 **11:00 – 11:15**	**Study the possibility of applying the advanced 2d multi-electrode electrical exploration method to find groundwater in vientiane province, Laos** *Viengthong Xayavong*[1,3], *Vu Duc Minh*[1], *Do Anh Chung*[2], *Sonexay Xayheuangsy*[3] *and* Thiengsamone Sounsuandao[3] [1]VNU University of Science, 334 Nguyen Trai, Hanoi, Vietnam. [2]Institute for Ecology and Works Protection, Vietnam Academy for Water Resources, 171 Tay Son, Dong Da, Hanoi, Vietnam. [3]Department of Physics, Faculty of Natural Science, National University of Laos,Dongdok Campus 7322, Vientiane, Laos. ***(Contribution talk)***
O – 34 **11:15 – 11:30**	**Application of low-level laser in treatment fatty blood disease** *Tran Minh Thai* [1], *Ngo Thi Thien Hoa* [2], *Tran Thien Hau* [1], *Can Ngoc Minh* [1] [1] Laser Technology Laboratory - Ho Chi Minh City University of technology- Viet Nam National University HCM City [2] Tan Chau Rehabilitation Treatment Department - An Giang Province ***(Contribution talk)***
12:00 – 13:30	**LUNCH BREAK**
	Friday, October 25, 2019 **Afternoon**
15:15 – 15:30	**COFFEE BREAK**
15:30 – 16:25	**Poster session**
	Chair: Prof. Anusara Srisrual, Prof. Elizabeth Ann Prieto

P01 – P41

P_CAEP – 01 **Biomodulation of cells in culture by optical radiation with different wavelengths**

A.V. Mikulich[1], Tran Quoc Tien[2], Quang Cong Tong[2], Thanh-Phuong Nguyen[3], L.G. Plavskaya[1], T.S. Ananich[1], A.I. Tretyakova[1], I.A. Leusenko[1], O.N. Dudinova[1], H.I. Staravoit[1], V.Yu. Plavskii[1]

[1]Institute of Physics of the NAS of Belarus, 68-2 Nezavisimosti Ave., 220072 Minsk, Belarus

[2]Insitute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Cau Giay, Hanoi, Vietnam

[3]Hanoi University of Science and Technology, 1 Dai Co Viet Rd., Hai Ba Trung, Hanoi, Vietnam

(Poster)

P_CAEP – 02 **Development of a Ce^{3+}:$LiCaAlF_6$ laser oscillator for Lidar applications**

Keito Shinohara[1], Pham Hong Minh[2], Pham Van Duong[2], Nguyen Van Diep[2], Nguyen Xuan Tu[2], Toshihiko Shimizu[1], and Nobuhiko Sarukura[1]

[1]Institute of Laser Engineering, Osaka University, 2-6 Yamadaoka, Suita, Osaka 565-0871, Japan

[2]Institute of Physics, Vietnam Academy of Science and Technology, 10 Dao Tan, Ba Dinh, Hanoi 10000, Vietnam

(Poster)

P_CAEP – 03 **Motion control of selsyn based steering wheel using video tracking data**

Nguyen Quang Minh, Nguyen Van Binh, Nguyen Dinh Van

National Center for Technological Progress

(Poster)

P_CAEP – 04 **Research into the relationship between cardiac responses and neural activity to improve classification of eeg-based imaginary action**

Nguyen Tran Duc Minh[1], Pham Quoc Cuong, Le Quoc Khai, Huynh Quang Linh

Biomedical Engineering Department, Faculty of Applied Science, Ho Chi Minh city University of Technology - VNU-HCMC, Vietnam

(Poster)

P_CAEP – 05 **Nghiên cứu, chế tạo hệ cánh tay robot điều khiển chiếu tia plasma jet điều trị trong y tế**

Nguyễn Văn Khá, Nguyễn Ngọc Anh, Lê Hồng Mạnh, Nguyễn Thị Khánh Vân, Nguyễn Công Thành.*

Viện Vật Lý, Viện Hàn lâm Khoa học và Công nghệ Việt Nam.
Số 18, Hoàng Quốc Việt, Cầu Giấy, Hà Nội, Việt Nam.
(Poster)

P_CAEP – 06 **Research and development of a wound treatmemt device based on negative pressure wound therapy technique and laser therapy**

Pham Trung Kien, Nguyen Tuan Anh, Nguyen Minh Tan, Chu Thi Minh Hoa
Center of Laser Technology, National Centre for Technological Progress
C6 Thanh Xuan Bac, Thanh Xuan, Hanoi, Vietnam
(Poster)

P_CAEP – 07 **Application of low-power semiconductor laser in function rehabilitation treatment for children**

Tran Minh Thai [1], Ngo Thi Thien Hoa [3], Tran Thien Hau [1], Ta Thi Lan Huong [2], Quach Kim Cuong[1]
[1] Laser Technology Laboratory - Ho Chi Minh City University of technology- Viet Nam National University HCM City
[2] Clinics of traditional medicine Tan Dinh Church, HCM City
[3] Tan Chau Rehabilitation Treatment Department - An Giang Province
(Poster)

P_CAEP – 08 **Plasma-liquid interaction treatment of ZnO nanoparticles for enhancement of photocatalytic degradation of reactive red 120 dye**

Nguyen Nhat Huy[1], Nguyen Thanh Trung[2,3], Nguyen Thanh Hai[3], Phung Thi Oanh[3,4], Dang Van Thanh[4], Keomany Inthavong[5], Do Hoang Tung[2,]*
[1]Ho Chi Minh City University of Technology, VNU-HCM, Vietnam
[2]Institute of Physics, Vietnam Academy of Science and Technology, Vietnam
[3]Research and Development Center for Advanced Technology, Viet Nam
[4]TNU - University of Medicine and Pharmacy, Vietnam
[5]Khang Khay Teacher Training College, Xieng Khouang, Laos
(Poster)

P_CAEP – 09 **Nghiên cứu quang xúc tác phân hủy thuốc nhuộm xanh methylen sử dụng vật liệu tio_2 chế tạo bằng phương pháp điện hóa**

Nguyễn Thị Khánh Vân[1,4], Nguyễn Nhật Huy[3], Nguyễn Năng Định[1], Đặng Văn Thành[1,2]
[1]Trường Đại học Công nghệ, Đại học Quốc gia Hà Nội;
[2]Trường Đại học Y Dược, Đại học Thái Nguyên;
[3]Trường Đại học Bách Khoa, ĐHQG-HCM;
[4]Trường Đại học Khoa học, Đại học Thái Nguyên
(Poster)

P_CAEP – 10 **Preparation of graphene/mno$_2$ nanocomposites by plasma-assisted sonochemical approach and its photocatalytic degradation of dyes in aqueous solution**

Tuyen Nguyen Long[1,2], Trieu Pham Quoc[1], Dinh Nguyen Ngoc[1], Thao Nguyen Thi Thu[3], Dung Nguyen Quoc[3], Hai Nguyen Thanh[4], Minh Phan Ngoc[4,5], Hong Phan Ngoc[4,5], Oanh Phung Thi[6], Thanh Dang Van[6,*]*

[1]University of Science, VNU, 334 Nguyen Trai Street, Thanh Xuan District, Ha Noi.

[2]Hung Vuong University, Viet Tri city, Phu Tho.

[3]Department of Chemistry, Thai Nguyen University of Education, 20 Luong Ngoc Quyen Street, Thai Nguyen.

[4]Center for High Technology Development, Viet Nam academy of Science and Technology, Ha Noi.

[5]Graduate University of Science and Technology, Viet Nam academy of Science and Technology, Ha Noi.

[6]Thai Nguyen University of Medicine and Pharmacy, 284 Luong Ngoc Quyen Street, Thai Nguyen.

(Poster)

P_CAEP – 11 **High performance anti-reflection coating on Germanium substrate for infrared region**

Pham Hong Tuan[1], Nguyen Thanh Hop[1], Nguyen Thi Thanh Lan[1], Nguyen Van Thanh[2]

[1]Center Optoelectronic, Nacentech, C6 Thanh Xuan Bac – Thanh Xuan- Ha Noi

[2]Research Institute of Technology for Machinery, 25 Vu Ngoc Phan – Dong Da – Ha Noi

(Poster)

P_CAEP – 12 **The structural tranformation and dynamical properties in network forming liquid**

Nguyen Thi Thanh Ha

Department of Computational Physics, Hanoi University of Science and Technology, No. 1 Dai Co Viet Road, Hanoi, Vietnam

(Poster)

P_CAEP – 13 **Computer simulation of aluminum-silicate: structural and dynamical heterogeneities**

Nguyen Thi Thanh Ha and Pham Khac Hung

Hanoi University of Science and Technology, No. 1 Dai Co Viet Road, Hanoi, Vietnam

(Poster)

P_CAEP – 14 **Domain structure and oxygen pockets in silica liquid under pressure**

Nguyen Thu Nhan and Pham Khac Hung*
Hanoi University of Science and Technology, 1 Dai Co Viet, Hanoi Viet Nam

(Poster)

P_CAEP – 15 **Simulation of network structure and polyamorphism of Calcium Titanate**

Nguyen Thu Nhan and Nguyen Thi Thanh Ha*
Hanoi University of Science and Technology, 1 Dai Co Viet, Hanoi Viet Nam

(Poster)

P_CAEP – 16 **Design of an ultra-wideband microwave absorber based on magnetic sheets and thin RSS**

Nguyen Tran Ha, Tran Quang Dat, Nguyen Vu Tung, Pham Van Thin
Department of Physical and Chemical Engineering, Le Quy Don Technical University, 236 Hoang Quoc Viet - Hanoi - Viet Nam

(Poster)

P_CAEP – 17 **Study on effect of technical parameters in liquid nitriding process to the structure and mechanical properties of AISI 420 stainless steel**

Thanh Nguyen Van[1,2], Trung Trinh Van[1] , Son Nguyen Anh[1], Tuan Pham Hong[3], Hop Nguyen Thanh [3]
[1]School of Materials Science and Engineering, Hanoi University of Science and Technology, No.1, Dai Co Viet, Hai Ba Trung, Ha Noi, Viet Nam
[2]Laboratory of Technology and Casting alloys, Research Institute of Technology for Machinery, No. 25, Vu Ngoc Phan, Dong Da, Ha Noi, Viet Nam
[3]Centre for Optoelectronics, National Center for Technological Progress, C6 Building, Thanh Xuan Bac, Thanh Xuan, Ha Noi, Viet Nam

(Poster)

P_CAEP – 18 **Synthesis, study of magnetic and optical properties of Mn doped CdS semiconductor nanocrystals**

Nguyen Thi Hien[1], Nguyen Thi Luyen[1], Doan Thuy Huong[1], Dinh Quang Chinh[1], Pham Minh Tan[2], Vuong Thi Kim Oanh[3], Phan Van Do[4], Nguyen Dang Tam[5], Phan The Long[6] và Nguyen Xuan Ca[1,]*
[1]Department of Physics and Technology, Thai Nguyen University of Sciences, Thai Nguyen, Vietnam
[2]Faculty of Fundamental Sciences, Thai Nguyen University of Technology, Thai Nguyen, Vietnam

[3]Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam
[4]Faculty of Energy Engineering, ThuyLoi University, 175 Tay Son, Dong Da, Ha Noi, Vietnam
[5]ThuyLoi University-second base, 02 Truong Sa, Binh Thanh, Ho Chi Minh city, Vietnam
[6]Department of Physics, Hankuk University of Foreign Studies, Yongin 449-791, South Korea
(Poster)

P _CAEP – 19 **Colloidal Cu-doped CdZnS nanocrystals: Cu doping and blue shift of absorption and luminescence spectra of host lattice**

Nguyen Dieu Linh[1], Hoang Thi Lan Huong[2], Nguyen Thi Thuy Lieu[2], Le Ba Hai[3], Nguyen Xuan Nghia[4]
[1]University of Science and Technology of Hanoi, 18 Hoang Quoc Viet, Cau Giay, Hanoi
[2]Posts and Telecommunications Institute of Technology, Km 10 Nguyen Trai, Thanh Xuan, Hanoi
[3]University of Khanh Hoa, 01 Nguyen Chanh, Nha Trang
[4]Institute of Physics, 10 Dao Tan, Ba Dinh, Hanoi
(Poster)

P_CAEP – 20 **About crystallization process and heterogeneous dynamics in supercooled liquid and amorphous Fe**

Pham Mai An[*] and Pham Huu Kien
Thainguyen University of Education, Luong Ngoc Quyen, Thainguyen, Vietnam
(Poster)

P_CAEP – 21 **Invenstigation on luminescence quenching of Sm^{3+} ions doped K_2YF_5 single crystal**

Phan Van Do[1], Pham Thi Xuan[2], Do Lam Duan[2], Nguyen Dang Tam[3], Nguyen xuan Ca[2], Luong Duy Thanh[1], Vu Phi Tuyen[4]
[1]Thuy loi University, 175 Tay Son, Dong Da, Ha Noi
[2]Faculty of Physics and Technology, Thai Nguyen University of Sciences, Thainguyen, Vietnam
[3]Thuy loi University-Second base, 02 Truong Sa, Binh Thanh, Ho Chi Minh City.
[4]National Institute of Information and Communications Strategy, Hanoi, Vietnam.
(Poster)

P_CAEP – 22 **Laser-assisted photochemical synthesis of aunps/ag nano-dendrites on**

optical fibre for ultra-stable sers substrates

Pham Thanh Binh[1], Do Thuy Chi[2], Nguyen Anh Tuan[2], Hoang Anh[2], Vu Duc Chinh[1], Bui Huy[1] and Pham Van Hoi[1]

[1]Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Road, Cau Giay District, Hanoi, Vietnam

[2]Thai Nguyen Education University, Luong Ngoc Quyen Street, Thai Nguyen City, Vietnam

(Poster)

P_CAEP – 23 **Study on energy transfer properties of Gd – Tb ion pairs in K_2GdF_5:Tb for use in neutron dosimetry**

Doan Phan Thao Tien[a,c], Tran Thi Thanh Lam[b], Tran Dinh Hung[b], Nguyen Thi Minh Nguyet[c], Ha Xuan Vinh[a,c]*

[a] Nhatrang Institute of Technology Research and Application - VAST

[b] Khanh Hoa Department of Education and Training

[c] The Physics association in Khanh Hoa Province

(Poster)

P_CAEP – 24 **Intercomparison of gamma scattering and gamma transmission methods in determining the effective atomic number of some composite materials**

Trinh Thi Ai Lam [1], Phan Ngoc Linh [2], Hoang Duc Tam [2]

[1]Faculty of Physics and Engineering Physics, VNU-HCM University of Science, 227 Nguyen Van Cu St., Dist. 5, Ho Chi Minh City, Vietnam

[2]Faculty of Physics, Ho Chi Minh City University of Education, 280 An Duong Vuong St., District 5, Ho Chi Minh City, Vietnam

(Poster)

P_CAEP – 25 **A new approaching method to calculate Rayleigh-Compton ratio for several substances in the range of $6 \leq Z \leq 82$**

Le Hoang Minh[1], Van Tan Phat[1], Chau Thanh Tai[1], Huynh Dinh Chuong[2], Tran Thien Thanh[1,2], Chau Van Tao[1,2]

[1]Nuclear Department, University of Science, Viet Nam National University-Ho Chi Minh City, 227 Nguyen Van Cu Street, Ward 4, District 5, Ho Chi Minh City.

[2]Nuclear Laboratory, Viet Nam National University-Ho Chi Minh City, 227 Nguyen Van Cu Street, Ward 4, District 5, Ho Chi Minh City.

(Poster)

P_CAEP – 26 **Analysing activity concentrations of natural radionuclides in rock samples by using hpge detector and nai detector – FSA method**

Le Huu Loi[1], Tran Thien Thanh[2], Nguyen Quang Vuong[3], Nguyen Trung

Hieu[4]
[1]Center nuclear for technique in HCMC, Department of physics and nuclear analysis, 217, Nguyen Trai Street, Nguyen Cu Trinh Ward , District 1, Ho Chi Minh City, Viet Nam.
[2]University of Science, VNU-HCM, Faculty of Physics & Engineering Physics, Department of Nuclear Physics-Nuclear Engineering, 227, Nguyen Van Cu Street, Ward 4, District 5, Ho Chi Minh City, Viet Nam.
[3]HCMC University of Education, Department of Physics, 280, An Duong Vuong Street, Ward 4, District 5, Ho Chi Minh City, Viet Nam.
(Poster)

P_CAEP – 27 **Identify possible sources of pollution by multivariate statistical analysis.**

Nguyễn Ngọc Mai[1], *Lê Hồng Khiêm*[1,2]
[1]Institute of Physics - Vietnam Academy of Science and Technology, Ha Noi, Vietnam
[2]Graduate University of Science and Technology - Vietnam Academy of Science and Technology, Ha Noi, Vietnam
(Poster)

P_CAEP – 28 **Matrix effects correction in x-ray fluorescence analysis by Claisse-Quintin algorithm**

Nguyen Thi Truc Linh[1], *Nguyen Duy Han*[2]
[1]Nuclear Technique Laboratory, University of Science, VNU-HCM
[2]Faculty of Physics and Engineering Physics, University of Science, VNU-HCM
(Poster)

P_CAEP – 29 **High adsorption capacity of Uranium from aqueous solution by reduced graphene oxide – porous polyaniline composite**

Tran Quang Dat[*], *Nguyen Tran Ha, Nguyen Vu Tung, Pham Van Thin*
Le Quy Don Technical University, 236 Hoang Quoc Viet Street, Hanoi
(Poster)

P_CAEP – 30 **Evaluation of collective effective dose due to exposure from TENORM in fly ash for a residential area around a coal fired power plant in Vietnam**

Trương Thi Hong Loan[1,2], *Vu Ngoc Ba*[1], *Le Do Loc*[2], *Nguyen Quang Dao*[2], *Truong Thi Xuan Truong*[2], *Mai Thanh Man*[2], *Le Xuan Thuyen*[3], *Tran Van Luyen*[4]
[1]Nuclear Technique Laboratory, VNUHCM - University of Science, Linh Trung Ward, Thu Duc District, Ho Chi Minh City, Viet Nam
[2]Faculty of Physics and Engineering Physics, VNUHCM - University of

Science, 227 Nguyen Van Cu Street, District 5, Ho Chi Minh City, Viet Nam
[3]Faculty of Biology and Biotechnology, VNUHCM - University of Science, 227 Nguyen Van Cu Street, District 5, Ho Chi Minh City, Viet Nam
[4]Radiation Protection and Environment Monitoring, Center for Nuclear Techniques Ho Chi Minh City, Viet Nam.
(Poster)

P_CAEP – 31 **Xây dựng kính hiển vi huỳnh quang siêu phân giải dựa trên kĩ thuật định vị đơn điểm và phát quang ngẫu nhiên rời rạc**

Nguyễn Trong Nghĩa, Nghiêm Thị Hà Liên, Nguyễn Đình Hoàng, Vũ Văn Sơn, Trần Hồng Nhung*
Nhóm NanoBioPhotonics, Trung tâm Điện tử Học lượng tử, Viện Vật Lý, Viện Hàn lâm Khoa học và Công nghệ Việt Nam.
(Poster)

P_CAEP – 32 **Giải pháp ứng dụng hiệu ứng pin nhiệt-điện Peltier để ổn định công suất phát của laser rắn YAG:Nd bơm bằng ma trận laser bán dẫn phát xung công suất lớn, tần lặp cao dùng trong đo xa laser**

Nguyễn Văn Thương, Vũ Quốc Thủy*
Viện Vật lý kỹ thuật, Viện KH-CN quân sự
(Poster)

P_CAEP – 33 **Extending tunable wavelength range by using configuration of second order Bragg reflection**

Đỗ Quang Hòa+, Trần Thị Trung Thủy, Vũ Dương, Nghiêm Thị Hà Liên*
Trung tâm Điện tử học – Lượng tử, Viện Vật lý, Viện HLKH&CN Việt Nam
(Poster)

P_CAEP - 34 **Design and fabrication of high power LED fishing lamp combined with asymmetric lens**

Duong Thi Giang, Tran Quoc Tien, and Pham Hong Duong
Institute of Materials Science, Vietnam Academy of Science and Technology (VAST), 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam
(Poster)

P_CAEP – 35 **System design of periscopic electro – optical sight**

Nguyen Quang Minh[1] , Nguyen Van Binh[1] , Nguyen Đinh Van[1]
Ta Van Tuan[2] , Nguyen Anh Tuan[3]
[1]National Center for Technological Progress
[2]The Vietnam Physical Society
[3]Technical Department of Armored Army

(Poster)

P_CAEP – 36 **Cavity ring-down spectroscopy of the $^{14}NH_2$ isotopomer radical**

Phung Viet Tiep[1], Stéphane Douin[2], Thomas Pino[2]
[1]Institute of Physics, Vietnam Academy of Sciences and Technology, 10 Dao Tan, Ba Dinh, Hanoi, Vietnam
[2]Institut des Sciences Moléculaires d'Orsay, UMR8214, CNRS, Université Paris-Sud, Rue André Rivière, Bât. 520, F-91405 OrsayCedex, France

(Poster)

P_CAEP – 37 **Determination of electron and gas temperature of a non-equilibrium plasma jet by optical emission spectroscopy**

Dao Nguyen Thuan[1], Nguyen Nhat Linh[1] and Le Thi Quynh Xuan[1]
[1)]*Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Ba Dinh, Hanoi, Vietnam*

(Poster)

P_CAEP - 38 **Investigation of styrene removal coupled with plasma catalysts under atmospheric conditions**

*Van Toan Nguyen[1], Duc Ba Nguyen[1], Bhattarai Roshan Mangal[1], Young Sun Mok[1]**
[1]Department of Chemical and Biological Engineering, Jeju National University, South Korea

(Poster)

P_CAEP – 39 **Effects of current density on the characteristics of oxide layers of 6061 Al alloy by plasma electrolytic oxidation**

Quang-Phu Tran[1], Van-Da Dao[1], Van-Hoi Pham[2], Tsung-Shune Chin[3]*
[1]Department of Electrical and Electronic Engineering, Hung Yen University of Technology and Education, 39A Road, Dan Tien Commune, Khoai Chau District, Hung Yen Province, Vietnam
[2]Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Road, Cau Giay District, Hanoi, Vietnam
[3]Department of Materials Science and Engineering, Feng Chia University, No. 100, Wenhua Road, Xitun District, Taichung City, Taiwan 407

(Poster)

P_CAEP – 40 **Influence of plasma treatment on the reaction of decolorization reaction of H_2O_2 with Methylene Blue in water solution**

Do Hoang Tung[1], Nguyen Thi Thu Thuy[2,3] , Bui Thi Huyen Trang[1]

[1]Institute of Physics, Vietnam Academy of Science and Technology, Vietnam, 18 Hoang Quoc Viet Street, Cau Giay District, Hanoi, Vietnam;
[2]Faculty of Engineering Physics and Nanotechnology, VNU University of Engineering and Technology, 144 Xuan Thuy Road, Cau Giay District, Hanoi, Vietnam
[3]University of Fire, Ministry of Public Security, Vietnam, 243 Khuat Duy Tien, Hanoi, Vietnam.
(Poster)

P_CAEP – 41	**Simple, high accuracy wound imaging analysis by combining Grabcut segmentation and KNN classification methods** *Do Van Hoan[1], Do Hoang Tung[2]* [1]Institute of Physics, Vietnam Academy of Science and Technology, Vietnam, 18 Hoang Quoc Viet Street, Cau Giay District, Hanoi, Vietnam; [2]University of Science and Technology of Hanoi Fire, 18 Hoang Quoc Viet Street, Cau Giay District, Hanoi, Vietnam. ***(Poster)***
16:25 – 18:05	**Plenary Session**
	Session chair: Prof. Nguyen Dai Hung
PL – 06 **16:25 – 16:50**	**Research opportunities in GIST with high excellence** *Jongseok Lee* ***(Plenary talk)***
PL – 07 **16:50 – 17:15**	**Internship and PhD research at Sokendai and Inter-University research institute in Japan** *Satoshi Mayama* ***(Plenary talk)***
PL – 08 **17:15 – 17:40**	**Research opportunities in Dubna** *Le Hong Khiem* ***(Plenary talk)***
PL – 09 **17:40 – 18:05**	**Introduction to International Centre of Physics under the auspices of UNESCO** *Dinh Van Trung* ***(Plenary talk)***
	Closing Ceremony
18:30 – 20:30	**Farewell party**
	Saturday, October 26, 2019 **Full day**

08:00 – 16:00 **Thai Nguyen tour**

http://caep6-casean6.hoabinhtourist.com/tour

ACTIVITIES

SOCIAL PROGRAM

THAI NGUYEN CITY TOUR

(Full day / Car)

Thai Nguyen is known a province in the Northeast Vietnam, the gateway connecting Viet Bac to the North Delta and is defined as the political, cultural and socio-economic center of Thai Nguyen province and the Northern VietNam. . Thai Nguyen has many revolutionary historic relics and scenic spots along with the favorable geographical location. Let's learn about the culture of the people here with HoaBinh Tourist

SCHEDULE:

08.30 am: Tour guide pick up at hotel and go to ***Thai Hai village***

09.00 am: Arrive ***Thai Hai village*** and start to visit the displaying and selling the products, tools and instruments of the Tay group, visit the natural landscape around the lake; fresh vegetable fields by the Thai farmers ; observe the Sanctuary of traditional culture; explore the world of natural flora and fauna in the reserve

Let's sit on the floor on house on stilts from the Dinh Hoa safety, explore daily life of ethnic Tay, Nung being recreated in reserve.

Along the cup of fragrant green tea, listen the traditional song of Tay

It's time to participate in folk games imbued with the traditional culture of ethnic Tay at Thai Hai village. Union participation in the game: go footbridges, seesaw in the conservation field

11.30 am: Lunch is served at food court

13.00 pm: After lunch, visit ***Tan Cuong Tea Hill*** - The space of Tan Cuong tea culture is a

place where people demonstrate tea product and enjoy fresh air and Tan Cuong tea. It is a big pride for visitor to try the greatest tea in such a beautiful place!

15.00 pm : Go back to ***Dung Tan Ecotourism Destinations-*** *visit* many kinds of ornamental birds and aquariums create a unique and attractive ecosystem of plants - birds - fish.

17.00pm : Arrive back in hotel. Tour ends

PRICE: 19 USD/ person (Package tour)

435.000vnđ/ person

INCLUSION:

- Pick-up and drop-off at your hotel by air-conditioned bus.
- Professional English speaking guide.
- Entrance fees.
- Vietnamese lunch
- Travel insurance
- Free travel cap

EXCLUSION:

- Drinks, tax
- Tips and others not clearly mentioned above.

BOOK OF ABSTRACTS

PLENARY TALKS

PL – 01

INTRODUCTION TO INSTITUTE OF PHYSICS

Prof. Dinh Van Trung

PL – 02

5S HUMAN CENTRIC LIGHTING SYSTEM

Pham Hong Duong, Duong Thi Giang and Pham Hoang Minh

Institute of Materials Science, Vietnam Academy of Science and Technology (VAST)

18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam

E-mail: duongphamhong@yahoo.com

Abstract: 5S Human Centric Lighting is a new lighting concept and solution developed by our group in order to establish the artificial indoor light environment that mimics the outdoor natural light environment which could be the best for human life. The system consists mainly of new types of linear LED lamps equipped of an asymmetrical lens and a shade parts. In combination with a large white ceiling, one can create the bright ceiling that is similar to the natural sky with white clouds in the zenith zone and yellowish clouds near the horizon. The variation of the sky color and scene can be created using the UV on canvas printing technology, mounted on the plaster ceiling. The circadian change of the intensity and CCT can be done easily if we use the programmable power supply to control individually 6500K and 3000K channels and use the ceiling as a light mixer. The results obtained in more than 30 lighting projects realized in Hanoi are very positive both for the comfort and the health of the users.

Key word: *Human centric lighting, LED, asymmetric lens, circadian*.

PL – 03

HIGH DENSITY WO_3-Gd_2O_3-B_2O_3 GLASS DOPED WITH Ln^{3+} ION FOR PHOTONIC AND RADIATION DETECTION MARTIAL APPLICATION

Nuanthip Wantana[1,2], Natthakridta Chanthima[1,2], Yotsakit Ruangthaweep[1,2], Yamanoi Kohei[3], Pham Hong Minh[4], Damir Valiev[5] HongJoo Kim[6], Jakrapong Kaewkhao[1,2]*

[1)]Physics Program, Faculty of Science and Technology, Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand

[2)]Center of Excellence in Glass Technology and Materials Science (CEGM), Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand

[3)]Institute of Laser Engineering, Osaka University, Japan

[4)]Institute of Physics (IOP), Vietnam Academy of Science and Technology (VAST), Hanoi, Vietnam

[5)]National Research Tomsk Polytechnic University, Lenin Avenue 30, Tomsk, 634050, Russia

[6)]Department of Physics, Kyungpook National University, Daegu, Republic of Korea

E-mail: jakrapong@webmail.npru.ac.th

Tungsten gadolinium borate (WGB) glasses doped with different concentrations of Ln^{3+} ions were prepared by the melt quenching technique. The structural and spectroscopic analysis of glasses were carried out by X-ray diffraction, density, molar volume, absorption, photoluminescence, temperature dependent luminescence and radioluminescence spectroscopy, including luminescence decay time measurements. The glasses containing WO_3 exhibit a high density over than 6.00 g/cm^3 and performs the enhanced atomic compaction with increment of Ln_2O_3 content. Ln^{3+} ions in glass absorb photons in visible light and near infrared region. The strongest luminescence wavelength is 575, 600, 613, 544, 1074, 1547 and 546 nm for Dy^{3+}, Sm^{3+}, Eu^{3+}, Tb^{3+}, Nd^{3+}, Er^{3+} and Ho^{3+} doped glass, respectively. The emission peaks of the radioluminescecne spectra are similar to those of the photoluminescence spectra, suggesting that the origin of the emission is same. In the temperature dependent luminescence, emission intensity of Ln^{3+} decreased with rising of temperature. The luminescence decay time for strongest emission line of Dy^{3+}, Sm^{3+}, Eu^{3+}, Tb^{3+} are in millisecond order while ones of Nd^{3+}, Er^{3+} and Ho^{3+} are in microsecond order. Ln-WGB glass performs a potential for using as photonic materials and radiation detecting applications in the high energy / nuclear physics, radiation monitoring and homeland security.

Keywords: *Ln^{3+}; Tungsten; High density glass; photoluminescence; radioluminescence*.

PL – 04

SYNERGISTIC EFFECTS OF ERBIUM AND TITANIA NANOPARTICLES CONCOCTION ON IMPROVED SELF-CLEANING AND SPECTRAL QUALITIES OF AMORPHOUS TELLURITE HOST

S. K. Ghoshal[a,*], N. N. Yusof[a], R. Arifin[a] and Areej S. Alqarni[a,b]
[a]Department of Physics, Faculty of Science, Universiti Teknologi Malaysia, Johor, Malaysia.
[b]Department of Physics, Faculty of Science, Taibah University, Madinah, Saudi Arabia.
[*]Corresponding author: sibkrishna@utm.my (S. K. Ghoshal)

Cost-effective and maintenance free glass surfaces with improved hydrophilicity and photocatalytic activity became demanding for various applications. Basic insight on the self-cleaning mechanism of such glass facade against deposited pollutants needs to be clarified. Zinc-sodium-tellurite glass system doped with varied trivalent rare earth ions are certainly an emergent up-converted solid state lasing material in nanophotonics. In this view, we intend to explain the synergism plasmonic performance between erbium ions (Er^{3+}) and titania (TiO_2) nanoparticles (TNPs) embedded inside zinc-sodium-tellurite amorphous matrices. To meet this goal, five glass samples of composition (69-x)TeO_2-20ZnO-10Na_2O-1Er_2O_3-(x)TiO_2, where x = 0.0, 0.1, 0.2, 0.3 and 0.4 mol% were prepared via melt quenching method and subsequently characterized. TNPs stimulated improvement in the photocatalytic activity, absorption and emission cross-sections of ErIs were evaluated to realize the feasibility of achieving efficient and economic up-converted lasing glass with self-cleaning traits. XRD pattern of as-quenched samples verified their true amorphous nature. TEM images manifested the growth of nearly spherical TNPs of average size ≈14 ± 1 nm which were homogeneously dispersed inside the glass matrix. The absorption spectra revealed ten significant bands of Er^{3+} ions. The surface plasmon absorption bands of TNPs were divulged at 552 and 580 nm. Photoluminescence spectra of the glass samples displayed three peaks positioned at 525 nm, 545 nm and 660 nm with intensity enhancement factor ≈30. The optical band gap for direct (3.06-2.90 eV) and indirect (3.08-3.03 eV) transitions were shrunk with increasing TNPs contents. The achievement fairly low water contact angle in the range 68° to 43° due to the inclusion of TNPs was ascribed to the improved hydrophilicity of the glass surface. Besides, slight increase in the rate constant of the methylene blue (MB) degradation under 350 nm irradiations with increasing TNPs contents indicated an enhancement in the photocatalytic actions. This observation was majorly attributed to the mechanism of TNPs enabled localized surface plasmon resonance (LSPR) assisted electromagnetic field enlargement in the proximity of Er^{3+}. Wenzel and Cassie–Baxter model was used to determine the surface wetting parameter for a complete understanding and validating the experimental results. Synergism between TNPs and Er^{3+} in the tellurite glass host was demonstrated to be beneficial for self-clealiness with improved photocatalytic action. It is established that the present glass composition is greatly advantageous for dual purposes including self-cleaning surface making and up-converted laser.

PL – 05

ABSTRACT TERAHERTZ EMISSION ENHANCEMENT IN GAAS ON SI(100) IN REFLECTION AND TRANSMISSION EXCITATION GEOMETRIES

Elizabeth Ann P. Prieto[1], Karl Cedric P. Gonzales[2], Alexander De Los Reyes[2], Armando S. Somintac[1,2], Arnel A. Salvador[1,2], Elmer S. Estacio[1,2]

1) Materials Science and Engineering Program, College of Science, University of the Philippines Diliman,

2) National Institute of Physics, University of the Philippines Diliman

E-mail: (eapprieto@msep.upd.edu.ph)

The monolithic integration of gallium arsenide on silicon (GaAs on Si) demonstrated enhanced terahertz (THz) emission in both reflection and transmission excitation geometries. The THz emission efficiency via time-domain spectroscopy is observed to be dependent on the Si substrate temperature. The GaAs on Si grown at substrate temperature Ts = 520°C exhibited the highest THz intensity. GaAs on Si can be the future state-of-the-art THz material system. The effectiveness of GaAs as an active layer integrated with low-cost Si substrate is desirable for efficient and cost-effective THz sources for various THz sensing and imaging systems. The demand downturn for efficient and cost-effective THz sources is highly unlikely especially in the next decade given the growing applications of THz sensing and imaging systems in the field of automotive and semiconductor industries, security and surveillance, and medicine. The effectiveness of GaAs on Si, however, as source of THz radiation is still restricted by the appropriate epitaxial growth method to achieve high quality film as well as the optimal growth parameter for the intense emission of THz radiation. The heteroepitaxial growth of GaAs on Si is constrained by the difference in polarity, lattice constant and thermal expansion coefficient between GaAs and Si leading to misfit and threading dislocations [1-3]. These primarily hinder the growth parametrization viable for the intense emission of THz radiation. Presented in this study is the THz emission of GaAs on Si grown at different substrate temperatures Ts = 320°C, 520°C and 630°C. The GaAs is deposited by molecular beam epitaxy on Si(100) substrate utilizing a two-step low-temperature GaAs buffer layer system to compensate the lattice mismatch between the GaAs and Si. The THz time-domain spectroscopy is performed in reflection and transmission excitation geometries using a ppolarized, mode-locked Ti:Sapphire pulsed laser as the excitation source.

REFERENCES

[1] D. A. Neumann, H. Zabel, R. Fischer, and H. Morkoc, J. Appl. Phys., 61(3), 1987.
[2] S. M. Koch, S. J. Rosner, R. Hull, G. W. Yoffe, and J. S. Harris, J. Cryst. Growth, 81(1-4), 1987.
[3] M. Yamaguchi, M. Tachikawa, Y. Itoh, M. Sugo, and S. Kondo, J. Appl. Phys., 68(9),1990.

PL – 06

RESEARCH OPPORTUNITIES IN GIST WITH HIGH EXCELLENCE

Jongseok Lee

PL – 07

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

Satoshi Mayama

PL – 8

RESEARCH OPPORTUNITIES IN DUBNA

Le Hong Khiem

PL – 09

INTRODUCTION TO INTERNATIONAL CENTRE OF PHYSICS UNDER THE AUSPICES OF UNESCO

Dinh Van Trung

INVITED TALKS

I – 01

EFFECTS OF DEUTERIUM-ION PLASMA IRRADIATION ON THE OPTICAL PROPERTIES OF BULK ZINC OXIDE SINGLE CRYSTALS

Melvin John F. Empizo[1], Kohei Yamanoi[1], Toshihiko Shimizu[1], Nobuhiko Sarukura[1], Bess G. Singidas[2], Roland V. Sarmago[1,2], Arnel A. Salvador[1,2], and Tsuguo Fukuda[3]

[1)] Institute of Laser Engineering, Osaka University, 2-6 Yamadaoka, Suita, Osaka 565-0871, Japan
[2)] National Institute of Physics, University of the Philippines Diliman, Diliman, Quezon City 1101, Philippines
[3)] Fukuda Crystal Laboratory Co., Ltd., 6-6-3 Minami-Yoshinari, Aoba-ku, Sendai, Miyagi 989-3204, Japan

E-mail: mjfempizo@ile.osaka-u.ac.jp

Understanding the effects of radiation environments is both necessary and important to realize the potential applications of various functional materials. Inside fusion reactors, for example, the chamber walls and diagnostic instruments are exposed to reaction by-products such as x-rays, neutrons, and alpha particles and to some unreacted deuterium and tritium fuels. Long-term exposure to such radiation environments can deteriorate and damage materials leading to sudden failure of devices. Since hydrothermal-grown bulk zinc oxide (ZnO) single crystals have been suggested to be used as potential scintillator materials for radiation detectors inside laser fusion reactors, we then investigate the effects of deuterium-ion (D-ion) plasma irradiation on the ZnO crystal's optical properties. The bulk crystals were irradiated with 1 keV, 10^{-20} $m^{-2}s^{-1}$ D ions – similar to conditions inside actual fusion reactors – using a steady-state, high-flux ion beam test (HiFIT) device [1, 2]. After irradiation, the single crystals exhibit decreased visible transmittances, redshifted ultraviolet (UV) emission peaks, shortened UV emission lifetimes, and suppressed visible emission bands. These changes in the optical properties are attributed to the generation of defects during irradiation and to the interaction of elemental hydrogen with other defects and/or impurities. Our results reveal the specific effects of D-ion plasma irradiation on bulk ZnO single crystals and provide some important insights on ZnO's scintillator applications.

REFERENCES

[1] M. J. F. Empizo, K. Yamanoi, K. Mori, K. Iwano, Y. Iwasa, Y. Minami, R. Arita, K. Fukuda, K. Takano, T. Shimizu, et al., *J. Appl. Phys.* **121**, 2017, p. 175102.
[2] K. Yamanoi, M. J. F. Empizo, K. Mori, K. Iwano, Y. Minami, R. Arita, Y. Iwasa, K. Fukuda, K. Takano, T. Shimizu, et al., *Opt. Mater.* **62**, 2016, p. 646.

I – 02

APPLICATION OF LIQUID DIELECTRIC TO DEVELOPMENT OF COLD ATMOSPHERIC PLASMA JET

Duc Ba Nguyen[1,2] and Young Sun Mok[1]

1. Department of Chemical and Biological Engineering, Jeju National University, Jeju 63243, Republic of Korea.

2. Center for Advanced Chemistry, Institute of Research and Development, Duy Tan University, 03 Quang Trung, Da Nang 550000, Vietnam.

Corresponding author: smokie@jejunu.ac.kr (Mok)

Abstract

In recent years, there has been an increasing interest in cold atmospheric plasma jet (CAPJ), since CAPJ is considered a powerful tool for biomedical applications of plasma, including cancer treatment, skin treatment, sterilization, and wound healing. As a result, several CAPJ sources have been introduced and applied for research or treatment, e.g. dielectric barrier discharge (DBD), Plasma Pencil, Rhytec Portrait, Bovie J-plasma, Canady Helios Cold Plasma and Hybird Plasma, kINPen, and PlasmaDerm. Among these configurations, two-ring DBD can be considered as the simplest configuration, i.e. it consisted of two-ring electrodes covered outside the dielectric tube. In order to avoid arcing or spark in a two-ring DBD, a large distance between two electrodes are proposal; however, reducing the jet length and high voltage breakdown for plasma gas under this condition. Recently, we developed two-ring DBD plasma with a liquid dielectric, i.e. the electrodes were isolated with air surrounding by electrical insulating oil. Under this condition, the distance between two electrodes can be reduced to a few mm without arcing or sparks between two electrodes. Also important is the configuration presented high performance of plasma jet in terms of the long plasma jet, low temperature, activated plasma jet source, and stable plasma.

I – 03

DEVELOPMENT OF DETECTORS BASED ON WIDE BAND GAP FLUORIDES

Marilou Cadatal-Raduban[1,2]

[1)] Centre for Theoretical Chemistry and Physics, Institute of Natural and Mathematical Sciences, Massey University, Albany, Auckland 0632, New Zealand

[2)] Institute of Laser Engineering, Osaka University, 2–6 Yamadaoka, Suita, Osaka 565-0871, Japan

E-mail: m.raduban@massey.ac.nz

Fluorine-based wide band gap materials have numerous applications in scientific research and industry primarily because of their high transparency down to around 100 nm. When doped with rare earth activator ions, these wide band gap materials also emit very short wavelengths from the ultraviolet down to the vacuum ultraviolet regions (400-100 nm), with very fast emission decay times. High transparency and fast emission decay times have opened up the potential of these wide band gap materials as scintillators of high energy radiation and also as detectors of vacuum ultraviolet radiation. In this talk, I will present recent progress in the development of detectors based on wide band gap fluoride materials.

REFERENCES

[1] K. Suzuki, M. Cadatal-Raduban, M. Kase, S. Ono, *Opt. Mater.* **88**, 2019, p. 576.
[2] Y. Minami, J. L. Gabayno, V. C. Agulto, Y. Lai, M. J. F. Empizo, T. Shimizu, K. Yamanoi, N. Sarukura, A. Yoshikawa, T. Murata, M. Guzik, Y. Guyot, G. Boulon, J. A. Harrison, M. Cadatal-Raduban, *J. Non-Cryst. Solids*, **521**, 2019, p. 119495.
[3] M.V. Luong, M.J.F. Empizo, J.L.F. Gabayno, Y. Minami, K. Yamanoi, T. Shimizu, N. Sarukura, M.H. Pham, H.D. Nguyen, K.G.Steenbergen, P. Schwerdtfeger, M. Cadatal-Raduban, Comp. Mater. Sci. **153**, 2018, p. 431.
[4] T. Shimizu, M.V.Luong, M. Cadatal_Raduban, M.J.F. Empizo, K. Yamanoi, R. Arita, Y. Minami, N. Sarukura, N. Mitsuo, H. Azechi, M.H.Pham, H.D. Nguyen, K. Ichiyanagi, S. Nozawa, R. Fukuya, S. Adachi, K.G. Nakamura, K. Fukuda, Y. Kawazoe, K.G. Steenbergen, P. Schwerdtfege, *Appl. Phys. Lett.*, **110**, 2017, p. 141902.

I – 04

NEW SKYRME PARAMETRIZATION WITH INCLUSION OF NUCLEAR TENSOR FOR FISSION-BARRIER CALCULATIONS

Meng-Hock Koh[1,2]

[1)] Department of Physics, Faculty of Science, Universiti Teknologi Malaysia, 81310 Johor Bahru, Malaysia

[2)] UTM Centre of Industrial and Applied Mathematics, 81310 Johor Bahru, Malaysia

E-mail: kmhock@utm.my

The nuclear tensor component within the Skyrme energy density functional is usually neglected due to its small contribution to the spin-orbit potential while posing technical difficulties when studying deformed nuclei. Nevertheless, investigation on the impact of nuclear tensor term is gaining in popularity recently with some new Skyrme parametrizations being introduced in the last decade. Among them are the SLy5+tensor (SLy5+T) [1] and SIII+tensor (SIII+T) [2, 3] in which tensor term was added perturbatively with respect to the original SLy5 and SIII parametrizations. In another work of Ref. [4], a family of TIJ Skyrme parametrization was introduced whereby all coupling constants entering the energy-density-functional (EDF) were fitted to ground-state properties of some magic nuclei. The present study is interested to extend the effort in this area by investigating the impact of nuclear tensor term in the case of nuclear fission within a static approach. This tantamount to calculate the deformation energy surface and to see how the nuclear tensor term alters the shape of the deformation energy and fission-barrier heights. Two studies have indeed shown that the nuclear tensor term plays an important role at large nuclear deformation [5,6]. Within the Skyme EDF, one needs a new Skyrme parametrization with inclusion of nuclear tensor for such purpose. Following this motivation, I will show the recent progress to generate a new Skyrme parametrization based on an existing standard Skyrme parametrization for nuclear fission studies. Application of the new parametrization on some cases will also be discussed.

REFERENCES

[1] G. Colo, H. Sagawa, S. Fracasso, P. F. Bortignon, *Phys. Lett. B* **646**, 2007, pp. 227
[2] D. M. Brink, F.Stancu, *Phys. Rev. C* **75**, 2007, pp. 064311
[3] D. M. Brink, F. Stancu, *Phys.Rev. C* **97**, 2018, pp. 064304
[4] T. Lesinski, M. Bender, K. Bennaceur, T. Duguet, J. Meyer, *Phys. Rev. C* **76**, 2007, pp. 014312
[5] S. V. Tolokonnikov, I. N. Borzov, Yu. S. Lyutostansky, E. E. Saperstein, *JETP Lett.* **107**, 2018, pp. 86
[6] L. M. Robledo, *private communication,* 2019

I – 06

DESIGN OF LENS FOR LED UNIFORM ILLUMINATION USING FREEFORM OPTICS

Pham Thanh Tuan[1], Seoyong Shin[2]

1) Faculty of Vehicle and Energy Engineering, HCMC University of Technology and Education
2) Department of Information and Communication Engineering, Myongji University, Yongin Campus, 116 Myongji-ro, Nam-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea
E-mail: sshin@mju.ac.kr (Shin Seoyong); pttuan1412@gmail.com (Pham Thanh Tuan)

We present a freeform lens design for light-emitting diode (LED) uniform illumination applications. The LED source is an array of LEDs. An array of collimating lens is applied to collimate output from the LED array. A freeform lens is used to redistribute the collimated beam along two dimensions in the illumination area. Collimating lens and freeform lens surfaces are designed by using principles of non-imaging optics such as Snell's law, conservation of optical path length, and edge-ray theorem. The collimated beam output from the collimating lens array is divided into many fragments. Each fragment is refracted by a sub-lens of freeform lens and distributed over the illumination area, so that the total beam can be distributed to the illumination target uniformly. The simulation results show that this design has a compact structure, high optical efficiency of 80% and good uniformity. Some consideration of the energy savings and optical performance are discussed by comparison with other typical light sources. The results show that our proposed LED lighting system can reduce energy consumption in comparison to using a conventional fluorescent lamp. Our research is a strong candidate for low cost, energy savings for indoor and outdoor lighting applications.

REFERENCES

1. Y. Dinh, X. Liu, Z. Zheng; P. Gu, "Freeform LED lens for uniform illumination." *Opt. Express* **16**, 2008 12958–12966.
2. Z. Su, D. Xue, Z. Ji, "Designing LED array for uniform illumination distribution by simulated annealing algorithm." *Opt. Express*, **20**, 2012, A843–A855.
3. Y. Shi, B. Li, M. Zhao, Y. Zhou, D. Zhang, "The design of LED rectangular uniform illumination lens system." *Opt. Int. J. Light Electron Opt*, **144**, 2017, 251–256.
4. J. M. Gordon, A. Rabl, "Reflectors for uniform far-field irradiance: Fundamental limits and example of an axisymmetric solution." Appl. Opt, 37, 1998 44–47.
5. G. Wang, L. Wang, F. Li, D. Kong, "Design of optical element combining Fresnel lens with microlens array for uniform light-emitting diode lighting." *J. Opt. Soc. Am. A*, 29, 2012, 1877–1884.
6. Kim, B. Kim; Choi, M. Choi; Kim, H. Kim; Lim, J. Lim; Kang, S. Kang, "Elimination of flux loss by optimizing the groove angle in modified Fresnel lens to increase illuminance uniformity, color uniformity and flux efficiency in LED illumination. Opt. Express 2009, 17, 17916–17927.

I – 07

HIGH PERFORMANCE OF TOLUEN DECOMPOSITION AT LOW TEMPERATURE OVER PD/ZSM-5 COUPLED WITH A DIELECTRIC BARRIER DISCHARGE

Md. Mokter Hossain, Duc Ba Nguyen, M.S.P. Shdhakaran,Young Sun Mok*

Department of Chemical and Biological Engineering, Jeju National University, Jeju 63243, Korea

*Corresponding author, Tel: (+82)64-754-3680, Fax: (+82)64-755-3670,

E-mail: smokie@jejunu.ac.kr

Abstract

Atmospheric pressure non-thermal plasma (NTP) has been recognized as a significant tool for the removing pollutants such as volatile organic compound (VOC) and odor from the air, NOx and soot from diesel exhaust, disinfection of water, and promoting various chemical reactions in gas or in liquid. In this study, noble metal palladium was used as a catalyst along with ZSM-5 as a support material for the purpose of decomposition of toluene. The toluene decomposition was investigated for the deodorizing process to improve the air quality using plasma discharge with catalyst. Plasma discharge itself can able to destroy toluene but it produces ozone and carbon monoxide (CO) without a catalyst which is very dangerous for humans. Catalyst also not fully able to remove the ozone and CO but it reduces the concentration at least several times.

I – 08

Co_3O_4 AND TiO_2 FILMS PREPARED BY MULTI-PLASMA JET SYSTEM WITH HOT HOLLOW CATHODE DISCHARGE

Jiří Olejníček, Jiří Šmíd, Petra Kšírová and Zdeněk Hubička

Department of Low-temperature plasma, Institute of Physics CAS,
Na Slovance 2, Prague, Czech Republic

E-mail: olejn@fzu.cz

Semiconducting crystalline films of Co_3O_4 and photoactive films of TiO_2 were deposited by novel sputtering technique with extremely high deposition rate even in reactive mode. This technique is based on modified hollow cathode plasma jet sputtering (HCPJS) with multi-nozzle arrangement. Unlike magnetron sputtering (MS), this kind of deposition process does not suffer from oxidation of sputtered cathode or absorption of magnetic field by a ferromagnetic target. For further increasing of deposition rate, an extremely high temperature of the uncooled hollow cathode is used. This makes it possible to combine the thermal evaporation from the surface of the hot hollow cathode with plasma sputtering of individual atoms. Therefore, compared to reactive sputtering by DC magnetron, the resulting deposition rate can be for some materials up to 10 times higher.

In this work, we decided to apply this technology to the preparation of thin layers of Co_3O_4 and TiO_2 and compare the results with similar layers prepared by classical magnetron. The films were sputtered from pure metallic cathodes (cobalt and titanium) in Ar/O_2 atmosphere with a total gas pressure in the range 1 – 10 Pa. The temperature of hollow cathode was kept slightly below the melting point of cathode material. The instantaneous deposition rate was measured by quartz crystal microbalance (QCM) technique. Although the thermal heat flux from the nozzle to the substrate was extremely high, we have been able to prepare these film on thermally sensitive polymers such as PET or PC foils. Final properties of deposited films were studied by Raman spectroscopy, X-Ray Diffraction, Scanning Electron Microscopy and other techniques and will be subject of the presentation.

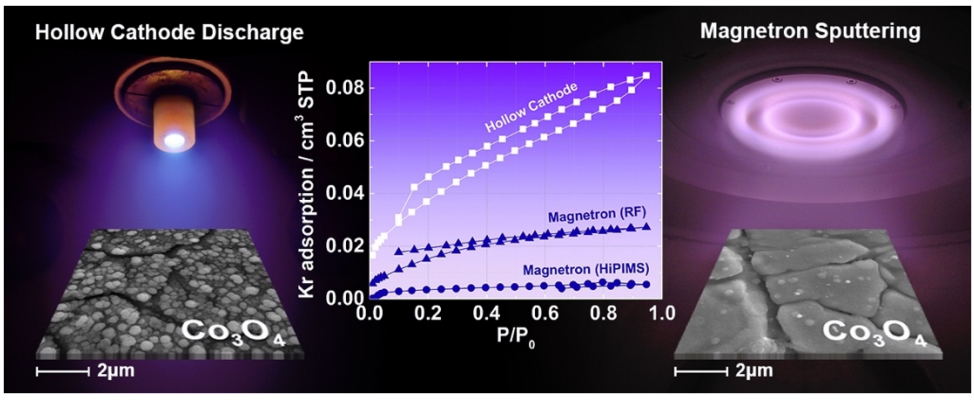


Fig. 1: Comparison of Co_3O_4 films prepared by hot hollow cathode and magnetron sputtering.

I – 09

APPLICATION OF LOW-LEVEL SEMICONDUCTOR LASER IN TREATMENT OF ATHEROSCLEROSIS OF INTERNAL CAROTID ARTERY IN TYPE 2 DIABETES AS HEMIPLEGIA AFTER CEREBROVASCULAR ACCIDENT

Tran Minh Thai [1], Ngo Thi Thien Hoa [2], Tran Thien Hau [1], Can Ngoc Minh [1]

[1] Laser Technology Laboratory - Ho Chi Minh City University of technology- Viet Nam National University HCM City

[2] Tan Chau Rehabilitation Treatment Department - An Giang Province

Email: tmthai_dhbk@hcmut.edu.vn

The people are difficult to detect and treat carotid atherosclerosis disease. The process of atherosclerosis occurs silently for a long time, without any unusual symptoms, only begins to manifest when the arteries are narrowed or blocked. When the inside of the carotid artery narrowed by atheromas is one of the important causes causing the cerebral vascular accident in cerebral infarction and transient anencephalohemia. There are currently four treatment therapies of internal carotid atherosclerosis:

a. The patient has performed bypass surgery when atheroma closes the inner carotid artery.
b. The patient must be performed carotid endothelial surgery when inside the narrowed carotid artery (70-99)%.
c. The patient can use the method of dilatation and stent setting if the carotid artery in the narrowing level (50-69)%.
d. The patient treated with antiplatelet agents [Aspirin (81-325 mg / day), clopidogrel 75mg / day] when the level of carotid stenosis in <50%.

The a,b,c therapies require high-tech and carry out in well-equipped hospitals in big cities. Because patients with type 2 diabetes are difficult to heal wounds, doctors will many difficulties in performing techniques in the above cases. The doctor must pay attention to adverse reactions to the patient's health in d therapy.

“Application of low-level semiconductor laser in treatment of atherosclerosis interval carotid artery in type 2 diabetes as hemiplegia after cerebrovascular accident”. Contents of this treatment method are parallel conducted: use the low-level laser to treat carotid atherosclerosis, use the low-level laser to treat fasting plasma glucose level in the early morning to the normal, use low-level semiconductor lasers treat rehabilitation and mental function for patients with paralysis after cerebrovascular accident.

We use low-power intravenous semiconductor laser equipment and 12-channel low-power semiconductor onto acupuncture - phototherapy laser equipment to perform the above therapies.

Using the above therapy to treat 80 people with carotid atherosclerosis in the level (50-60%) with 48 people accounting for 60% and at the level (30-40%), 32 people accounted for 40%.

The number of patients with type 2 diabetes, the average value of early morning fasting blood sugar index reached 200.87 mg/dl - very high.

These patients were half-paralyzed after the cerebrovascular accident at the levels that the third analysis level with 6 people accounting for 7.5%, the fourth paralysis level with 40 people accounting for 50%, the fifth paralysis level with 34 people accounting for 42.5%.

After the end of the three low-power semiconductor laser therapy (60 treatments), the patient was tested for blood sugar early in the morning. The results showed that the average value of blood sugar index reached 93.76 mg/dl - normal, the average value of HbA1c index reached 6.72% - normal. In 80 patients with internal carotid atherosclerosis, 79 people had completely gone, accounting for 98.75%. In the course of treatment does not occur complications and harmful side effects.

I – 10

LIGAND FIELD PARAMETERS EVALUATION OF SAMARIUM ACTIVATED $BaSO_4$-TeO_2-B_2O_3 GLASSES FOR LASER APPLICATIONS

S. Hashim[1,2*] and I. Abdullahi[1,3]
[1]Department of Physics, Faculty of Science, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.
[2]Centre for Sustainable Nanomaterials (CSNano), Ibnu Sina Institute for Scientific and Industrial Research (ISI-SIR), Universiti Teknologi Malaysia, 81310 UTM Skudai, Johor, Malaysia
[3]Department of Physics Federal University Gusau, Zamfara State Nigeria.

*Corresponding author: suhairul@utm.my

Abstract

The nature of Sm-O bond of Samarium activated Barium-sulfur-telluro-borate glasses of composition (70-y)B_2O_3-15$BaSO_4$-15TeO_2-ySm_2O_3 ($0.0 \leq y \leq 2.0$ mol%) prepared through melt quenching technique was investigated using the Ligand field parameters. Crystal field strength (Dq) and Racah parameters B and C were derived from the high energy region of the absorption spectra. B and C are parameters that describe the influence of inter-electronic force of repulsion in an atom and hence approximate the strength of Sm-O bond. The absorption spectra revealed nine (9) bands of transitions from lower $^6H_{5/2}$ energy level of Samarium to higher $^6P_{3/2}$, $^4I_{11/2}$, ^6H_j and ^6F_k levels (j = 15/2 & 1/2, k = 11/2, 9/2, 7/2, 5/2 and 3/2). The Sm-O bond in the prepared glass samples is less covalent due to the high values of Dq, B and C. Both the crystal field strength and Racah parameters were found to decrease with increase in Sm^{3+} contents which is an indication in the increase in the covalency of the glass samples. The observed less covalent nature of Sm-O bond was complemented further by the negative value (-0.7444, -0.9018, -0.8821 and -0.8821 for samples with y = 0.5, 1.0, 1.5 and 2.0 respectively) of the evaluated bonding parameter of all the glass samples. The prepared glass samples have the required features for laser applications.

I – 11

JUDD-OFELT ANALYSIS AND INFRARED LASER POTENTIAL OF LITHIUM BISMUTH ALUMINIUM BORATE GLASS DOPED WITH Er^{3+}

Eakgapon Kaewnuam[1*], Nuanthip Wantana[2,3] and Jakrapong Kaewkhao[2,3]

[1)] Physics Program, Faculty of Science and Technology, Muban Chombueng Rajabhat University, Ratchaburi, 70150, Thailand

[2)] Physics Program, Faculty of Science and Technology, Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand

[3)] Center of Excellence in Glass Technology and Materials Science (CEGM), Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand

E-mail: Eakgapon@mcru.ac.th

Er^{3+} doped lithium bismuth aluminium borate glasses were studied in the density, refractive index, light path length, absorption spectra and emission spectra to use data of these properties for Judd Ofelt (J-O) analysis. For J-O results of 1.0 mo% Er_2O_3 doped glass, the experimental and calculated oscillator strength of each absorption band of Er^{3+} correspond together and their values are in a range of 0.44 – 6.94 x 10^{-6}. The strongest oscillator strength belongs to the hypersensitive $^4I_{15/2} \rightarrow {}^2H_{11/2}$ transition (523 nm) of Er^{3+}. The J-O intensity parameter (Ω_2, Ω_4 and Ω_6) is 3.67, 2.00 and 1.67 x 10^{-20} cm^2, respectively. The stimulated emission cross-section (σ) for 1.5 μm wavelength with $^4I_{13/2} \rightarrow {}^4I_{15/2}$ transition is 6.17 x 10^{-21} cm^2. The values of Ω_2 represents the satisfy asymmetric level of Er^{3+} environment that affects to the quite σ value for laser action. The developed glasses in this work perform a potential for using as the gain medium in an infrared laser device and the other infrared sources.

Keywords: *Borate glass, Erbium, Judd-Ofelt.*

CONTRIBUTION TALKS

O – 01

ADSORPTION AND PLASMA-CATALYTIC OXIDATION OF ETHYLENE OVER ZEOLITE-SUPPORTED PALLADIUM CATALYST USING CORONA DISCHARGE-COUPLED CATALYTIC REACTOR

Saud Shirjana[1], Bhattarai Roshan Mangal[1], Young Sun Mok[1]*

[1]Department of Chemical and Biological Engineering, Jeju National University, Jeju-do, South Korea

* Correspondence: smokie@jejunu.ac.kr

Volatile Organic Compounds (VOCs) can be harmful for the environment and human health [1]–[4]. Among the many VOCs, ethylene is one that is produced by agricultural commodities that cause the ripening of fruits and vegetables [5]. Controlling the ethylene activity can lead to extend the postharvest shelf life of fruits and vegetables. The adsorption of dilute ethylene was performed in corona discharge-coupled catalytic reactor(CDCCR) with palladium-coated zeolite pellets serving as both adsorbent and catalyst. The removal of ethylene in this system was carried out by cyclic operation consisting repetitive steps: 1) adsorption followed by 2) plasma-catalytic oxidation. Ethylene was removed from air stream with concentration of 30ppm and enriched on zeolite surface during adsorption process for 60 min followed by application of plasma for 35min to recover the adsorption capability of the surface. The zeolite-supported palladium catalyst showed high ethylene adsorption capacity of 334.4 $\mu mol/g_{cat}$ at room temperature. The experimental result showed that the conversion efficiency of ethylene was observed to be nearly 86%.

REFERENCES

[1] J. Tétreault, A. L. Dupont, P. Bégin, and S. Paris, *Polym. Degrad. Stab.*, vol. 98, no. 9, pp. 1827–1837, 2013.
[2] W.-T. Tsai, *Environments*, vol. 3, no. 4, p. 23, 2016.
[3] Q. H. Trinh, M. S. Gandhi, and Y. S. Mok, vol. 04, pp. 2–7, 2015.
[4] Q. H. Trinh, S. B. Lee, and Y. S. Mok, *J. Hazard. Mater.*, vol. 285, pp. 525–534, 2015.
[5] N. Sue-aok, T. Srithanratana, K. Rangsriwatananon, and S. Hengrasmee, *Appl. Surf. Sci.*, vol. 256, no. 12, pp. 3997–4002, 2010.

O – 02

CoMoS@N-DOPED CARBON NANOCOMPOSITE AS A HIGH-PERFORMANCE ANODE MATERIAL FOR LITHIUM-ION BATTERIES

Bhattarai Roshan Mangal[1], MSP Sudhakaran[2], Md. M. Hossain[2], Saud Shirjana[2] and Y.S. Mok*

[1,2)]Department of Chemical and Biological Engineering, Jeju National University, Jeju, South Korea

*Corresponding Author: smokie@jejunu.ac.kr

Nanosized $CoMoO_4$ was prepared via a one-pot hydrothermal method as reported by Y. Chen et al [1]. Obtained CoMoO4 nanoparticles was mixed with Thioacetamide and grind together to form well mixed powder. Obtained powder was put inside the furnace in ceramic boat at 500 degree for 5 hours under argon atmosphere. The resulting product was CoMoS. Dopamine HCl was used as an N-Doped carbon source and treated with CoMoS in pH-maintained tris-buffer solution. Obtained nanocomposites have been characterized using different approaches like XRD analysis, FE-SEM, EDS elemental mapping, Raman Spectroscopy, and Fourier Transform Infrared Spectrophotometry. CR2032 cell has been fabricated and put for the electrochemical characterization process. These nanocomposites as an anode material for lithium- ion batteries (LIBs) should exhibit excellent rate capability and high stable cycling performances compared to its pristine electrode CoMoS. Cyclic Voltammetry (CV) analysis demonstrate the good electrochemical reversibility of the CoMoS@N-Doped carbon nanocomposites.

REFERENCES

[1] Y. Chen, B. Liu, W. Jiang, Q. Liu, J. Liu, J. Wang, H. Zhang, X. Jing, *J. Power Sources*. **300** ,2015, pp. 132–138

O – 03

MODIFIED STRUCTURE SILICA OPTICAL FIBER FOR DETECTION OF EDIBLE OILS ADULTERANT

Ika Puspita[1], Aliefa Tasya[1], Zuhaida Hilmiana[1], A.M. Hatta[1], Sekartedjo[1], F. Kurniawan[2]

[1)] Dept. Engineering Physics, Institut Teknologi Sepuluh Nopember, Kampus ITS Sukolilo, Surabaya, Indonesia

[2)] Dept. Chemistry, Institut Teknologi Sepuluh Nopember, Kampus ITS Sukolilo, Surabaya, Indonesia

E-mail: ika.tf10@gmail.com

Edible oil adulteration become extensive issue within these two decades [1]. Some techniques have been developed and utilized to detect adulterant substance in edible oils [2-5]. They showed great performance on detecting animal fats in other animal fats. However, they cannot detect animal fats in plant-based fats. Therefore, it is important to develop a detection system to detect animal fat-based adulterant in plant-based fat products. In our previous work [6-7], silica optical fiber was utilized to detect lard adulterant in olive oil. It shows a great performance to detect animal fat-based adulterant. Hence, in this paper, the silica optical fiber structure modified to multimode-singlemode-multimode (MSM) structure to enhance the sensitivity of detection. The result shows that the modified structure of silica optical fiber could achieve the sensitivity of 15.8 dBm/%. The proposed MSM structure offered simple, ease, low cost detection system for detecting adulterant substance in edible oils.

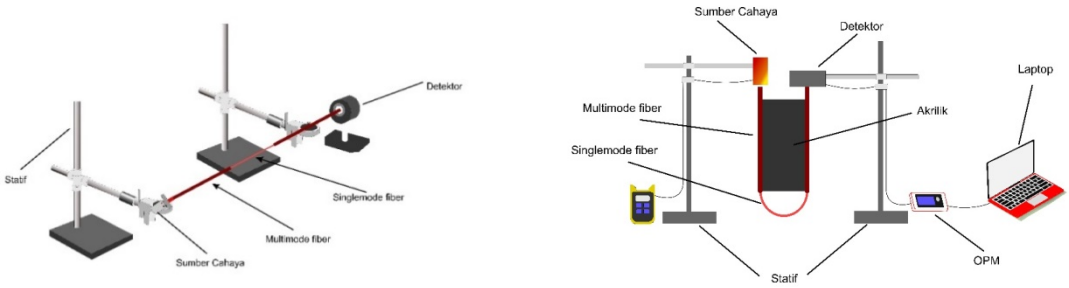


Fig. 1. Modified silica optical fiber structure

REFERENCES

[1] M. Tejada, Greek police make arrests in olive oil fraud ring, *Olive Oil Times*, 25 Jul 2013
[2] Marikkar, et al. Int. J. Food Prop. (2012), 15, pp. 683–690
[3] Indrasti, D. et al. Food Chem. (2010), 122, pp. 1273–1277
[4] M. Latief, et al, IOP Conf. Series, Materials Science and Engineering, 206 (2017)
[5] M. A. Sairin, et al, Smart Sensor Chapter of Lard Detection in Edible Oil Using Dielectric Spectroscopy, Ed. S. Mukhopdhyay et.al, (Springer International Publishing, AG, 2017)
[6] I. Puspita, et al. *2018 3rd International Seminar on Sensors, Instrumentation, Measurement and Metrology (ISSIMM)*. IEEE, 2018. p. 30-33.
[7] D.P Banurea., et al. In: *AIP Conference Proceedings*. AIP Publishing, 2019. p. 060010.

O – 04

GRAPHENE FILM ON METAL CATALYST SUBSTRATE VIA CHEMICAL VAPOR DEPOSITION

Mohd Syafiq Elias, Madzlan Aziz, Zaiton Abdul Majid, Norikazu Nishiyama

Faculty of Science, Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor Malaysia

Department of Chemical Engineering, Graduate School of Engineering Science, Osaka University 560-8531 1-3 Machikaneyama, Toyonaka City, Osaka, Japan

The synthesis of graphene film on metal catalyst substrate via chemical vapor deposition (CVD) method is one of the best approach for the graphene formation. Here in this research a new route to the formation of graphene film has been proposed with an innovative way to utilize the Zn metal catalyst for the low temperature synthesis of graphene film on the targeted substrate. From the results obtained, it can be deduced that amorphous graphene film can be synthesized directly on the targeted substrate such as silicon or quartz glass in the CVD reactor system without involving any complicated transfer method. Surface properties of Zn metal catalyst plays an important role in the graphene synthesis. The graphene film synthesis can be conducted at low temperature using Zn metal catalyst than the commonly used metal catalyst due to the low melting point of Zn (419.5℃). Besides that, the formation of graphene film on the liquid phase of Zn metal catalyst has been demonstrated in this study. From Raman spectroscopy analysis, it clearly shows the ability of liquid Zn metal catalyst to be the catalyst for the formation of graphene film whereby the existence of G-band and 2-D band can be observed. In contrast to the extremely low carbon solubility found in Zn metal, catalytically decomposed carbon atoms are proposed to be embedded in the liquid phase of Zn metals and formed graphene film during the cooling of the synthesis reaction.

Keywords: *Graphene film, CVD, liquid Zn metal, low temperature synthesis, low carbon solubility.016-O04*

O – 05

LOCATING THE N^+-GaAs/LT-GaAs INTERFACE USING A CROSS-SECTIONAL SCANNING TUNNELING MICROSCOPE

Maria Herminia Balgos[1,2], Elizabeth Ann Prieto[2], Rafael Jaculbia[1], Masahiko Tani[3], Elmer Estacio[2], Arnel Salvador[2], Armando Somintac[2], Norihiko Hayazawa[1,2], Yousoo Kim[1,2]

[1)] Surface and Interface Science Laboratory, RIKEN, 2-1 Hirosawa, Wako, Saitama 351-0198, Japan

[2)] National Institute of Physics, University of the Philippines, Diliman, Quezon City 1101, Philippines

[3)] Research Center for Development of Far-Infrared Region, University of Fukui, Fukui 910-8507, Japan

E-mail: mbalgos@nip.upd.edu.ph

The scanning tunneling microscope (STM) is one of the few tools that can image surfaces with high spatial resolution [1,2]. However, the samples being studied are usually limited to materials with high electrical conductivity owing to the detection scheme of the STM. In this work, we present a direct probe of the interface between a highly doped gallium arsenide (n^+-GaAs) and undoped and annealed low temperature grown GaAs (LT-GaAs) using cross-sectional STM operated at 4.7 K. We took advantage of the carrier injection from the n^+-GaAs to image the low conductivity LT-GaAs layer with STM. The effect of the carrier injection to the scanning tunneling spectroscopy (STS) of LT-GaAs as a function of distance from the interface is presented based on the effect of doping concentration on the tip induced band bending commonly observed in the STS of semiconductors [3]. Our results show that the LT-GaAs layer has a p-type character near the interface and semi-insulating character far from the interface.

REFERENCES

[1] G. Binnig, H. Rohrer, C. Gerber, and E. Weibel, *Physical review letters* **49**, 1982, p. 57
[2] K. Oura, V. Lifshits, A. Saranin, A. Zotov, and M. Katayama, Surface science: an introduction, Springer Science & Business Media, 2013, pp. 159-164
[3] R. M. Feenstra, Y. Dong, M. Semtsiv, and W. Masselink, *Nanotechnology* **18**, 2006, p. 044015

O – 06

CHARACTERIZATION OF BIOCHAR MATERIALS MANUFACTURED FROM AGRICULTURAL WASTE BIOMASS FOR DIRECT CARBON FUEL CELL (DCFC)

Thin Thin Kyu[1], Yin Maung Maung[1], Than Than Win[2] and Khin Khin Win[1]

[1)] Department of Physics, University of Yangon, Yangon, Myanmar

[2)] Department of Physics, Panglong University, Panglong, Myanmar

drthinthinkyu25@gmail.com

Biomass which undergoes pre-treatment could be used to produced biochar with various applications such as direct carbon fuel cell (DCFC) as a renewable energy source. Biochar is a solid material that is produced by heat decomposition of Agricultural wastes biomass. A variety of agricultural wastes such as corn cob, rice husk coconut shell and oil palm empty fruit bunch are produced every year. The experiments were carried out to study the characterization of the two different biomasses such as Coconut Husk and Areca nut Husk. In this study, investigations were carried out on proximate analysis and physical properties of coconut husk and Areca nut husk biomass. The Coconut Husk and Areca nut Husk were heated at 400˚C-500˚C for 1h in muffle furnace and ground into the uniform powder. All samples were characterized by means of thermogravimetric analysis (TGA), Fourier Transform Infrared Spectroscopy (FTIR), X–ray Diffraction (XRD) and Scanning Electron Microscopy (SEM), to obtain a close correlation between cell performance and biochar characteristics.

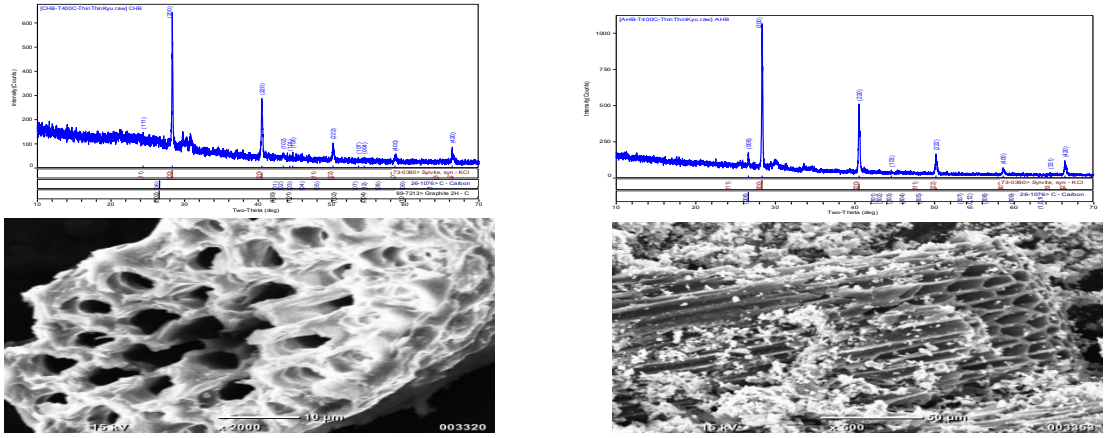


Fig XRD and SEM Analysis of Coconut Husk and Areca nut husk Biochar

REFERENCES

[1] Y Xing , W Hailong , S Peter James, X Song and L Shujuan, L Kouping, “Thermal Properties of Biochars Derived from Waste Biomass Generated by Agricultural and Forestry Sectors” *Energies*, **10** 2017, pp. 469

[2] L. Yusriaha,, S.M. Sapuana, E.S. Zainudina, and M. Mariattib, "Exploring the Potential of Betel Nut Husk Fiber as Reinforcement in Polymer Composites: Effect of Fiber Maturity", *Procedia Chemistry*,**4,** 2012, pp.87 – 94
[3] S.P. Kurhekar, S.K. Jain And P.P. Chavan, "Studies on combustion of agricultural waste", *Engineering And Technology In India*, **6**, 2015, Issue 2, ,pp.89-93
[4] L. K. Palniandy, W. Y. Wongi, J. J. Yap, V. Doshi, L and W. Yoon, "Effect of Alkaline Pre-treatment on Rice Husk-Derived Biochar for Direct Carbon Fuel Cell", Journal of Engineering Science and Technology, **5,** 2017, pp. 84-100

O – 07

ULTRASOUND-ASSISTED PREPARATION OF ACTIVATED CARBON FROM SUGARCANE BAGASSE USED FOR REMOVAL OF Pb(II) FROM WATER

Nguyen Dinh Vinh*, Bui Minh Quy, Nguyen Thi Ngoc Linh, Nguyen Thi Hong Hoa, Luu Tuan Duong

Faculty of Chemistry, Thai Nguyen University of Sciences, Tan Thinh Ward, 251580 Thai Nguyen, Vietnam

* Correspondence: vinhnd@tnus.edu.vn

Abstract: The preparation of activated carbon (AC) from sugarcane bagasse through carbonization and chemical activation steps under ultrasonic condition has been studied. With the use of ultrasound, the preparation time has been significantly reduced. The as-prepared AC has a very high surface area, reached 1457 m^2/g and a porous structure. The feasibility of Pb(II) removal from aqueous solution by activated carbon depends on the pH of the solution and contacts time. The maximum adsorption is reached at pH 5.5 and 60 min of contact time. The adsorption kinetics was analyzed by the pseudo-first-, second-order, and Elovich models and the results revealed that the adsorption kinetics obeys the pseudo-second-order model. The adsorption data were fitted well with the Langmuir adsorption isotherm. The maximum adsorption capacity calculated from Langmuir model is 32.252 mg/g.

O – 08

MULTIBAND METAMATERIAL ABSORBER CREATING BY CONNECTING INDUCTANCE RINGS IN THE STRUCTURE

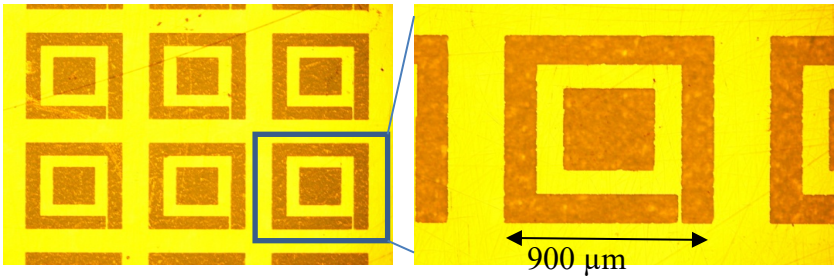
Tran Manh Cuong[1], Do Hoang Tung[2], Nguyen Duy Cuong[3], Nguyen Thi Thuy[1], Pham Van Hai[1].

[1] Hanoi National University of Education
[2]Institute of Physics, Vietnam Academy of Science and Technology
[3] Hanoi University of Science & Technology

Abstract:

Studies on absorber metamaterials today are of great interest due to the prospect of its application in new technology such as sensors, energy harvesting, radar stealth etc. This paper presents an absorber structure that operates at 100 GHz region created by two resonant rings and its response when two rings are electrically connected to each other. The connection clearly generates new absorption peaks and creates a simple multi-peak absorber structure that is easy to implement in practice with an ON/OFF device connected to the meta-surface circuit. The investigation on the effect of the connection position also reported and discussed in this study.

Keywords: *Absorber, multiband, meta-surface.*



O – 09

USING SOIL HARDENER DHD-101 IN BUILDING ROADS AND MAKING ADOBE BRICKS

Bui Thi Thu Phuong[1], Doan Ba Tuan[2], Nguyen The Hung[3]

Center for Technical Physics, Institute of Physics, 18 Hoang Quoc Viet, Cau Giay, Ha Noi,

E-mail: btphuong@iop.vast.ac.vn, batuandoan@gmail.com, nthung@iop.vast.ac.vn

Soil hardener, also known as soil stabilizer, is an important additive for building roads and manufacturing adobe bricks. The use of this soil stabilizer increased the CBR value from 5.8% to 7.8%, leading to a 28% increase in Elastic Modulus when constructing roads. The average expense, for making a 1 kilometer long and 6 meter wide concrete road in rural areas, with compressive strengh 500kg /cm^2, is about 1 billion VND. This cost will be reduced to about 400 million VND, which means a reduction of 60%, by using this soil stabilizer DHD-101. Calculations also show that the stabilizer used in making adobe bricks will lead to a reduction of the cost of bricks by 30-40%. Moreover, the use of soil stabilizers also has great significance in environmental protection. Research on manufacturing stabilizers for soil has been carried out at the Center for Technical Physics, Institute of Physics, Vietnam Academy of Science and Technology. The process of manufacturing soil stabilizers DHD-101 uses the basic material lignin, a by-product of the paper industry, which has been established on a semi-industrial scale at the Institute of Physics. This research orientation opens up the prospect of huge application of DHD-101 products in the industrialization process in Vietnam.

O – 10

NGHIÊN CỨU CHẾ TẠO VẬT LIỆU GRAPHITE ÔXIT DẠNG CẦU GAI TỪ LÕI PIN TÁI CHẾ VÀ ỨNG DỤNG LÀM VẬT LIỆU HẤP PHỤ XỬ LÍ THUỐC NHUỘM ĐỎ 120 TRONG MÔI TRƯỜNG NƯỚC

Hà Xuân Linh[1], Đặng Văn Thanh[2], Nguyễn Phương Chi[2], Trần Quốc Toàn[3], Nguyễn Thị Kim Ngân[4], Nguyễn Nhật Huy[5,*]

[1]Khoa Quốc tế, Đại học Thái Nguyên
[2]Trường Đại học Y-Dược, Đại học Thái Nguyên
[3]Trường Đại học sư phạm, Đại học Thái Nguyên
[4]Trường Đại học Khoa học, Đại học Thái Nguyên
[5] Trường Đại học Bách Khoa, ĐHQG-HCM

Tóm tắt: Bài báo này trình bày kết quả nghiên cứu khả năng hấp phụ thuốc nhuộm đỏ 120 (D120) trong nước sử dụng vật liệu graphite oxide dạng cầu gai (CGO) chế tạo bằng phương pháp điện ly plasma có sự hỗ trợ của siêu âm. Một số yếu tố ảnh hưởng đến khả năng hấp phụ D120 của CGO được khảo sát bằng phương pháp hấp phụ tĩnh như ảnh hưởng của pH (2-11), thời gian tiếp xúc (0-180 phút), khối lượng chất hấp phụ sử dụng (0,01 - 0,07 g), nhiệt độ hấp phụ (25^{0}C - 50^{0}C), và nồng độ ban đầu của thuốc nhuộm (50 mg/L - 250 mg/L). Kết quả cho thấy khả năng hấp phụ khá cao của vật liệu CGO dành cho thuốc nhuộm đỏ 120 và khả năng tiềm tàng của việc ứng dụng vật liệu này trong xử lý nước thải, đặc biệt là dành cho các hợp chất màu và các chất hữu cơ khó phân hủy sinh học.

Từ khóa: *Hấp phụ, graphite oxide, D120, plasma, điện ly, nước thải*.

Liên hệ:
TS Nguyễn Nhật Huy
Khoa Môi trường và Tài nguyên
Trường Đại học Bách Khoa Thành phố Hồ Chí Minh
268 Lý Thường Kiệt, P14, Q10, Tp.HCM
Điện thoại: 0901 964 985
Email: nnhuy@hcmut.edu.vn

O – 11

KẾT QUẢ NGHIÊN CỨU BƯỚC ĐẦU SỬ DỤNG TỪ TRƯỜNG CƯỜNG ĐỘ CAO TRONG PHƯƠNG PHÁP GIÂM RỄ VÀ CHIẾT CÀNH CÂY HỒNG ĂN QUẢ KHÔNG HẠT GIA THANH

Trịnh Đình Trung[1*],Trịnh Ngọc Diệu[2)]; Hoàng Thị Huyền Trang[3], Nguyễn Khắc Hưng[3], Phạm Bích Ngọc[3], Nguyễn Thị Xuyên[4]

[1*] *Trung tâm Phát triển công nghệ cao,Viện Hàn lâm Khoa học và Công nghệ Việt Nam*
[2] *Trung tâm Ứng dụng Vật lý y sinh và Kỹ thuật môi trường, Liên hiệp các Hội khoa học và KTVN*
[3] *Viện Công nghệ sinh học, Viện Hàn lâm Khoa học và Công nghệ Việt Nam*
[4] *Viện Kỹ thuật Nhiệt đới, Viện Hàn lâm Khoa học và Công nghệ Việt Nam*

[*]E.mail: *trinhdinhtrungtdt@gmail.com* – Mobil: *0917688631*

TÓM TẮT

Hồng Gia Thanh và hồng Hạc Trì *(Diospyros Kaki)* là hai loại cây ăn quả đặc sản thuộc loại quý hiếm của vùng đất tổ (Phú Thọ). Phương pháp nhân giống giâm rễ và chiết cành thông thường ít cho kết quả mong muốn. Trong nghiên cứu này, chúng tôi trình bày kết quả sử dụng từ trường cường độ cao trong phương pháp nhân giống giâm rễ và chiết cành. Việc tích hợp với từ trường cường độ cao, 2200–2500 Gauss, đã được thực hiện với hồng Gia Thanh. Kết quả cho thấy, đối với hom rễ giâm cho tỷ lệ bật chồi đạt 98,0%, tỷ lệ chồi sống 100% và chiều cao, số chồi nhánh, số lá non đều vượt trội. Với cành chiết, tỷ lệ cành chiết tạo được sơ khởi rễ đến 80,0%, tỷ lệ cành chiết có sơ khởi rễ ra được rễ đạt 18,7%, tỷ lệ cành chiết ra rễ sống 100%. Như vậy, sử dụng từ trường cường độ cao trong nhân giống cây hồng ăn quả đặc sản không hạt bằng phương pháp giâm rễ và chiết cành cho kết quả nhân giống đạt hiệu quả cao so với phương pháp nhân giống bằng giâm rễ truyền thống thông thường.

Từ khóa: C*ành giâm, cành chiết, cây hồng, từ trường cường độ cao*

O – 12

THEME: THE WAVE-PARTICLE EFFECT AND USE FOR THE WHOLE NEW ENERGY STORAGE TECHNOLOGY

To van Chieu
The TVC private Enterprise - Hung Yen, Vietnam.
Email: tovan@gmx.net

O – 13

CHẾ TẠO GƯƠNG QUANG HỌC KHẨU ĐỘ LỚN SỬ DỤNG TRONG HỆ ĐO LIDAR: CÁC KẾT QUẢ MỚI

Phạm Đồng Bằng[1], Đinh Văn Trung[1], Trần Ngọc Hưng[1], Bùi Văn Hải[2]

[1]Institute of Physics, Vietnam Academy of Science and Technology.

[2]Le Quy Don Technical University

Trong việc nâng cấp hệ Lidar khảo sát khí quyển tầng cao, chúng tôi đã tiến hành chế tạo gương quang học khẩu độ lớn để tăng diện tích của hệ thu quang để thu được tín hiệu yếu từ khoảng cách xa. Quá trình chế tạo gương được thực hiện trong thời gian dài với các khâu quan trọng: xây dựng lò nung phôi, thiết kế hệ mài gương và hệ đo kiểm chất lượng gương. Cho đến nay chúng tôi đã tối ưu hóa được các kỹ thuật nung phôi gương và chế tạo thành công gương quang học có đường kính lên tới 60 cm. Sử dụng gương này trong các đo đạc thử nghiệm cho thấy hệ đo Lidar có thể thu nhận tín hiệu tán xạ từ khí quyển tầng cao tới độ cao trên 70 km.

REFERENCES

[1] Fine Annealing of Optical Glass by H.R.LILLIE and H.N.RITLAND Corning Glass Works, Corning, New York

[2] X. Wang, L. Wang, L. Yin, B. Zhang, D. Fan, and X. Zhang, Chin. Opt. Lett. **5,** 645 (2007).

[3] WWW.AUBERING.COM

[4] D. Malacara, *Optical Shop Testing* (Wiley, New York, 1978) pp.283¡317.

[5] Cornejo A 2007 Ronchi Test *Optical Shop Testing*, 3th. Ed., ed Malacara D chapter 9 pp 317-360

O – 14

THE NEAR-INFRARED LUMINESCENCE OF Nd^{3+}-DOPED TUNGSTEN GADOLINIUM BORATE GLASSES FOR PHOTONIC MATERIAL APPLICATIONS

Nuanthip Wantana[1,2], Natthakridta Chanthima[1,2], Yotsakit Ruangthaweep[1,2], Yamanoi Kohei[3], Pham Hong Minh[4], HongJoo Kim[5], Jakrapong Kaewkhao[1,2]*

[1)]Physics Program, Faculty of Science and Technology, Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand
[2)]Center of Excellence in Glass Technology and Materials Science (CEGM), Nakhon Pathom Rajabhat University, Nakhon Pathom, 73000, Thailand
[3)]Institute of Laser Engineering, Osaka University, Japan
[4)]Institute of Physics (IOP), Vietnam Academy of Science and Technology (VAST), Hanoi, Vietnam
[5)]Department of Physics, Kyungpook National University, Daegu, Republic of Korea

E-mail: w.nuanthip@gmail.com

The tungsten gadolinium borate glasses with different concentrations of Nd^{3+} ions were prepared by the melt-quenching technique. Their structure and luminescence properties were investigated by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) density, molar volume, absorption and near-infrared luminescence spectroscopy. Glasses radiative potential were investigated by using Judd-Ofelt analysis. The density of glasses increases with increasing of Nd_2O_3 concentration, while molar volume decrease. The absorption spectra represent the photon absorbing of Nd^{3+} in visible light (VIS) and near-infrared (NIR) regions. Glass show the strongest emission with 1056 nm wavelength ($^4F_{3/2} \rightarrow {}^4I_{11/2}$ of Nd^{3+}) under ultraviolet (UV), VIS, and NIR excitation. The intensity of all emission spectra increases with increment of Nd^{3+} concentration up to 1.0 mol%. The decay time of Nd^{3+} is in microsecond order. Obtained Ω_4/Ω_6 ratio is too small that is good corresponding with stronger 1074 nm emission ($^4F_{3/2} \rightarrow {}^4I_{11/2}$) than 916 nm emission ($^4F_{3/2} \rightarrow {}^4I_{9/2}$). High stimulated emission cross section, branching ratio and quantum efficiency of 1.0 mol% Nd^{3+} doped glass performs the advantage potential to develop this glass for using as laser medium in green emitting solid state laser.

Keywords: *Borate glass, Tungsten, Neodymium, Judd-Ofelt.*

O – 15

THE STRUCTURAL TRANSITION UNDER COMPRESSION AND STRUCTURAL HETEROGENEITY FOR LIQUID SiO_2 SYSTEM

P.H.Kien[1,*], D.T.Thanh[1], P.M.An[1], N.T.M.Thuy[1], N.H.Linh and L.T.H.Gam[1]

Department of Physics, Thainguyen University of Education, 20 Luong Ngoc Quyen road, Thainguyen, Vietnam

*E-mail: phamhuukien@dhsptn.edu.vn

In this paper, we reported a simulation of the structural transition and structural heterogeneity (SH) for liquid SiO_2 system. Structural characteristics of liquid SiO_2 is clarified via the pair radial distribution functions, the distribution of SiO_x and OSi_y (x=4,5,6; y=1,2,3) basic units, angle and bond length distribution and 3D visualization. Simulation results indicated that network structure of liquid SiO_2 is built by SiO_x units that are linked to each other through common oxygen atoms. We found the existence of separate SiO_x-phases where they are not uniform in liquid SiO_2. The existence of separate phases is evidence of SH in liquid SiO_2 system. Moreover, the self-diffusion of Si and O atoms was also discussed and calculated in detail.

Keywords: *Simulation; phase; network structure; liquid; diffusion*

REFERENCES

[1] K.J. Kingma, R.E. Cohen, R.J. Hemley, H.K. Mao, *Nature* **374**, 1995, 243.
[2] S.R. Shieh, T.S. Duffy, B. Li, *Phys. Rev. Lett.* **89**, 2002, 255507.
[3] S. Ono, K. Hirose, M. Murakami, M. Isshiki, *Earth Planet Sci. Lett.* **197**, 2002, 187.
[4] D. A. Keen and M. T. Dove, *Mineralogical Magazine* **64**, 2000, 447.
[5] P.K. Hung, N.V. Hong, *Eur Phys J B.* **71**, 2009, 105.
[6] P.K. Hung, N.V. Hong, L.T. Vinh, *J Phys Condens Matter.* **19**, 2007, 466103.

O – 16

X-RAY LUMINESCENCE COMPARISON OF PHOTONIC NANOMATERIALS: CdSeS, $LaF_3:Ce^{3+}$/CdSeS, AND $CsPbI_3$

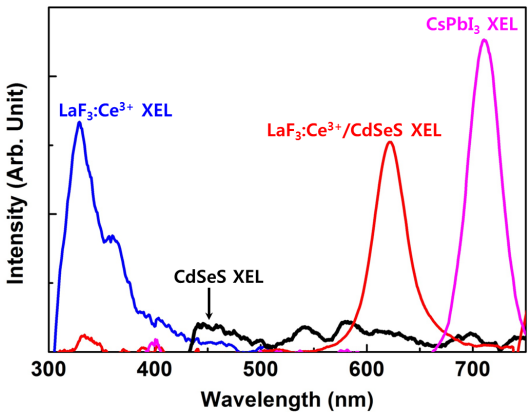
Phan Van Cuong[1], Tran Thi Kieu[2]

[1)] Department of Physics, Nha Trang University, 02 Nguyen Dinh Chieu Street. Nhatrang, Vietnam

[2)] Ngo Gia Tu high school, Camranh, Vietnam

E-mail: cuongpv@ntu.edu.vn

Quantum dots and their chemical adaptation have the various photonic potential applications in the future. II-VI semiconductor quantum dots (QDs) such as CdSe, CdS, and CdTe have attracted attention for radiation detection applications because of high quantum efficiencies of up to 90% and short luminescence lifetimes in the nanosecond range [2, 3]. However, most II-VI semiconductor QDs have effective atomic numbers (Z_{eff}) smaller than 50, resulting in low stopping power and weak scintillation luminescence [4]. $LaF_3:Ce^{3+}$ nanocrystals have shown high stopping power and fast response time, but their ultraviolet (UV) emission is usually not adequate for X-ray imaging/detection systems using commercial photodiodes and charge coupled devices (CCDs). QDs/$LaF_3:Ce^{3+}$ nanocomposites (NCs) such as CdTe/$LaF_3:Ce^{3+}$ and CdSeS/$LaF_3:Ce^{3+}$ have been investigated to overcome these shortcomings of QDs and $LaF_3:Ce^{3+}$ nanocrystals in X-ray imaging/detection applications [5, 6]. Cesium lead halide perovskite ($CsPbX_3$with X = Cl, Br, I, and mixed Cl/Br and Br/I systems) QDs have narrow emission line widths of 12–42 nm, high quantum efficiencies of 50–90%, and short luminescence lifetimes of 1–29 nm [7]. In this report, CdSeS quantum dots, $LaF_3:Ce^{3+}$/CdSeS nanocomposites, and $CsPbI_3$ quantum dots were synthesized and characterized to compare the properties of photoluminescence and X-ray excited luminescence in these materials. CdSeS quantum dots have an intense photoluminescence peak but negligible X-ray excited luminescence. The $LaF_3:Ce^{3+}$/CdSeS nanocomposites have a single X-ray excited luminescence peak and a corresponding photoluminescence peak. The X-ray excited luminescence peak in $LaF_3:Ce^{3+}$/CdSeS nanocomposites originates from a resonance energy transition from $LaF_3:Ce^{3+}$ nanocrystals to CdSeS quantum dots. The $CsPbI_3$ quantum dots, which contain the heavy element Pb (atomic number X = 82), exhibited a higher X-ray excited luminescence than the CdSeS quantum dots and the $LaF_3:Ce^{3+}$/CdSeS nanocomposites.



X-ray excited luminescence (XEL) spectra of samples

O – 17

DESIGN AND FABRICATION OF LED BLACKBOARD WASHING LUMINAIRE COMBINED WITH LINEAR FREEFORM LENS

Duong Thi Giang, Tran Quoc Tien, and Pham Hong Duong

Institute of Materials Science, Vietnam Academy of Science and Technology (VAST)
18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam

E-mail: dtgh3_lt@yahoo.com

Abstract: The illumination pattern of an LED blackboard washing luminaire according to the Vietnam National Standard TCVN7114:2008 is required to have a lighting uniformity better than 50%. However, by using the conventional fluorescence or LED tubular luminaires, the achieved illumination pattern have uniform ratios less than 30%. The LED luminaire proposed by this paper consists of a LED strip mounted on the heat sink, and a linear asymmetric lens in order to redistribute the illumination pattern. The measured results showed that the lighting uniformity on the blackboard surface is better than 60%, and the average illuminance is increased by 150% compared with the case when using tubular LED luminaire. In addition, the glare-free lighting can be achieved since all direct lights from LED were shaded.

Key word: *LED, blackboard washing lamp, freeform lens.*

O – 18

PROPORTIONAL AND INTEGRAL FEEDBACK CONTROL OF A XY NANOPOSITIONING DEVICE

Dinh Van Trung[1], Nguyen Thi Thanh Bao[1]

[1)] Institute of Physics, Vietnam Academy of Science and Technology

E-mail: dvtrung@iop.vast.ac.vn

Achieving precise positioning at nanometer accuracy is very important in many scientific applications and often requires the use of realtime feedback mechanisms. In this paper we report the implementation of the proportional and integral control of a two-dimensional scanning stage integrating piezoelectric actuators and high precision position sensors. The strain gage sensor with higher bandwidth is used to measure position along the fast moving X axis while the capacitive sensor is used in the more slowly moving Y axis. The proportional and integral control is implemented on a Field programmable logic array and allow us to reach a positioning accuracy below 5 nm. Application of the scanning stage in single molecule and single nanoparticle imaging are also reported.

O – 19

3D RECONSTRUCTION OF ABSORBING STRUCTURE IN BIOLOGICAL TISSUE FROM SINGLE 2D NEAR INFRARED TRANSILLUMINATION IMAGE - BLOOD VESSEL PHANTOM STUDY

Ngoc An Dang Nguyen[1, 3], Minh Quang Nguyen[1], Hoang Nhut Huynh[1], Anh Tu Tran[1], Phuong Anh Bui[2], Trung An Dang Nguyen[3], Van Chinh Nguyen[3], Trung Nghia Tran[1]

[1)] Faculty of Applied Science, Ho Chi Minh City University of Technology, 268 Ly Thuong Kiet St., ward 14, Dist. 10, Ho Chi Minh City, Vietnam

[2)] Department of Science and Technology, Vietnam National University Ho Chi Minh City, Linh Trung ward, Dist. Thu Duc, Ho Chi Minh City, Vietnam

[3)] University of Medicine and Pharmacy Ho Chi Minh City, 217 Hong Bang St., ward 11, Dist. 5, Ho Chi Minh City, Vietnam

E-mail: (dnnan.sdh19@hcmut.edu.vn, ttnghia@hcmut.edu.vn)

Using a near-infrared (NIR) light with 700-1200 nm wavelength, we can visualize the macroscopic internal structure of an animal body (kidney, liver …) by transillumination imaging. In previous studies, we can suppress the scattering effect in the transillumination image efficiently. With obtained projection images from many orientations after suppress scattering effect, we can reconstruct a three dimensional (3D) image using filtered-back-projection technique. In this paper, we propose a technique to estimate the parameters of absorbing structure (depth and width) from a single 2D near infrared transillumiantion image of blood vessel. Then, we can reconstruct 3d structure of blood vessel from estimated parameter.

REFERENCES

[1] T. N. Tran, K. Yamamoto, T. Namita, Y. Kato and K. Shimizu, *Biomedical Optics Express*, Vol. 5, Iss. 5, 2014, pp. 1321-1335.

[2] T. N. Tran, T. N. Phan Van, A. T. Tran, K. Yamamoto, T. Namita and K. Shimizu, *Journal of Development Science and Technology*, Vol. 20 - K3/2017, 2017, pp. 67-73.

O – 20

DETERMINATION OF THE CONCENTRATION OF Fe, Se AND Zn ELEMENTS IN NAILS OF VIETNAMESE WOMEN WITH BREAST CANCER USING K_0-INAA METHOD

Huynh Truc Phuong[1], Tran Pham Ngoc Trinh[2], Dinh Thanh Binh[2], Nguyen Thi Truc Linh[3], Truong Thi Hong Loan[3], Tran Tuan Anh[4], Ho Manh Dung[4], Nguyen Van Dong[5]

[(1)] Department of Nuclear Physics, University of Science, VNU-HCM, 227 Nguyen Van Cu, Distr. 5, Ho Chi Minh City, Vietnam.
[(2)] Department of Oncology, Dong Nai General Hospital, 2 Dong Khoi, Bien Hoa City, Vietnam.
[(3)] Nuclear Technique Labolatory, Building B23, Linh Trung Campus, University of Science, VNU-HCM.
[(4)] Institute of Nuclear Research (VINATOM), 1 Nguyen Tu Luc, Dalat City, Vietnam.
[(5)] Department of Analytical Chemistry, University of Science, VNU-HCM, 227 Nguyen Van Cu, Distr. 5, Ho Chi Minh City, Vietnam.

Email: htphuong@hcmus.edu.vn

Breast cancer is the most common type of cancer resulting in death. Trace elements of Fe, Se and Zn can play a key role in the onset and prevention of breast cancer. The purpose of this work is to determine the concentrations of Fe, Se and Zn in fingernails collected from 29 women with breast cancer and 30 healthy women, who are the same age and living in Dong Nai province, Vietnam. The concentrations of Fe, Se and Zn in fingernails were determined using the k_0-INAA method. As a result, the mean concentrations of Fe, Se and Zn in fingernails of women with breast cancer were 102.87 µg/g, 0.75 µg/g and 65.49 µg/g, respectively, while those of healthy women were 69.74 µg/g, 0.78 µg/g and 107.75 µg/g. The assessment of these elements in fingernails for both two sample groups, including t-test and correlation coefficients, was also carried out in this study. As a result, the significant difference ($p < 0.05$) was found for the Fe and Zn in fingernails of women with breast cancer, while those of Se was not found. The correlation between Se and Zn was found in both groups. The correlation between Fe and Zn was found in fingernails of healthy women, but it disappears in the women with breast cancer.

O – 22

DESIGN AND REALIZATION OF LED EQUIPMENT APPLY IN NEONATAL JAUNDICE TREATMENT

Kieu Ngoc Minh[1], Tong Quang Cong[1], Tran Quoc Tien[1], Nguyen Duc Thinh[2], Nguyen Thanh Phuong[2*]

[1)] Institute of Materials Science, Vietnam Academy of Science and Technology,

18 Hoang Quoc Viet, Cau giay, Hanoi, Vietnam,

[2)] School of Engineering Physics, Hanoi University of Science and Technology,

No. 1 Dai Co Viet Rd. Hai Ba Trung, Hanoi, Vietnam

*phuong.nguyenthanh@hust.edu.vn

At present, infants face up to many health risks, one of which is neonatal jaundice. Neonatal jaundice is a yellowish discoloration of the white part of the eyes and skin in a newborn baby due to high bilirubin levels, which is a biological product of hemoglobin degeneration. When old red blood cells break down, the hemoglobin in red blood cells is converted to bilirubin. Jaundice occurs in the majority of term neonates during the first week of life and is generally harmless. When the bilirubin level increase rapidly and highly, deposition of unconjugated bilirubin in the central nervous system may cause serious neurodevelopmental impairment. Hence, jaudice treatment for infants is very importance.

The non-complex and common method for jaundice treatment in children based on the phototherapy which works by changing trans-bilirubin into the water-soluble cis-bilirubin isomer. Most current jaundice equipment is using fluorescent lamps in the 300 - 500 nm wavelength range, which is consistent with the absorption spectrum of bilirubin. Nowadays, with the development of light-emitting diode (LED) technology in terms of narrower emission spectra, long life time, and less heat effect, LEDs are becoming great candidate to supplant for fluorescent lamps for the manufacture of phototherapy equipment. In this report, we realize a LED equipment at wavelength range of 494 nm. By using a lens array, more uniform of light distribution is obtained that allows the better treatment efficiency. The results also show that an average optical intensity greater than 2mW/cm^2 at the exposure area of 30x40 cm^2 is approached suitable for jaundice treatment.

O – 23

USING CROSS-POLARIZATION SCHEME MICROSCOPE FOR PHOTOLUMINESCENT APPLICATION TO POINT-OF-CARE DIAGNOSTICS

Nguyen Nang Dinh[1], Nguyen Thi Dung[1], Nguyen Phuong Hoai Nam[1], Nguyen Duc Cuong[1], Nguyen Dinh Lam[1], Trương Thi Ngoc Lien[2]

[1] *University of Engineering and Technology, Vietnam National University, Hanoi*
144 Xuan Thuy Road, Hanoi, Vietnam
[2] *Hanoi University of Science and Technology, 1 Dai Co Viet, Hanoi, Vietnam*

Email: dinhnn@vnu.edu.vn / dinh158@gmail.com

In this work, we use a novel, inexpensive, cross-polarization scheme to filter out excitation light from the emission signal. Using this cross-polarization mechanism, we have demonstrated a compact fluorescence detection system. We exhibit a prototype microfluidic fluorescence characterization system for intensity-based light detection. The excitation light is polarized, with a second polarizer orientated at 90^{O} between the sample and the detector. This method practically eliminates the 'noise' signal due to the leakage excitation light on the optical intensity detector, thereby significantly enhancing the signal-to-noise ratio. Bassing on the cross-polarization scheme, we setted-up a photoluminescent polarized light microscope (PLM) that can be used for the observation of the bacteria with anti-body attached to quantum dots and/or luminescent centers.

O – 24

DEVELOPMENT OF DIAGNOSTIC DEVICE USING NEAR INFRARED LIGHT - PRELIMINARY RESEARCH

Ngoc An Dang Nguyen[1, 3], Phuong Anh Bui[2], Trung An Dang Nguyen[3], Van Chinh Nguyen[3], Trung Nghia Tran[1]

[1)] Faculty of Applied Science, Ho Chi Minh City University of Technology, 268 Ly Thuong Kiet St., ward 14, Dist. 10, Ho Chi Minh City, Vietnam

[2)] Department of Science and Technology, Vietnam National University Ho Chi Minh City, Linh Trung ward, Dist. Thu Duc, Ho Chi Minh City, Vietnam

[3)] University of Medicine and Pharmacy Ho Chi Minh City, 217 Hong Bang St., ward 11, Dist. 5, Ho Chi Minh City, Vietnam

E-mail: (dnnan.sdh19@hcmut.edu.vn, ttnghia@hcmut.edu.vn)

Using a near-infrared (NIR) light with 700-1200 nm wavelength, we can visualize the internal absorbing structure (kidney, liver …) of a small animal body and blood vessels in some human body parts (arm, leg…) by transillumination imaging. In previous studies of our group, even with simple system (light-emitting diode (LED)'s array and low-cost charge-coupled device (CCD) camera), we can obtain the blood vessel transillumination image of human arm. However, the deep structure is severely blurred because of the strong scattering in body tissue. We developed a technique using the deconvolution with a depth-dependent point spread function to suppress the scattering effect and verified their feasibility in experiments. In this paper, we propose a preliminary research on development a novel imaging modality of human body parts, especially in breast tumor diagnostic imaging.

REFERENCES

[1] T. N. Tran, K. Yamamoto, T. Namita, Y. Kato and K. Shimizu, *Biomedical Optics Express*, Vol. 5, Iss. 5, 2014, pp. 1321-1335.
[2] T. N. Tran, T. N. Phan Van, A. T. Tran, K. Yamamoto, T. Namita and K. Shimizu, *Journal of Development Science and Technology*, Vol. 20 - K3/2017, 2017, pp. 67-73.

O – 25

OPTIMAL DESIGN OF A MULTIMODE-INTERFERENCE FOR APPLICATION IN PHOTONICS INTERCONNECTS

Nguyen Quoc Chien[1], Truong Cao Dung[2], Chu Manh Hoang[1]

[1)] International Training Institute for Materials Science, Hanoi University of Science and Technology, No. 1, Dai Co Viet, Hai Ba Trung, Hanoi, Vietnam

[2)] Posts and Telecommunications Institute of Technology, Km10, Nguyen Trai, Ha Dong, Ha Noi

E-mail: hoangcm@itims.edu.vn

Multimode switches are a key component in wavelength-division multiplexing systems, which can switch data between different spatial channels exploiting multiple orthogonal optical modes. Among them, multimode interference (MMI) couplers are of great interest for a wide variety of photonics devices [1-3]. In this work, we will present optimal design of a MMI coupler for application in switching data channels. The MMI is designed for operation in the S-band of optical telecommunication. The structure and material, geometrical parameters of MMI affecting to the transmission characteristics are investigated in detail, which are guideline for fabrication. The optimal design of the MMI is carried out by theoretical analysis and numerical simulation.

REFERENCES

[1] L. B. Soldano, and E. C. Pennings, Optical multi-mode interference devices based on selfimaging: principles and applications, *J. Lightw. Technol.*, 13, 1995, pp. 615-627.

[2] R. B. Priti, O. L.-Ladouceur, A Reconfigurable Multimode Demultiplexer/Switch for Mode-Multiplexed Silicon Photonics Interconnects, *IEEE Journal of Selected Topics in Quantum Electronics*, 24(6) 2018, 8300810

[3] R. B. Priti, H. P. Bazargani, Y. Xiong, and O. Liboiron-Ladouceur, Mode selecting switch using multimode interference for on-chip optical interconnects, *Opt. Lett.*, 42(20), 2017, pp. 4131–4134.

O – 26

SIMULATION DESIGN OF A MICRO-HEATER FOR APPLICATION IN INTEGRATED MICROSYSTEMS

Nguyen Tai Tuan[1,2], Truong Cao Dung[3], Chu Manh Hoang[1]

[1)] International Training Institute for Materials Science, Hanoi University of Science and Technology, No. 1, Dai Co Viet, Hai Ba Trung, Hanoi, Vietnam

[2)] School of Mechanical Engineering, Hanoi University of Science and Technology, No. 1, Dai Co Viet, Hai Ba Trung, Hanoi, Vietnam

[3)] Posts and Telecommunications Institute of Technology, Km10, Nguyen Trai, Ha Dong, Ha Noi

E-mail: hoangcm@itims.edu.vn

Micro-heater is a very important component to integrated microsystems. It can used for stabilizing the operation of gas sensors [1-2] or tuning operation characteristics of optical devices [3]. In this study, we will present an optimal design of a micro-heater for tuning the index of an optical waveguide. The micro-heater is optimized for a waveguide with the size of 5 µm x 100 µm. The temperature can be heated up to 300 ^{o}C with an applied voltage of 1 V, while the effective heating area is minimized. The optimal design of the micro-heater is carried out by finite element method.

REFERENCES

[1] W.-S. Choi, B.-J. Kim, H.-J. Lee, J.-W. Choi, S.-D. Kim & N.-K. Min, Study on the Micro-Heater Geometry in In2O3 Micro Electro Mechanical Systems Gas Sensor Platforms and Effects on NO2 Gas Detecting Performances, *Journal of Nanoscience and Nanotechnology*, **12**(2), 2012, pp. 1170–1173.

[2] M. Lee, Y.-K. Lee & Y. Zohar, Design, fabrication and characterization of a thermal microsystem integrated with heaters, pressure and temperature microsensors, *Journal of Micromechanics and Microengineering*, **21**(12), 2011, 125021

[3] M. Bahadori, A. Gazman, N. Janosik, S. Rumley, Z. Zhu, R. Polster, K. Bergman, Thermal Rectification of Integrated Microheaters for Microring Resonators in Silicon Photonics Platform. *Journal of Lightwave Technology*, **36**(3), 2018, pp. 773–788.

O – 27

A SEMI-EMPIRICAL APPROACH BASED ON VIRTUAL POINT DETECTOR CONCEPT TO CALCULATE THE EFFICIENCY OF NAI(TL) DETECTOR FOR MEASUREMENTS OF POINT SOURCE ON THE DETECTOR'S SYMMETRY AXIS

Huynh Dinh Chuong[1], Le Thi Ngoc Trang[1], Tran Thien Thanh[1,2]

1) Nuclear Technique Laboratory, University of Science, VNU-HCM, 227 Nguyen Van Cu Street, District 5, Ho Chi Minh City, Vietnam

2) Department of Nuclear Physics, Faculty of Physics and Engineering Physics, University of Science, VNU-HCM, 227 Nguyen Van Cu Street, District 5, Ho Chi Minh City, Vietnam

E-mail: hdchuong@hcmus.edu.vn

NaI(Tl) detectors are one of the most commonly used instruments for gamma-ray spectrometry applications in experimental nuclear physics. An accurate knowledge of the full energy peak efficiency (FEPE) of the detector is required for the operation of gamma-ray spectrometers in many applications, such as the radioactivity measurements in the environmental samples, the radioactive waste drums and the radioactive contamination. The FEPE varies strongly with the source-detector distance and incident photon energy. Therefore, from the practical point of view, it is necessary to find a method to quickly and simply calculate for the FEPE at any source–detector configuration with satisfactory accuracy. However, the dependence of FEPE on source-detector distance is generally a complex function of the shape, dimensions of detector and measurement geometry. This causes the difficulty for calculating the effect of the varying distances. The virtual point detector (VPD) concept was introduced by Notea [1] to deal with this problem. It is suggested that the detector volume may be replaced for FEPE calculations by a virtual equivalent point detector located on the symmetry axis of real detector. Based on this concept, the FEPE of detector is represented by a simple quadratic inverse function of the source-VPD distance. Therefore, the VPD concept can be used for facilitating FEPE calculations.

In the present work, we propose a semi-empirical approach that combines the experimental method, the Monte Carlo simulation and the VPD concept to calculate the FEPE of a NaI(Tl) detector for the measurements of point sources located on the detector's symmetry axis at various distances. This approach only requires an experimental FEPE calibration with several photon energies for a source-detector configuration. The efficiency transfer factors for different source-detector distances are calculated by Monte Carlo simulation using MCNP6 code. The application of the Monte Carlo simulation will help to expand the investigated ranges of the source-detector distance and the incident photon energy that experimental conditions do not allow. Then, the data of simulated FEPE are used to determine the positions of VPD corresponding to various incident photon energies. A semi-empirical equation involving incident photon energy and source-VPD distance are built to calculate the FEPE for the NaI(Tl) detector. The obtained results show a good agreement between calculated and experimental FEPE. This demonstrates that the proposed approach is efficient and reliable for the FEPE calculation of NaI(Tl) detector.

REFERENCES

[1] A. Notea, *Nucl. Instru. Methods* **91**, 1971, pp. 513

O – 28

STUDY ON EFFECT OF TECHNICAL PARAMETERS IN LIQUID NITRIDING PROCESS TO THE STRUCTURE AND MECHANICAL PROPERTIES OF AISI 420 STAINLESS STEEL

Thanh Nguyen Van[1,2], Trung Trinh Van[1] , Son Nguyen Anh[1], Tuan Pham Hong[3], Hop Nguyen Thanh [3]

[1)] [1]School of Materials Science and Engineering, Hanoi University of Science and Technology, No.1, Dai Co Viet, Hai Ba Trung, Ha Noi, Viet Nam

[2)]Laboratory of Technology and Casting alloys, Research Institute of Technology for Machinery, No. 25, Vu Ngoc Phan, Dong Da, Ha Noi, Viet Nam

[3)]Centre for Optoelectronics, National Center for Technological Progress, C6 Building, Thanh Xuan Bac, Thanh Xuan, Ha Noi, Viet Nam

E-mail: thanhmaterial@mail.com

Nowadays, martensitic stainless steels have been widely used in many applications owing to their superior mechanical properties and corrosion resistance. Liquid nitriding (LN) is an effective process for improving the surface hardness and anti-wear properties of stainless steels, achieved surface hardness up to 900 HV. The most significance of liquid nitriding method is its higher diffusion rate compared to gas nitriding or plasma nitriding. However, the hardness and corrosion resistance of stainless steels are decreased at high temperature and long process time. In this study, we investigate the effect of technical parameters in this process to microstructure and mechanical properties of stainless steel AISI 420. Stainless steel samples after heat treatment (quenching at 1040ºC, tempering at 550ºC) are nitridized at various temperatures (460, 500, 540 and 580ºC) and times (1, 3, 5 and 7 hours). After nitriding process, we investigate microstructure of the steels using optical microscope, measure the micro hardness distribution from surface to core, determine the atomic structure with XRD and SEM method, adjust the resistance ability against corrosion by measuring the corrosion arc.

.

Keywords: AISI 420 Stainless steel, liquid nitriding, corrosion resistance.

REFERENCES

[1] Yuanhua Lin, Jun Wang, Dezhi Zeng, Runbo Huang, and Hongyuan Fan, Advance complex liquid nitriding of stainless steel AISI 321 surface at 430 ºC, Journal of materials engineering and performance, 2013.

[2] K. Funatani, Low-Temperature Salt Bath Nitriding of Steels, Metal Sci. Heat Treat., 2004, 46, p 277.

[3] M. Kuczynska-Wydorska and J. Flis, Corrosion and Passivation of Low-Temperature Nitrided AISI, 304L and 316L Stainless Steels in Acidified Sodium Sulphate Solution, Corros. Sci., 2008, 50, p 523.

O – 29

RESOLVING THE BISTATIC LIDAR IMAGES IN RANGE FOR MEASURMENT OF THE LOWER ATMOSPHERE IN HANOI

B. V. Hải[1], P. M. Tiến[2], N. X. Tuan[3], T. N. Hung[3], D. V. Trung[3]

[1]*Le Quy Don Technical University, 236 Hoang Quoc Viet, North Tu Liem Dist, Hanoi.*

[2] *Ho Chi Minh City Institute of Physics, 1 Mac Dinh Chi Str., Dist. 1, Ho Chi Minh City*

Institute of Physics - VAST, 10 Dao Tan, Ba Dinh Dist, Hanoi.

Email: bvhaihsh@mta.edu.vn

Develop a bistatic imaging lidar system for the observation the aerosols, fog, and clouds in the lower atmosphere by using CCD camera as detector. The bistatic imaging lidar especially is powerful in observation within several hundred meters of the Earth's surface. Theoretical discussion showed that the signal does not depend on the measured range. Our bistatic imaging lidar observed can resolve the atmospheric layer up to 300 m on nighttime. A range-resolved profile was obtained with a very short time resolution within 1 minute. The bistatic profiles ware compared with the nomal lidar signal using photoelectron detector in the same range.

Keywords: Bistatic lidar, lidar image, aerosol.

REFERENCES

[1] M. Sasaki, A. Kusaka, Y. Asaoka, Design of UHECR telescope with 1 arcmin resolution and 50° field of view, Nucl. Instr. Meth. Phys. Res. A492, 49-56 (2002). 2 M. Sasaki, Y. Asaoka, M. Jobashi. Self-triggered image intensifier tube for high-resolution UHECR imaging detector, Nucl. Instr. Meth. Phys. Res.A 501. 359-366 (2003).

[2] H. Kuze, S. Fukagawa, N. Takeuchi, Y. Asaoka, and M. Sasaki, "Development of a wide-area imaging idar for atmospheric monitoring," 29th SICE Remote Sensing Symposium, 61-64 (2003). (in Japanese)

[3] S. Fukagawa, I. Kouga, H. Kuze, N. Takeuchi, M. Sasaki, Y. Asaoka, S. Ogawa, Simulation study for aerosol distribution retrieval from bistatic, imaging lidar data. CLEO/PR2005(Tokyo), C15, (2005).

[4] J.A. Reagan, D.M. Byrne, B. Herman, Bistatic LIDAR: a tool for characterizing atmosphericparticles:part I-the inverse problem, IEEE Transactions on Geoscience and Remote Sensing, 20, 236-243 (1982).

O – 30

VALIDATION OF COINCIDENCE SUMMING CORRECTIONS COMPUTED BY THE ETNA SOFTWARE AND MCNP-CP CODE

Le Quang Vuong[1,4], Phan Long Ho[3], Le Cong Hao[1,2], Tran Thien Thanh[1,2], Chau Van Tao[1]
[1)] Department of Nuclear Physics, Faculty of Physics & Engineering Physics, VNUHCM-University of Science, Vietnam
[2)] Nuclear Technique Laboratory, VNUHCM-University of Science, Vietnam
[3)] Institute of Public Health in Ho Chi Minh City, Vietnam
[4)] Faculty of Physics, Ho Chi Minh City University of Education, Vietnam

E-mail: vuonglq@hcmue.edu.vn

Abstract

The coincidence-summing correction is required to determine the accuracy of the efficiency calibration curves for gamma-ray spectrometry. These corrective factors directly depend on the radionuclide decay scheme and on the knowledge of detection efficiency with the geometrical conditions of the source-detector arrangement. In this work, the experimental measurement is based on a p-type HPGe and the different thickness of IAEA-RGU-1 [1] samples. The ETNA software [2] and MCNP-CP code [3] are used to compute the corrections due to coincidence summing and these results showed that a good agreement for both codes. Finally, the coincidence summing correction was applied for determining the efficiency calibration curves for gamma-ray spectrometry using different thickness of standard samples.

REFERENCES

[1] https://nucleus.iaea.org/rpst/ReferenceProducts/ReferenceMaterials/Radionuclides/IAEA-RGU-1.htm. Accepted 01.12.2018
[2] M.C. Lépy, M.M. Bé, F. Pyton, *Note Technique LNHB/01/09/A*, 2004.
[3] A. Berlizov, *Institute for Nuclear Research National Academy of Sciences of Ukraine*, 2012.

O – 31

MODIFICATION AND NANOSTRUCTURAL CHARACTERIZATION OF MYANMAR COAL

Min Maung Maung[1], Thein Tun Linn[2], Aung Min[2]

[1)] Department of Physics, University of Yangon, Kamayut 11041, Yangon, Yangon Region, Myanmar

E-mail: minaerchan@gmail.com

Myanmar coal samples were proposed to be an alternative source of graphite as raw material to prepare grapheme oxide. They were collected from Namma coal mine (Lashio, Shan state), Kalewa coal mine (Sagaing Region) and Thitchauk coal mine (Sagaing Region). Modified Hummer's method was used for extraction of graphite from raw coal minerals. The nanostructural characterization of these modified samples was identified by X-ray diffraction analysis (XRD). A successful oxidation process of graphite isolated from Myanmar coal was confirmed by Scanning Electron Microscope- Energy Dispersive X-ray Spectroscopy (SEM-EDS). The results of FTIR and Raman spectroscopy analysis showed that the graphite was fully oxidized by strong oxidizing agents like $KMnO_4$ and $NaNO_3$, introduced oxygen atoms into the graphite layers and formed bonds like C=O, C-H, COOH and C-O-C with the carbon atoms in the graphite layers. The frequency dependence dielectric behavior of these samples was also determined by GW Instek 8110 LCR meter. Although the dielectric constant of Namma and Thitchauk samples decreased with increasing frequency, Kalewa sample was nearly constant in the frequency range up to 50 kHz.

Keywords : Myanmar coal, XRD, SEM-EDS, Modified Hummer's method, graphene oxide.

REFERENCES

[1] Ahmad S et al, 2004, "Ferroelectric Ceramics Processing Properties and Applications", Department of Ceramic Science and Engineering, Rutgers University: USA

[2] Leila Shahriary, Anjali A. Athawale International Journal of Renewable Energy and Environmental Engineering ISSN 2348-0157, Vol. 02, No. 01, January 2014, pp 58-63.

[3] Lerf, A., He, H., Forster, M. and Klinowski, J., 1998, Structure of Graphite Oxide Revisited. *Journal of Physical Chemistry B,* 102, 4477-4482. https://doi.org/10.1021/jp9731821

[4] "Instruction Manual LCR meter GW 820", USA

[5] Moulson A J & Herbert J M, 1997, "Electroceramic Materials Properties Applications", New Delhi: Thomson Press

[6] Suryanarayana C. and Norton M. G. (1998), X-ray Diffraction A Practical Approach, (New York: Plenum)

[7] S. N. Alam et al. Graphene, 2017, *Scientific Research Publishing, 6*, p 1-18 http://www.scirp.org/journal/graphene

[8] Tyagi M S, 1991, "Introduction to Semiconductor Materials and Devices", New York: Wiley

[9] Xu Y, 1991, "Ferroelectric Materials and their Applications", New York: Elsevier Science Publishing Co. Inc.

O – 32

PREPARATION OF ELECTROSPINNING POLYACRYLONITRILE/TITANIUM DIOXIDE NANOFIBERS AND THEIR OPTICAL PROPERTIES AS A CANDIDATE MATERIAL FOR NATURAL DYE SENSITIZED SOLAR CELLS

Ulwiyatus Sa'adah[1], Markus Diantoro[1,2], Thathit Suprayogi, Nasikhudin[1,2], Arif Hidayat[1], Siti Wihdatul Himmah, Hari Wisodo

[1)] Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Negeri Malang, Jalan Semarang 5 Malang 65145, Indonesia

[2)] Center of Advanced Materials for Renewable Energy, Universitas Negeri Malang, Jalan Semarang 5 Malang 65145, Indonesia

E-mail: ulwiyatussaadah@gmail.com

Nowadays, a photovoltaic device that are able to generate electricity directly from sunlight offers the right solution for utilizing solar energy resources. Dye Sensitized Solar Cells (DSSCs) as one of the most promising harvesting energy device have been extensively developed due to their high energy conversion efficiency, low cost, simple for production, and friendly environment [1]. New scheme of polyacrylonitrile/titanium dioxide nanofibers was introduced as photoanode materials. SEM image possessed the appearance of composite fibers with diameter of 229 nm. Introducing TiO_2 nanoparticles in PAN matrix reduce the optical band gap of films significantly till 3.18 eV, thus it was influenced their photovoltaic performance. The nanoparticles are generally embedded in the fibers which is not evenly distributed due to high adhesion force and electrostatic interaction among the individual nanoparticles [2].

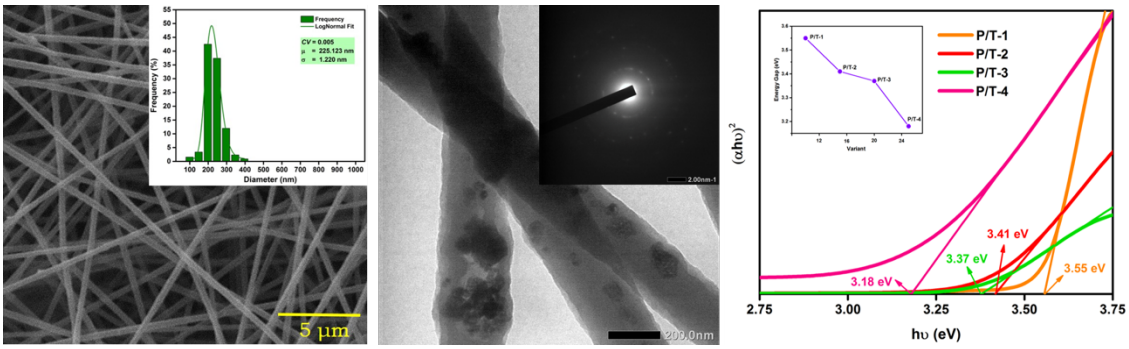


Fig. 2. Micrographs and Tauc Plot Linear Fit of Polyacrylonitrile/Titanium Dioxide Nanofibers

REFERENCES

[1] H. Song, H. Y. Kim, H. S. Kim, J. S. Suh, B. H. Jun, and W. Y. Rho, *Chem. Phys. Lett.* **687**, 2017, pp. 152–157

[2] T. Tański, W. Matysiak, and B. Hajduk, *Beilstein J. Nanotechnol.* **7**, 2016, pp. 1141

O – 33

STUDY THE POSSIBILITY OF APPLYING THE ADVANCED 2D MULTI-ELECTRODE ELECTRICAL EXPLORATION METHOD TO FIND GROUNDWATER IN VIENTIANE PROVINCE, LAOS

Viengthong Xayavong[1,3], Vu Duc Minh[1], Do Anh Chung[2], Sonexay Xayheuangsy[3] and Thiengsamone Sounsuandao[3]

[1]*VNU University of Science, 334 Nguyen Trai, Hanoi, Vietnam.*
[2]*Institute for Ecology and Works Protection, Vietnam Academy for Water Resources, 171 Tay Son, Dong Da, Hanoi, Vietnam.*
[3]*Department of Physics, Faculty of Natural Science, National University of Laos Dongdok Campus 7322, Vientiane, Laos.*

E-mail: viengthongxv@gmail.com

Abstract

The groundwater sources can be determined from earth resistivity values through electrical resistivity measurement. Meanwhile, water in clayey soil and groundwater zones are identified through combination of resistivity and induced polarization data analysis. The authors have conducted research the possibility of applying the advanced 2D multi-electrode electrical exploration method (both resistivity and induced polarization) for groundwater investigation in Vientiane Province, Laos. Hence, five 2D-electrical resistivity and two induced polarization profiles were carried out using the SuperSting R8/IP system with 56 electrodes with maximum length of 560 m at two sites namely Phonhong and Thoulakhom districts. Resistivity and IP raw data were analyzed using EarthImager 2D software. The results showed that relatively low resistivity and high chargeability regions vary from 4 to 10 $\Omega.m$ and 20 to 30 ms respectively at depth vary from 12 to 30 m and extend from 30 m upto 100 m at some research areas are considered as thick saturated clayey or saline water zones, whereas the moderate resistivity regions range from 20 to 80 $\Omega.m$ corresponds well with low chargeability ranged from 1 to 2 ms at depth of 24 to 96 m, indicating suitable areas for good quality groundwater potential zones of some research areas. Thus affirmed that the application of the advanced 2D multi-electrode electrical exploration method to find groundwater in Laos is feasible and effective.

Keyword: *Advanced 2D Multi-electrode Electrical Exploration, groundwater, saline water, Laos.*

O – 34

APPLICATION OF LOW-LEVEL LASER IN TREATMENT FATTY BLOOD DISEASE

Tran Minh Thai [1], Ngo Thi Thien Hoa [2], Tran Thien Hau [1], Can Ngoc Minh [1]

[1] Laser Technology Laboratory - Ho Chi Minh City University of technology- Viet Nam National University HCM City

[2] Tan Chau Rehabilitation Treatment Department - An Giang Province

Email: tmthai_dhbk@hcmut.edu.vn

Fatty blood is also known as dyslipidemia or high blood fat. According to the World Health Organization (WHO) report: Fatty blood is a disease that has a mortality rate after AIDS and tends to increase with the modern rhythm of life.

In Vietnam, the incidence of steatosis is at an alarming rate of 29.1%. If people over 60 with fatty blood disease often had a high rate of 63% in the past, nowadays people aged 35 to 44 that is a tendency to be more prevalent in with an alarming rate of 41.7%.

Fatty blood is a disease that is difficult to detect and treat. The use of western medicine also only inhibits the development and reduces the complications of the disease, but does not cure it.

We conducted research using intravenous CST semiconductor laser working at 650nm wavelength for 32 patients with high blood fat.

- Before treatment: (according to NCEP - ATP III):

- Average value Total cholesterol reached 277.813 mg/dl - high level.
- The average value of LDL-C reaches 175,862 mg/dl - high level.
- Triglyceride average value reached 412,969 mg / dl - high level.

-After 20 times of treatment with a low-level semiconductor laser.

- The average value of cholesterol reached 162,890 mg/dl - normal.
- This value is smaller than the average before treatment of 1,706 times - a big difference.
- The average value of LDL-C reaches 48.84 mg/dl - optimal. This value is smaller than the average before treatment of 3,6 times - a big difference.
- Triglyceride mean value reaches 131,969 mg / dl - normal. This value is smaller than the average before treatment of 3,14 times - a big difference.

During the treatment process, it does not occur side effects which are harmful to the health of patients. Treatment techniques are simple and easy widely universal, outpatient treatment.

POSTERS

P_CAEP – 01

BIOMODULATION OF CELLS IN CULTURE BY OPTICAL RADIATION WITH DIFFERENT WAVELENGTHS

A.V. Mikulich[1], Tran Quoc Tien[2], Quang Cong Tong[2], Thanh-Phuong Nguyen[3], L.G. Plavskaya[1], T.S. Ananich[1], A.I. Tretyakova[1], I.A. Leusenko[1], O.N. Dudinova[1], H.I. Staravoit[1], V.Yu. Plavskii[1]

[1)] Institute of Physics of the NAS of Belarus, 68-2 Nezavisimosti Ave., 220072 Minsk, Belarus
[2)] Insitute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Cau Giay, Hanoi, Vietnam
[3)]Hanoi University of Science and Technology, 1 Dai Co Viet Rd., Hai Ba Trung, Hanoi, Vietnam

E-mail: a.mikulich@ifanbel.bas-net.by

It is well-known that the cells in culture are convenient model to study the biological effect of optical radiation. Although light influences the cellular metabolism, many questions need to be clarified in underlying process. One of them is dependence of biological effect on wavelength of incident radiation.

This study aimed to investigate the effect of low-intensity optical radiation of laser and light-emitting diodes (LEDs) on metabolic and mitotic activity of cells in culture.

Fibroblast–like African green monkey kidney cells (BGM) were chosen as object in this study. Cells were plated at a cell density of $8 \cdot 10^4$ cells on sterile Petri dishes and grown in Dulbecco's modified Eagle's medium (DMEM) with 10% FBS and 1% antibiotic-antimycotic at 37ºC with 5% CO_2. After incubation, the dishes were irradiated in configuration from the bottom of dish. Polarized optical radiation of lasers with wavelengths of λ = 405, 445, 520, 635, 808 nm and LEDs with λ = 405, 445, 525, 635, 850 nm was used in the experiments. In case of LEDs the thin-film polarizer was used. Power density of optical radiation was 3 mW/cm^2. Metabolic and mitotic activity of cells was analyzed by colorimetric MTT-test and direct counting of number of dividing cells. In addition, wound healing assay by making a scratch on a cell monolayer was used to assess the photobiological effect of low-intensity optical radiation with different wavelengths.

Results of this study show that depending on wavelength of incident radiation both stimulation and inhibition of metabolic and proliferation activity is observed. So, optical radiation of violet (405 nm) and blue (445 nm) spectral region exerts inhibiting action on cellular metabolism, radiation of green spectral region practically doesn't influences (for cell culture used in this study) the biological processes, optical radiation of red and infrared spectral regions revealed stimulating effect. We also observed the stimulation of migratory ability of cells upon exposure to optical radiation of red spectral region. 24 h after exposure of cells to radiation we found statistically significant difference in scratch width: compared to the control group (70,1±2,0 %) the scratch width in red irradiation group was (6,1±0,8) %. In contrast to red irradiation group, the irradiation with λ = 405 nm caused inhibition of wound closure: compared to the control group the scratch width in this group was (69,6±3,2) %. It should be noted that comparable effects are observed when cells exposed to either optical radiation of laser or LEDs.

In conclusion, the sign of biological effect upon exposure of cells in culture to optical radiation of lasers and LEDs depends on the wavelength of incident radiation.

This work was supported by the Belarusian Republican Foundation for Fundamental Research (project № F18VG-001) and Belarusian-Vietnamese collaboration project "Method development and equipment realization of photodynamic therapy applied for wound".

P_CAEP – 02

DEVELOPMENT OF A Ce^{3+}:$LiCaAlF_6$ LASER OSCILLATOR FOR LIDAR APPLICATIONS

Keito Shinohara[1], Pham Hong Minh[2], Pham Van Duong[2], Nguyen Van Diep[2], Nguyen Xuan Tu[2], Toshihiko Shimizu[1], and Nobuhiko Sarukura[1]

[1)] Institute of Laser Engineering, Osaka University, 2-6 Yamadaoka, Suita, Osaka 565-0871, Japan
[2)] Institute of Physics, Vietnam Academy of Science and Technology, 10 Dao Tan, Ba Dinh, Hanoi 10000, Vietnam

E-mail: shinohara-k@ile.osaka-u.ac.jp

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.

REFERENCES

[1] M. A. Dubinskii, V. V. Semashko, A. K. Naumov, and S. L. Korableva, in *Advanced Solid State Lasers*, A. Pinto and T. Fan, eds., OSA Proceedings Series (Optical Society of America, 1993), paper LM5.
[2] T. Fujii, T. Fukuchi, N. Cao, K. Nemoto, and T. Takeuchi, *Appl. Opt.* **41**, 2002, pp. 524-531.

P_CAEP – 03

MOTION CONTROL OF SELSYN BASED STEERING WHEEL USING VIDEO TRACKING DATA

Nguyen Quang Minh, Nguyen Van Binh, Nguyen Dinh Van

National Center for Technological Progress

E-mail: lipro.csei@gmail.com

Abstract: SS 405A selsyn used in fire director radar is specially designed: its rotor and stator motions can be controlled independently. In the following motion control mode of radar, an actuator 2 phase motor is used to drive rotor of SS 405A. A motion control solution for 2 phase actuator motor driving SS 405A rotor using data obtained by thermal camera video tracking process is proposed. Such a solution can be useful in semi-auto target tracking mode of radar in day/night conditions. It is meaningful in the case of radar deactivation in real practice. The simulation results show that the position errors are within the range of ± 2 mrad in semi-auto tracking mode of radar. Those results satisfy the system requirements.

REFERENCES:

[1] Г.Н.Арсеньев, И.В.Литовко, "*Электропреобразовательные устройства РЭС*", ИД "Форум-Инфра-М", Москва, 2008.
[2] Norman S.Nise, " *Control Systems Engineering*", 7 th Ed., John Wiley & Sons, 2015.
[3] Visharad D. Chikate et.al, " *Speed control of two phase induction motor*", IJEREEE, Vol.4 (3), 2018.
[4] Guan Zhai, Huadong Meng and Xiqin Wang, "*A Constant Speed Changing Rate and Constant Turn Rate Model for Maneuvering Target Tracking*", Sensor (Basel), Vol.14, No.3, 2014, pp. 5239-53.
[5] Ayham Zaitouny, Thomas Stemler and Shannon Dee Algar, "*Optimal shadowing filter for a positioning and tracking methodology with limited information*", Sensor (Basel), Vol.19, No.4, 2019, p.931.
[6] Qingping Yu, Xiaoming You and Sheng Lu, "*Manoeuvering target track prediction model*", Int.J.on Cybernetics & Informatics (IJCI), Vol.4, no.1, 2015, pp. 41- 50.

P_CAEP – 04

RESEARCH INTO THE RELATIONSHIP BETWEEN CARDIAC RESPONSES AND NEURAL ACTIVITY TO IMPROVE CLASSIFICATION OF EEG-BASED IMAGINARY ACTION

Nguyen Tran Duc Minh[1], Pham Quoc Cuong, Le Quoc Khai, Huynh Quang Linh

[1)] Biomedical Engineering Department, Faculty of Applied Science, Ho Chi Minh city University of Technology - VNU-HCMC, Vietnam

E-mail: ntdminh1504@gmail.com

Brain – Computer Interface (BCI) is a technology widely used in helping paralyzed or disabled patients normally move and communicate. Furthermore, studies have shown there are correlations between cardiac and neural activity during movements and imaginary movements. This study aims to determine if heart rate variability (HRV), along with brain signal, can be a potential combination to better distinguish imaginary tasks in BCI of certain imaginary limb movements. Electroencephalography (EEG) and electrocardiography (ECG) signals are acquired simultaneously during tasks called motor imagery (MI) when a person perform an imagination of certain actions through a self-guided imagery training process. After that, event-related (de-) synchronization (ERD/ERS) and HRV analysis are used to extract features, which would be used to discriminate imagination tasks using linear discriminant analysis (LDA) and artificial neuron network (ANN) combined method. The result shows that motor imagery actually affects cardiac activity as it generates a discriminative trend in heart rate and analysis also shows that some HRV parameters in frequency and non-linear domain, which reflect autonomous nervous system (ANS) activity, change adaptively during motor imagery task. Therefore, it is expected to be an extra feature to improve accuracy of classification of imaginary movements.

KEYWORDS: *Brain – Computer Interface, even-related, EEG, ECG, heart rate variability*

P_CAEP – 05

NGHIÊN CỨU, CHẾ TẠO HỆ CÁNH TAY ROBOT ĐIỀU KHIỂN CHIẾU TIA PLASMA JET ĐIỀU TRỊ TRONG Y TẾ

Nguyễn Văn Khá*, Nguyễn Ngọc Anh, Lê Hồng Mạnh, Nguyễn Thị Khánh Vân, Nguyễn Công Thành.
Viện Vật Lý, Viện Hàn lâm Khoa học và Công nghệ Việt Nam.
Số 18, Hoàng Quốc Việt, Cầu Giấy, Hà Nội, Việt Nam.
*Email: *nvkha@iop.vast.vn*

TÓM TẮT:

Plasma là khí bị ion hóa chứa các điện tích tự do, các gốc tự do cũng như các phân tử và nguyên tử ở trạng thái kích thích. Trong hai thập kỷ vừa qua, ngành plasma nhiệt độ thấp đã tạo ra một cuộc cách mạng trong công nghệ vật liệu. Hiện nay, nó đang hướng đến một mục tiêu mới: plasma chăm sóc sức khỏe, trước mắt là xử lý các dụng cụ y tế và xa hơn nữa là các mô sống. Mục đích của việc xử lý mô bằng plasma là điều trị không tạo hiệu ứng phụ với độ tin cậy cao: loại bỏ chính xác vùng bị bệnh mà chỉ làm ảnh hưởng tối thiểu đến các mô xung quanh. Hơn thế nữa, plasma còn có khả năng diệt khuẩn nhanh, hiệu quả rất phù hợp để tiệt trùng cụ y tế hoặc diệt khuẩn cục bộ cho các vùng mô. Dựa vào kết quả qua nhiều năm nghiên cứu, chúng tôi đã chế tạo thành công thiết bị Plasma Jet sử dụng để điều trị các vết thương ngoài da, các vết thương hở trong y tế. Hệ máy cánh tay Robot là một thành phần quan trong trong thiết bị plasma nói trên. Hệ có khả năng chụp, phân tích hình ảnh của vết thương qua đó tự động điều khiển đầu phát plasma đến các vị trí cần chiếu nhằm tăng hiệu quả điều trị. Chi tiết của nghiên cứu, chế tạo và kết quả thử nghiệm sẽ được được chúng tôi trình bày trong bài toàn văn của hội nghị.

P_CAEP – 06

RESEARCH AND DEVELOPMENT OF A WOUND TREATMEMT DEVICE BASED ON NEGATIVE PRESSURE WOUND THERAPY TECHNIQUE AND LASER THERAPY

Pham Trung Kien, Nguyen Tuan Anh, Nguyen Minh Tan, Chu Thi Minh Hoa

Center of Laser Technology, National Centre for Technological Progress
C6 Thanh Xuan Bac, Thanh Xuan, Hanoi, Vietnam
E-mail: phamkien1@yahoo.com

Abstract: Negative-pressure wound therapy (NPWT) is a therapeutic technique using a vacuum dressing to promote healing in acute or chronic wounds. It has been successfully used in different wound type treatment such as burns (second and third-degree), infection, diabetic ulcers, laparotomy,...The therapy involves the controlled application of sub-atmospheric pressure to the local wound environment, using a sealed wound dressing connected to a vacuum pump.

This paper presents the research and development of a wound treatment device based on Negative-Pressure Wound Therapy technique and laser therapy. A laser diode with the wavelength of 635 nm and output power of 50 mW, operating in two modes: 50 Hz and 2.5 kHz, is used as the light source for laser therapy. For the wound therapy, negative pressure is controlled in the range of 4 to 20 kPa with a step of 4 kPa.

Keywords: *wound therapy, negative pressure wound therapy, laser therapy*

P_CAEP – 07

APPLICATION OF LOW-POWER SEMICONDUCTOR LASER IN FUNCTION REHABILITATION TREATMENT FOR CHILDREN

Tran Minh Thai [1], Ngo Thi Thien Hoa [3], Tran Thien Hau [1], Ta Thi Lan Huong [2], Quach Kim Cuong[1]

[1] Laser Technology Laboratory - Ho Chi Minh City University of technology- Viet Nam National University HCM City

[2] Clinics of traditional medicine Tan Dinh Church, HCM City

[3] Tan Chau Rehabilitation Treatment Department - An Giang Province

Email: tmthai_dhbk@hcmut.edu.vn

Cerebral palsy is a pathological condition or injury of the brain before fully developing, causing movement problems or abnormal positions. Most children cerebral palsy are accompanied by symptoms of dementia, abnormal behaviour, sensory disorders and perceptions. For children with cerebral palsy, it is difficult to achieve complete recovery results with merely training, acupuncture, and Oriental or western medicine. We have developed the therapy of treating cerebral palsy in children with low-power semiconductor lasers. The main content of the method includes:

Using intravenous low-power semiconductor lasers, working at a wavelength of 650 nm to improve the circulatory system available in the patient's body, in order to provide high-quality blood to feed the brain and other lesions due to cerebral palsy.

At the same time, using two wavelengths simultaneously, the two types of semiconductor lasers working at wavelengths of 780nm and 940nm create, directly impacting on the areas: language zone, cognitive zone, auditory zone, neck area, two nerve plexus in the neck and waist.

We combined with onto acupuncture semiconductor laser at a wavelength of 940nm work acting on acupuncture points in traditional acupuncture to restore motor function.

We activate the patient's immune system with cerebral palsy in three ways: Using a two-wavelength effect while acting on thymus, spleen and lymph nodes; Using the Opto acupuncture to affect the acupuncture points on the body as Hegu, Xuan Zhong, Qu Chi, San Yin Jiao, Zu San Li; use intravenous semiconductor lasers. Combine physiotherapy lessons and nutrition in children with cerebral palsy.

We use the above therapy to treat 74 children with cerebral palsy at the age of (4-15) years. These patients have the following characteristics: were diagnosed with cerebral palsy by the hospitals and treated for a long time, but the effect was not as expected. Therefore, the family of pediatric patients find low-power semiconductor laser treatment. A treatment process consists of 20 treatments.

After 04 low-power semiconductor laser treatment regimens have obtained results: 12 children with lower limb recover 80%, 12 children with hemiplegia recover 80%, 26 children with epilepsy reduced seizures menstruation, short duration of seizures and mild intensity, 19 children prone to collapse on their heads, 5 children with knee stiffness recover 85%

compared with children of the same age. Treatment does not occur complications and adverse reactions to the health of patients.

P_CAEP – 08

PLASMA-LIQUID INTERACTION TREATMENT OF ZnO NANOPARTICLES FOR ENHANCEMENT OF PHOTOCATALYTIC DEGRADATION OF REACTIVE RED 120 DYE

Nguyen Nhat Huy[1], Nguyen Thanh Trung[2,3], Nguyen Thanh Hai[3], Phung Thi Oanh[3,4], Dang Van Thanh[4], Keomany Inthavong[5], Do Hoang Tung[2,*]

[1]Ho Chi Minh City University of Technology, VNU-HCM, Vietnam
[2]Institute of Physics, Vietnam Academy of Science and Technology, Vietnam
[3]Research and Development Center for Advanced Technology, Viet Nam
[4]TNU - University of Medicine and Pharmacy, Vietnam
[5]Khang Khay Teacher Training College, Xieng Khouang, Laos
[*]*Corresponding author's e-mail:* dhtung@gmail.com

Abstract: In this work, we report on plasma-liquid interaction treatment of ZnO (PTZ) nanoparticles for enhancement of photocatalytic degradation of reactive red 120 dye (R120) under UV light irradiation. A fast decomposition of the R120 dye was observed with a removal efficiency of 95 % within 90 min. The structure and surface properties of the as-prepared PTZ were investigated using X-ray diffraction, Fourier-transform infrared spectroscopy, photoluminescence, Raman, and scanning electron microscopy measurements. The photoluminescence spectroscopy reveals an increase in the green emission intensity due to surface modification which is attributed to the surface states and oxygen vacancies of the material.

Key words: *plasma, ZnO, reactive red 120, photocatalysis, dye wastewater*

Liên hệ :

Do Hoang Tung
Institute of Physics
Vietnam Academy of Science and Technology
No.18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam
Phone: +84-4-37916575
Email: dhtung@gmail.com

P_CAEP – 09

NGHIÊN CỨU QUANG XÚC TÁC PHÂN HỦY THUỐC NHUỘM XANH METHYLEN SỬ DỤNG VẬT LIỆU TiO_2 CHẾ TẠO BẰNG PHƯƠNG PHÁP ĐIỆN HÓA

Nguyễn Thị Khánh Vân[1,4], Nguyễn Nhật Huy[3], Nguyễn Năng Định[1], Đặng Văn Thành[1,2]

[1]Trường Đại học Công nghệ, Đại học Quốc gia Hà Nội;
[2]Trường Đại học Y Dược, Đại học Thái Nguyên;
[3]Trường Đại học Bách Khoa, ĐHQG-HCM;
[4]Trường Đại học Khoa học, Đại học Thái Nguyên.

Tóm tắt

Báo cáo này trình kết quả nghiên cứu quá trình quang xúc tác phân hủy thuốc nhuộm xanh methylen (MB) trong nước sử dụng hạt nano TiO_2 (NTs) chế tạo bằng phương pháp điện hóa. Các đặc trưng của vật liệu được xác định sử dụng các phép đo SEM, XRD, Raman và UV-vis. Các thông số ảnh hưởng đến hiệu quả quang xúc tác phân hủy MB như thời gian chiếu sáng, pH dung dịch, khối lượng vật liệu và nồng độ MB ban đầu được khảo sát một cách chi tiết. Kết quả cho thấy tốc độ phân hủy tối đa của MB (nồng độ ban đầu 20 ppm) là 98,36% ở giá trị pH 9,01 trong thời gian 60 phút sử dụng đèn Xenon ngay tại nhiệt độ phòng. Các hạt NTs cho thấy hoạt động xúc tác quang cao hơn so với vật liệu P25 thương mại trong cùng điều kiện.

Từ khóa: TiO_2, quang xúc tác, điện hóa, xanh methylen.

Liên hệ: ThS. Nguyễn Thị Khánh Vân
Trường Đại học Khoa học, Đại học Thái Nguyên;
Phường Tân Thịnh Thành phố Thái Nguyên, Thái Nguyên, Việt Nam.
Email: vanntk@tnus.edu.vn
Điện Thoại: 0977724945

P_CAEP – 10

PREPARATION OF GRAPHENE/MnO_2 NANOCOMPOSITES BY PLASMA-ASSISTED SONOCHEMICAL APPROACH AND ITS PHOTOCATALYTIC DEGRADATION OF DYES IN AQUEOUS SOLUTION

Tuyen Nguyen Long[1,2], Trieu Pham Quoc[1], Dinh Nguyen Ngoc[1], Thao Nguyen Thi Thu[3], Dung Nguyen Quoc[3], Hai Nguyen Thanh[4], Minh Phan Ngoc[4,5], Hong Phan Ngoc[4,5*], Oanh Phung Thi[6], Thanh Dang Van[6,*]

[1)] University of Science, VNU, 334 Nguyen Trai Street, Thanh Xuan District, Ha Noi.
[2)] Hung Vuong University, Viet Tri city, Phu Tho.
[3)] Department of Chemistry, Thai Nguyen University of Education, 20 Luong Ngoc Quyen Street, Thai Nguyen.
[4)] Center for High Technology Development, Viet Nam academy of Science and Technology, Ha Noi.
[5)] Graduate University of Science and Technology, Viet Nam academy of Science and Technology, Ha Noi.
[6)] Thai Nguyen University of Medicine and Pharmacy, 284 Luong Ngoc Quyen Street, Thai Nguyen.

*Email: hongpn82@gmail.com, thanhdv@tnmc.edu.vn

This report presented an effective way to synthesize graphene/MnO_2 nanocomposites (GMC) using plasma-assisted sonochemical method for photocatalytic decomposition of dyes (methylene blue, reactive red 120...) from aqueous solution. The morphology, structure and chemical composition of GMC materials were investigated through scanning electron microscopy (SEM), transmission electron microscopy (TEM), X-ray diffraction (XRD), Raman spectrum and X-ray electron spectroscopy. SEM and TEM results showed that MnO_2 nanoparticles with particle size of 40-60nm were attached uniformly on the surface of graphene nanosheets. The effects on photocatalytic process were studied such as the influencing factors of pH, contact time, absorbent dosage, initial dye concentration.

Keywords: *sonochemical method, plasma, dyes, graphene, MnO_2.*

P_CAEP – 11

HIGH PERFORMANCE ANTI-REFLECTION COATING ON GERMANIUM SUBSTRATE FOR INFRARED REGION

Pham Hong Tuan[1], Nguyen Thanh Hop[1], Nguyen Thi Thanh Lan[1], Nguyen Van Thanh[2]
1) Center Optoelectronic, Nacentech, C6 Thanh Xuan Bac – Thanh Xuan- Ha Noi
2) Research Institute of Technology for Machinery, 25 Vu Ngoc Phan – Dong Da – Ha Noi
E-mail: thanhhop83@gmail.com, phamhongtuan1@yahoo.com

Abstract:

Germanium (Ge) based optical components are widely used for the thermal imaging system operating in both 3-5 µm and 8-12 µm, due to its low absorptance in the range 2-12 µm, low chromatic aberration, chemical resistance and good strength. The high refractive index (4.02 at 10 µm) of Ge is advantage to minimal lens surface curvature, but it makes the the Fresnel reflection intensity become very high. The reflectivity on each surface is about 36%, so that reduce thermal imaging perfomance such as low transmission, internal reflection, high NETD (Noise Equivalent Temperature Difference) or Narcissus effect. To reduce the reflection loss, the present method is use of multilayer anti-reflection (AR) coating, which has design is optimized for the broadband 8-12 µm by using Spektrum software (Laser Zentrum Hannover e.V.). The coating consisting of Ge, zinc sulfide (ZnS) and yttrium fluoride (YF_3) as high, medium, and low refractive index materials respectively are deposited by electron beam evaporation with ion assisted deposition (IAD). It has been proposed that using IAD in fabrication of infrared AR coating can obtain a stable refractive index, enhance mechanical properties, and reduce water absorption, which leading to absorption bands around 3, 6 and 12 µm. Yttrium oxide (Y_2O_3) also is used to deposite a very thin protecting layer on top surface. The coating has been characterized by Fourier transform infrared (FTIR) spectroscopy and exhibited average transmission more than 95% over the range 8-12 µm after coating anti reflection.

Key word: *optical coating, anti-reflection, germanium, thermal imaging, IAD.*

P_CAEP – 12

THE STRUCTURAL TRANFORMATION AND DYNAMICAL PROPERTIES IN NETWORK FORMING LIQUID

Nguyen Thi Thanh Ha

Department of Computational Physics, Hanoi University of Science and Technology,
No. 1 Dai Co Viet Road, Hanoi, Vietnam
E-mail: ha.nguyenthithanh1@hust.edu.vn

In this present study, molecular dynamics (MD) simulation is employed to clarify the structure and dynamics in Germania (GeO_2) liquid. MD models consisting of 5499 atoms were constructed in the range of pressure from 0 to 150 GPa and 3500K temperature. The microstructure and dynamic properties have been studied with help of domain of structure unit GeO_x, boundary atom oxygen and oxygen particles, pocket of oxygen. The results reveal that there is the structural transformation in high-pressure densification. At low pressure, the structure is mainly GeO_4 domain meanwhile the structure is mainly GeO_6 domain at high pressure. The ratio of the boundary atom oxygen increase with pressure and stabilized from the pressure range of 40 to 150 GPa. Therefore, at low and high pressure region, the GeO_2 structure is a two-domain structure and it is three domain structure the range of pressure from 3 to 130 GPa. Moreover, the oxygen atom density in pockets is also calculated and indicates heterogeneous structure in GeO_2. Heterogeneous structure related to the cause of dynamical heterogeneity. The existence of separate fast- and slow-regions in GeO_2 is the main characteristic of dynamical heterogeneity

P_CAEP – 13

COMPUTER SIMULATION OF ALUMINUM-SILICATE: STRUCTURAL AND DYNAMICAL HETEROGENEITIES

Nguyen Thi Thanh Ha and Pham Khac Hung

Hanoi University of Science and Technology, No. 1 Dai Co Viet Road, Hanoi, Vietnam

E-mail: ha.nguyenthithanh1@hust.edu.vn

Abstract. Molecular dynamic simulation is carried out for the aluminum-silicate liquid. The microstructure and dynamic properties have been studied with help of Si-O, Al-O subnet and init-bond and Link-cluster function. The simulation results show that there is a strong correlation between mean square displacement and init-bond function. The Si-O bond is much stronger than Al-O bond and the diffusion is realized by bond-breaking mechanism. The link-cluster function is quite different for most mobile, immobile atoms and the ones taken randomly from the system. The structure of the melt consists of a number of SMIMA regions and a large SMMA region. SMMA and SMIMA regions cover respectively the Al-rich and Si-rich domain of network structure and bond-breaking events happen more frequently in SMMA region than that in SMIMA ones. Therefore, the origin of dynamical heterogeneity is from the non-uniform distribution of bond-breaking events through network structure.

Key word: *Molecular dynamic, aluminum-silicate, subnet, init-bond, Link-cluster function*

P_CAEP – 14

DOMAIN STRUCTURE AND OXYGEN POCKETS IN SILICA LIQUID UNDER PRESSURE

Nguyen Thu Nhan* and Pham Khac Hung

Hanoi University of Science and Technology, 1 Dai Co Viet, Hanoi Viet Nam

*E-mail: nhan.nguyenthu@hust.edu.vn

Silica melt at 3500 K and pressure up to 45 GPa have been investigated using molecular dynamics simulation. The simulation shows that the network structure of the melt comprises the D4, D5 and D6 domain and boundary regions between domains. The domain structure strongly changes as the melt is compressed to higher pressures. The densification of the melt is analyzed through Voronoid polyhedron. We also study the structural heterogeneity by spheres passing four atoms and containing only oxygen atoms inside. We found that the network structure also contains a number of oxygen pockets. The size of pocket reaches up to 59. Moreover, the size and volume of pockets have the tendency to reduce under pressure.

Keywords: *Domain structure, oxygen pockets, voronoid polyhedron, silica melt.*

P_CAEP – 15

SIMULATION OF NETWORK STRUCTURE AND POLYAMORPHISM OF CALCIUM TITANATE

Nguyen Thu Nhan* and Nguyen Thi Thanh Ha

Hanoi University of Science and Technology, 1 Dai Co Viet, Hanoi Viet Nam

*E-mail: nhan.nguyenthu@hust.edu.vn

Network structure and polyamophism of Calcium Titanate glass have been investigated using molecular dynamics simulation. The local enviroment of atoms is studied via radial distribution function, coordination number distribution. The topology of basic units is analyzed via bond length and bond angle. The network structure is investigated via distribution of linkages Ti-O-Ti, Ca-O-Ti, Ca-O-Ca. Specially, the polyamorphism as well as structural and compositional heterogeneities are also presented and discussed in this work.

Keywords: Calcium titanate, polyamophism, network structure, linkages, heterogeneities.

P_CAEP – 16

DESIGN OF AN ULTRA-WIDEBAND MICROWAVE ABSORBER BASED ON MAGNETIC SHEETS AND THIN RSS

Nguyen Tran Ha, Tran Quang Dat, Nguyen Vu Tung, Pham Van Thin

Department of Physical and Chemical Engineering, Le Quy Don Technical University,

236 Hoang Quoc Viet - Hanoi - Viet Nam

E-mail: hant.mta@gmail.com

In this paper, an broadband dual-layer microwave absorber based on magnetic sheets and thin split ring Resonators (RSS) is designed and simulation results are presented. The proposed structure consists of coupled SRR with two splits in each SRR and is designed on a magnetic sheets substrate backed by a metallic ground plane. Under normal incidence, the proposed structure exhibits at least 99% of absorption in the whole band of 4 GHz to 18 GHz for both Transverse Electric (TE) and Magnetic (TM) polarizations. For oblique incidences, a very slight decrease in the bandwidth is observed in the upper frequency band until 45° and the absorption remains very interesting for higher incidences. In addition, parametric studies have demonstrated that at least 95% of absorption can be produced with our structure by adjusting the thicknesses of the magnetic sheets. Another issue to be presented and discussed in this paper is a new approach for evaluating the performance of absorbers. In fact, studies show that the absorber can compete with other recent broadband absorbers.

REFERENCES

[1] Bao-Qin Lin, et al., *Microwave and Optical Technology Letters,* **57.6**, 2015, pp. 1439-1441.
[2] Chin, J. Y., Lu. M. and Cui T. J., *Applied Physics Letters*, **93,** 251903, 2008.
[3] Shi, J. H., et al., *Physical Review B*, **89.16**, 2014, pp. 165128.
[4] Ye, Yuqian, and Sailing He, Applied Physics Letters, **96.20**, 203501, 2010.
[5] Hossain, Md Ikbal, et al., *Materials*, **8.1**, 2014, pp. 57-71.
[6] Dong, Guoxiang et al., *Optics Communications*, **365**, 2016, pp. 108-112.
[7] Michele Borgese et al., *Scientific reports*, 8:7651, 2018.
[8] Schurig, D., J. J. Mock, and D. R. Smith, *Applied physics letters*, **88.4**, 041109, 2006.

P_CAEP – 17

STUDY ON EFFECT OF TECHNICAL PARAMETERS IN LIQUID NITRIDING PROCESS TO THE STRUCTURE AND MECHANICAL PROPERTIES OF AISI 420 STAINLESS STEEL

Thanh Nguyen Van[1,2], Trung Trinh Van[1] , Son Nguyen Anh[1], Tuan Pham Hong[3], Hop Nguyen Thanh [3]

[1)] [1]School of Materials Science and Engineering, Hanoi University of Science and Technology, No.1, Dai Co Viet, Hai Ba Trung, Ha Noi, Viet Nam

[2)]Laboratory of Technology and Casting alloys, Research Institute of Technology for Machinery, No. 25, Vu Ngoc Phan, Dong Da, Ha Noi, Viet Nam

[3)]Centre for Optoelectronics, National Center for Technological Progress, C6 Building, Thanh Xuan Bac, Thanh Xuan, Ha Noi, Viet Nam

E-mail: thanhmaterial@mail.com

Nowadays, martensitic stainless steels have been widely used in many applications owing to their superior mechanical properties and corrosion resistance. Liquid nitriding (LN) is an effective process for improving the surface hardness and anti-wear properties of stainless steels, achieved surface hardness up to 900 HV. The most significance of liquid nitriding method is its higher diffusion rate compared to gas nitriding or plasma nitriding. However, the hardness and corrosion resistance of stainless steels are decreased at high temperature and long process time. In this study, we investigate the effect of technical parameters in this process to microstructure and mechanical properties of stainless steel AISI 420. Stainless steel samples after heat treatment (quenching at 1040ºC, tempering at 550ºC) are nitridized at various temperatures (460, 500, 540 and 580ºC) and times (1, 3, 5 and 7 hours). After nitriding process, we investigate microstructure of the steels using optical microscope, measure the micro hardness distribution from surface to core, determine the atomic structure with XRD and SEM method, adjust the resistance ability against corrosion by measuring the corrosion arc.

Keywords: *AISI 420 Stainless steel, liquid nitriding, corrosion resistance.*

REFERENCES

[1] Yuanhua Lin, Jun Wang, Dezhi Zeng, Runbo Huang, and Hongyuan Fan, Advance complex liquid nitriding of stainless steel AISI 321 surface at 430 ºC, Journal of materials engineering and performance, 2013.

[2] K. Funatani, Low-Temperature Salt Bath Nitriding of Steels, Metal Sci. Heat Treat., 2004, 46, p 277.

[3] M. Kuczynska-Wydorska and J. Flis, Corrosion and Passivation of Low-Temperature Nitrided AISI, 304L and 316L Stainless Steels in Acidified Sodium Sulphate Solution, Corros. Sci., 2008, 50, p 523.

P_CAEP – 18

SYNTHESIS, STUDY OF MAGNETIC AND OPTICAL PROPERTIES OF Mn DOPED CdS SEMICONDUCTOR NANOCRYSTALS

Nguyen Thi Hien[1], Nguyen Thi Luyen[1], Doan Thuy Huong[1], Dinh Quang Chinh[1], Pham Minh Tan[2], Vuong Thi Kim Oanh[3], Phan Van Do[4], Nguyen Dang Tam[5], Phan The Long[6] và Nguyen Xuan Ca[1,*]

[1]Department of Physics and Technology, Thai Nguyen University of Sciences, Thai Nguyen, Vietnam
[2]Faculty of Fundamental Sciences, Thai Nguyen University of Technology, Thai Nguyen, Vietnam
[3]Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam
[4]Faculty of Energy Engineering, ThuyLoi University, 175 Tay Son, Dong Da, Ha Noi, Vietnam
[5]ThuyLoi University-second base, 02 Truong Sa, Binh Thanh, Ho Chi Minh city, Vietnam
[6]Department of Physics, Hankuk University of Foreign Studies, Yongin 449-791, South Korea

*Email: canx@tnus.edu.vn

Abstract: Manganese (Mn) doped cadmium sulfide (CdS) semiconductor nanocrystals (CdS:Mn) NCs have been prepared by wet chemical method at different Mn mole percentages (0, 1, 2, 5, and 10%). Mn doped CdS NCs with different concentrations have a spherical shape, about 4 nm in size and zinc-blende (Zb) structure. Energy dispersive x-ray (EDX) carried out to specify the presence and the chemical composition of the prepared Mn doped CdS NCs. The optical properties have been determined by analysis of absorption spectroscopy (Abs) and photoluminescence (PL) spectroscopy. The fabricated Mn doped CdS NCs exhibited the dual emissions in the visible window at about 426 nm and 585 nm, which correspond to the excitonic emission of CdS NCs and Mn^{2+} dopant ions, respectively. Vibrating sample magnetometer (VSM) technique used to identify the magnetic properties of the samples. VSM datas of Mn doped CdS NCs at room temperature show weak hysteresis loops, which indicate the change from diamagnetic of undoped CdS to superparamagnetic behavior of Mn doped CdS NCs.

References

[1] G.Arun Kumar, H.S.Bhojya Naik, R.Viswanath, M.Vinuth, I.K.Suresh Gowda, *Materialstoday.* **4**, 2017, 8336-8344.

[2] H. Yang, P. H. Holloway, J. Chem. Phys. **121**, 2004, 10233.

[3] N. X. Ca, N. T. Hien, P. N. Loan, P. M. Tan, U. T. D. Thuy, T. L. Phan, Q. B. Nguyen, *J. Elec. Mater.* **48**, 2019, 2593-2599.

P_CAEP – 19

COLLOIDAL Cu-DOPED CdZnS NANOCRYSTALS: Cu DOPING AND BLUE SHIFT OF ABSORPTION AND LUMINESCENCE SPECTRA OF HOST LATTICE

Nguyen Dieu Linh[1], Hoang Thi Lan Huong[2], Nguyen Thi Thuy Lieu[2], Le Ba Hai[3], Nguyen Xuan Nghia[4]

[1)] University of Science and Technology of Hanoi, 18 Hoang Quoc Viet, Cau Giay, Hanoi
[2)] Posts and Telecommunications Institute of Technology, Km 10 Nguyen Trai, Thanh Xuan, Hanoi
[3)] University of Khanh Hoa, 01 Nguyen Chanh, Nha Trang
[4)] Institute of Physics, 10 Dao Tan, Ba Dinh, Hanoi

E-mail: nxnghia@iop.vast.ac.vn

In practice, transition metal doping can influence differently to UV-Vis absorption and luminescence spectra of II-VI host nanocrystals. The spectra can be: (i) not shifted [1]; (ii) shifted to low energy [2]; or (iii) shifted to high energy [3]. The experimental observations also are explained differently such as the change in nanocrystal size, intrinsic reasons of transition metal-doped nanocrystals like *sp-3d* exchange interaction in confinement regime, or strain in nanocrystals, … By comparing the absorption and luminescence spectra of CdZnS and Cu-doped CdZnS nanocrystals obtained in the same preparation conditions, it was found that Cu doping results in the blue-shift of both band edge absorption and luminescence peaks of CdZnS host nanocrystal. The nature of this phenomenon is analysed and discussed in relation to the size, crystal structure, strain, and spectroscopic characteristics of nanocrystal samples.

REFERENCES

[1] S. Gul, J.K. Cooper, C. Corrado, B. Vollbrecht, F. Bridges, J. Guo and J.Z. Zhang, *J. Phys. Chem. C* **115**, 2011, pp. 20864-20875.
[2] R.S. Kurma, V. Veeravazhuthi, N. Muthukumarasamy, M. Thambidurai and D.V. Sankar, *Superlattices and Microstructures* **86**, 2015, pp. 552-558.
[3] M. Kuppayee, G.K. Vanathi Nachiyar and V. Ramasamy, *Applied Surface Science* **257**, 2011, pp. 6779-6786.

P_CAEP – 20

ABOUT CRYSTALLIZATION PROCESS AND HETEROGENEOUS DYNAMICS IN SUPERCOOLED LIQUID AND AMORPHOUS FE

Pham Mai An* and Pham Huu Kien
Thainguyen University of Education, Luong Ngoc Quyen, Thainguyen, Vietnam
E-mail: phammaian@dhsptn.edu.vn

In this paper, the supercooled liquid and amorphous Fe was investigated by means of molecular dynamics simulation based on Pak-Doyama potential. The crystallization was analyzed through pair radial distribution function, angle distribution, coordination number and transition to different atom types. Amorphous Fe possesses a large number of icosahedron type atoms which play a role in preventing of transformation into the bcc phase. The structure of amorphous Fe slightly changes during the relaxation time. The crystallization occurred when Fe was annealed at 1000 K for 3×107 steps666 . We found that unlike amorphous Fe, the structure of crystalline Fe is strongly heterogeneous and consists of separate regions with different local microstructure. Dynamical heterogeneous in the supercooled liquid and amorphous Fe was also examined through the distribution of mobile and immobile atoms. It is found that there is a connection between local structure, crystallization pathway and dynamical heterogeneity in the system. Consequently, mobile and immobile atoms have a tendency to segregate.

REFERENCES

[1] L. Gao, Q. Zhang, *Scr. Mater.* **44**, 2001, 1195.
[2] H. Zhang, J.F. Banfield, *J. Chem. Mater.* **14**, 2002, 4145.
[3] G. Madras, B.J. McCoy, *Cryst. Growth & Design* **7**, 2007, 250.
[4] C. Pan, P. Shen, S.Y. Chen, *J. Cryst. Growth* **299**, 2007, 393.
[5] P.H. Kien, M.T. Lan, N.T. Dung, P.K. Hung, *Int. J. Mod. Phys. B* **28**, 2014, 1450155.
[6] T.P. Duy, V.V. Hoang, *Physica B* **407**, 2012, 978.
[7] Kien Pham Huu, Trang Giap Thi Thuy, Hung Pham Khac, *AIP Advances* 7, 2017, 045301.

P_CAEP – 21

INVENSTIGATION ON LUMINESCENCE QUENCHING OF Sm^{3+} ions DOPED K_2YF_5 SINGLE CRYSTAL

Phan Van Do[1], Pham Thi Xuan[2], Do Lam Duan[2], Nguyen Dang Tam[3], Nguyen xuan Ca[2], Luong Duy Thanh[1], Vu Phi Tuyen[4]

[1]Thuy loi University, 175 Tay Son, Dong Da, Ha Noi
[2]Faculty of Physics and Technology, Thai Nguyen University of Sciences, Thainguyen, Vietnam
[3]Thuy loi University-Second base, 02 Truong Sa, Binh Thanh, Ho Chi Minh City.
[4]National Institute of Information and Communications Strategy, Hanoi, Vietnam.

E-mail: phanvando@tlu.edu.vn

Abstract. $K_2Y_{1-x}F_5:xSm^{3+}$ (x = 0.5, 1.0, 2.0, and 4.0 at.%) single crystals were synthesized under hydrothermal condition. Absorption, excitation and luminescence spectra as well as lifetime of $K_2YF_5:Sm^{3+}$ crystals were measured at room temperature. The concentration quenching phenomenon is originated from energy transfer through cross-relaxation between Sm^{3+} ions. The main interaction mechanism between Sm^{3+} ions is dipole-dipole interaction that has been found by using the Dexter model. The energy transfer parameters such as the probability and efficiency of energy transfer process have been found through the analysis of decay curves.

REFERENCES

[1] P.V. Do, V.P. Tuyen, V.X. Quang, L.X. Hung, L. D. Thanh, T. Ngoc, N.V. Tam, B.T. Huy, *Opt. Mater.* 55, 2016, 62.

[2] P. Solarz, W.R. Romanowski, *Physical Review B* 72 (2005) 075105.

[3] K.K. Mahato, S.B. Rai, A. Rai, *Spectrochim. Acta, Part A* 60 (2004) 979.

[4] P.V. Do, V.P. Tuyen, V.X. Quang, N.M. Khaidukov, N.T. Thanh, B. Sengthong, B.T. Huy, *J. Lumin* 179, 2016, 93.

P_CAEP – 22

LASER-ASSISTED PHOTOCHEMICAL SYNTHESIS OF AUNPS/AG NANO-DENDRITES ON OPTICAL FIBRE FOR ULTRA-STABLE SERS SUBSTRATES

Pham Thanh Binh[1], Do Thuy Chi[2], Nguyen Anh Tuan[2], Hoang Anh[2], Vu Duc Chinh[1], Bui Huy[1] and Pham Van Hoi[1]

[1]Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Road, Cau Giay District, Hanoi, Vietnam

[2]Thai Nguyen Education University, Luong Ngoc Quyen Street, Thai Nguyen City, Vietnam

E-mail: binhpt@ims.vast.ac.vn

Nanostructured silver dendrites are known to yield the highest signal-enhancement factors in surface-enhanced Raman scattering (SERS) spectroscopy, but its low chemical stability toward oxidation shows a challenge in the realization of Ag nanostructures-based SERS substrates with long operating lifetime. In this work, we report a new type of the silver dendritic nanostructures-based SERS optical fibre substrate which is modified by laser-assisted photochemical synthesis of gold nanoparticles (AuNPs). The morphology and chemical composition of SERS probes are characterized by high-resolution scanning electron microscope (HR-SEM) and Energy dispersive X-ray spectroscopy (EDX), respectively. The achieved SERS-activity optical fibre substrates were tested with low concentration of Rhodamine 6G and exhibit high sensitivity and excellent stability in long operating lifetimes. These results are a significant advance in developing robust SERS optical fibre substrates for direct and rapid detection of trace molecular in food security and environmental protection.

REFERENCES

[1] G. Shi, M. Wang, Y. Zhu, Y. Wang, X. Yan, X. Sun, H. Xu & W. Ma, *Beilstein J. Nanotechnol.* **10,** 2019, pp. 578-588.

[2] N. Cennamo, L. Zeni, F. Arcadio, E. Catalano and A. Minardo, *Fibers* **7,** 2019, pp. 34-7.

[3] L. T. Q. Ngan, K. N. Minh, D. T. Cao, C. T. Anh and L. V. Vu, *Journal of Electronic Materials,* 2017. pp. 3770-3775.

[4] T. B. Pham, V. C. Nguyen, V. H. Pham, H. Bui, R. Coisson, V. H. Pham and D. C. Vu, *Journal of Nanoscience and Nanotechnology* **19**, 2019, pp. 1-8. Doi: 10.1166/jnn.2019.17136.

[5] H. Lee, J. D. Liao, K. Sivashanmugan, B. H. Liu, W. E. Fu, C. C. Chen, G. D. Chen and Y. D. Juang, *Nanomaterials* **8,** 2018, pp. 402-11.

[6] S. W. Lee, S. H. Chang, Y. S. Lai, C. C. Lin, C. M. Tsai, Y. C. Lee, J. C. Chen and C. L. Huang, *Materials,* **7**, 2014, pp. 7781-7798.

[7] H. J. Yin, Z. Y. Chen, Y. M. Zhao, M. Y. Lv, C. A. Shi, Z. L. Wu, X. Zhang, L. Liu, M. L. Wang and H. J. Xu, *Scientific Reports,* **5**, 2015, pp. 14502.

[8] H. L. Nguyen, T. H. Nguyen, D. N. Ngo, Y-H. Kim and S-W. Joo, *Sensors* **19**, 2019, pp. 1355.

P_CAEP – 23

STUDY ON ENERGY TRANSFER PROPERTIES OF Gd – Tb ION PAIRS IN K_2GdF_5:Tb FOR USE IN NEUTRON DOSIMETRY

Doan Phan Thao Tien[a,c*], Tran Thi Thanh Lam[b], Tran Dinh Hung[b], Nguyen Thi Minh Nguyet[c], Ha Xuan Vinh[a,c]

[a] *Nhatrang Institute of Technology Research and Application - VAST*
[b] *Khanh Hoa Department of Education and Training*
[c] *The Physics association in Khanh Hoa Province*
[*] *Email:* thaotien2109@gmail.com

The crystal lattice structures of K_2GdF_5 and K_2TbF_5 are very similar and the crystal cell sizes are also approximately the same, so the Gd^{3+} and Tb^{3+} ions are easily doped in the crystal lattice with high doping concentration. The energy transfer process from Gd^{3+} ions to Tb^{3+} ions in K_2GdF_5:Tb^{3+} is researched by the excitation, absorption and emission spectra. The stimulating spectra of K_2GdF_5:Tb coincide with of K_2GdF_5, but the emission spectra coincided K_2TbF_5. The results show that the excitation wavelength at 275 nm of K_2GdF_5:Tb^{3+} corresponds to the transition $^8S_{7/2}$ to ^6I_J (J = 7/2, 9/2, 11/2) of Gd ion, and the emission wavelength at 542 nm corresponds to transition ^5D_J (J = 3,4) to ^7F_J (J = 3, 4, 5, 6) of Tb^{3+} ion. The ^6I_j energy levels of Gd^{3+} ions overlap with many energy levels of ^5F_J (J = 1,2,3,4) of Tb^{3+} ions, so that, the excitation energy is easily transferred from Gd ion to Tb ion. The property of Gd ion is strongly neutron absorption, and Tb ion is strongly emitted in the 542 nm region. The research results show that the high thermoluminescence intensity of the irradiated neutron K_2GdF_5:Tb due to the effective energy transfer properties of Gd-Tb ion pairs.

Keyword: *Gd-Tb energy transfer.*

P_CAEP – 24

INTERCOMPARISON OF GAMMA SCATTERING AND GAMMA TRANSMISSION METHODS IN DETERMINING THE EFFECTIVE ATOMIC NUMBER OF SOME COMPOSITE MATERIALS

Trinh Thi Ai Lam [1], Phan Ngoc Linh [2], Hoang Duc Tam [2]

[1)] Faculty of Physics and Engineering Physics, VNU-HCM University of Science, 227 Nguyen Van Cu St., Dist. 5, Ho Chi Minh City, Vietnam

[2)] Faculty of Physics, Ho Chi Minh City University of Education, 280 An Duong Vuong St., District 5, Ho Chi Minh City, Vietnam

E-mail: tamhd@hcmue.edu.vn

The study aims to determine the effective atomic number of some composite materials using gamma scattering and gamma transmission methods. In the gamma scattering method, the calibration curve of ratio R (R is the ratio of saturated thickness of an element to the saturation intensity of such element) versus the atomic number Z is completely constructed based on Monte Carlo simulation. The effective atomic number (Z_{eff}) of composite materials were determined using the obtained calibration curve. The value Z_{eff} of the composite materials is also determined using the transmission method with the photon beam of 661.7 keV. The results show good agreement between the two methods for all investigated materials. These results strongly suggest that the gamma scattering method is suitable and feasible for determination of effective atomic number.

REFERENCES

[1] M.M. Hosamani, N.M. Badige, *Chem. Phys. Lett.* **695**, 2018, pp. 94–98.
[2] K. Kulwinder, K.J. Singh, A. Vikas, *Nucl. Eng. Des.* **285**, 2015, pp.31–38.
[3] S. Aly, R.M. Elshazly , Y.H. Elbashar, A.M. Abou El-azm , M.M. El-Okr, M.N.H. Comsan, A.M. Osman, A.M. Abdal-monem, A.R. El-Sersy, *Radiat. Phys. Chem.* **102**, 2014, pp.167–170.
[4] H.C. Manjunatha, *Radiat. Phys. Chem.* 137, 2017, pp.254–259.
[5] X-5 Monte Carlo Team, 2003. MCNP – A General Monte Carlo N–Particle Transport Code, Version 5, Volume I: Overview and Theory. Los Alamos National Laboratory.
[6] NIST (2013) XCOM: photon cross sections database. http://www.nist.gov/pml/data/xcom/index.cfm. Accessed Mar 2019.

P_CAEP – 25

A NEW APPROACHING METHOD TO CALCULATE RAYLEIGH-COMPTON RATIO FOR SEVERAL SUBSTANCES IN THE RANGE OF 6≤ Z ≤ 82

Le Hoang Minh[1], Van Tan Phat[1], Chau Thanh Tai[1], Huynh Dinh Chuong[2], Tran Thien Thanh[1,2], Chau Van Tao[1,2]

[1)]Nuclear Department, University of Science, Viet Nam National University-Ho Chi Minh City, 227 Nguyen Van Cu Street, Ward 4, District 5, Ho Chi Minh City.

[2)]Nuclear Laboratory, Viet Nam National University-Ho Chi Minh City, 227 Nguyen Van Cu Street, Ward 4, District 5, Ho Chi Minh City.

E-mail: lehoangminh987@gmail.com

In this study, the Lagrange interpolation method [1] was applied to calculate the the form factor F(X,Z) and the incoherent scattering function S(X,Z) with X being the momentum transfer for photon with energy of 59,54 keV for ^{241}Am source at scattering angle 150^{o} and energy of 145 keV for ^{141}Ce source at 90° scattering angle. This method is considered on several substances including C, Al, Fe, Cu, Zn, Mo, Ag, Sn, Gd, Ta, W, Au, Pb. From the results obtained for these two parameters, the value of Rayleigh-Compton ratio for the elements with $6 \leq Z \leq 82$ has an average discrepancy being less than 6% when compared to the correlation interpolation method from previous study [2]. Thus, based on Lagrange interpolation method to calculate Rayleigh-Compton ratio, effective atomic number and electron density of compounds will be determined more accurately, conveniently, quickly.

REFERENCES

[1] Dang Van Liet, *Numerical Analysis*, Viet Nam National University, Ho Chi Minh city, 2004.

[2] M. P. Singh, A. Sharma, B. Singh and B. S. Sandhu, J Radioanal Nucl Chem. **302**, 2014, pp. 187

P_CAEP – 26

ANALYSING ACTIVITY CONCENTRATIONS OF NATURAL RADIONUCLIDES IN ROCK SAMPLES BY USING HPGE DETECTOR AND NAI DETECTOR – FSA METHOD

Le Huu Loi[1], Tran Thien Thanh[2], Nguyen Quang Vuong[3], Nguyen Trung Hieu[1]

[1]Center nuclear for technique in HCMC, Department of physics and nuclear analysis, 217, Nguyen Trai Street, Nguyen Cu Trinh Ward , District 1, Ho Chi Minh City, Viet Nam.

[2]University of Science, VNU-HCM, Faculty of Physics & Engineering Physics, Department of Nuclear Physics-Nuclear Engineering, 227, Nguyen Van Cu Street, Ward 4, District 5, Ho Chi Minh City, Viet Nam.

[3]HCMC University of Education, Department of Physics, 280, An Duong Vuong Street, Ward 4, District 5, Ho Chi Minh City, Viet Nam.

E-mail: loilhph@gmail.com

Activity concentrations of natural radionuclides usually derived from separate calibration measurements using the HPGe detector. Currently, we are researching the possibility of using NaI detector in obtaining the activity concentrations and comparing with the value of the Full Spectrum Analysis (FSA) method. The rock samples are obtained by the coorporation between us and Department of Geology. The results from HPGe detector were done, but the one from NaI detector and FSA are being analysed. We have some problems for shifting the channel of NaI spectrum. The detail results and evaluation were given below.

REFERENCES

[1] C. Mertensa, C. De Lellisb, P. Van Putb, F. Tondeura, *MCNP simulation and spectrum unfolding for an NaI monitor of radioactivity in aquatic systems*, Nuclear Instruments and Methods in Physics Research A 580, 2007, pp. 118–122

[2] J. Bare´ n, F. Tondeur, *Gamma spectrum unfolding for a NaI monitor of radioactivity in aquatic systems: Experimental evaluations of the minimal detectable activity*, Applied Radiation and Isotopes 69, 2011, pp. 1121–1124

[3] P. Chiozzi, P. De Felice, A. Fazio, V. Pasquale, M. Verdoya, *Laboratory application of NaI(Tl) g-ray spectrometry to studies of natural radioactivity in geophysics*, Applied Radiation and Isotopes 53, 2000, pp. 127–132

[4] A. Caciolli, M. Baldoncini, G.P. Bezzon, C. Broggini, G.P. Buso, I. Callegari, T. Colonna, G. Fiorentini, E. Guastaldi, F. Mantovani, G. Massa, R. Menegazzo, L. Mou, C. Rossi Alvarez, M. Shyti, A. Zanon, G. Xhixha, *A new FSA approach for in situ γ ray spectroscopy*, Science of the Total Environment 414, 2012, pp. 639–645

P_CAEP – 27

IDENTIFY POSSIBLE SOURCES OF POLLUTION BY MULTIVARIATE STATISTICAL ANALYSIS.

Nguyễn Ngọc Mai[1], Lê Hồng Khiêm[1,2]

[1]Institute of Physics - Vietnam Academy of Science and Technology, Ha Noi, Vietnam

[2]Graduate University of Science and Technology - Vietnam Academy of Science and Technology, Ha Noi, Vietnam

E-mail: mainn89@mail.com

This paper presents the application of multivariate statistical analysis (Such as Principal component analysis (PCA) and Hierarchical cluster analysis) to find possible sources of contamination of heavy metal elements in the air through moss biological indicators using SPSS software. Data on the content of elements in the Barbula Indica moss samples collected in Hanoi and surrounding areas were determined by neutron activation analysis method at the IBR-2 pulsed nuclear reactor of FLNP, Dụbna

Key word: multivariate statistical analysis, biological indicator, Barbula Indica moss

REFERENCES

[1] Yun Yan, Qiang Zhang, G.Geoff Wang, Yan-Ming Fang. Atmospheric deposition of heavy metals in Wuxi, China: Estimation based on native moss analysis. Environmental Monitoring and Assessment 188 (2016) 1-8.

[2] Harmens H., Norris D.A., Steinnes E., Kubin E., Piispanen J., Alber R., Aleksiayenak Y., Blum O., Coşkun M., Dam M., et al. Mosses as biomonitors of atmospheric heavy metal deposition: spatial patterns and temporal trends in Europe. Environ. Pollut. 158 (2010) 3144–3156.

[3] L.Barandovski et.al. Atmospheric deposition of trace element pollutants in Macedonia studied by the moss biomonitoring technique. Environ. Monit. Assess 138 (2008)107-118.

[4] M.V.Frontasieva et.al. Atmospheric deposition of heavy metals in noethern Serbia Bosnia-Herzegovina studied by the moss biomonitoring, neutron activation analysis and GIS technology. Journal of Radioanalytical and Nuclear Chemistry 259 (2004) 141-147.

[5] Blagnyte R., Paliulis D. Research into heavy metals pollution of atmosphere applying moss as bioindicator: A literature review. Environ. Res. Eng. Manag. 54 (2011) 26–33.

P_CAEP – 28

MATRIX EFFECTS CORRECTION IN X-RAY FLUORESCENCE ANALYSIS BY CLAISSE-QUINTIN ALGORITHM

Nguyen Thi Truc Linh[1], Nguyen Duy Han[2]
[1] Nuclear Technique Laboratory, University of Science, VNU-HCM
[2] Faculty of Physics and Engineering Physics, University of Science, VNU-HCM

In this work, the Claisse-Quintin (C-Q) algorithm was applied to correct the effects of the matrix components to iron concentration in Cr-Fe-Ni samples. The X-ray fluorescence spectrometry which includes three Am-241 radioactive sources that total activity is 50mCi, Si(Li) semiconductor detector, ITRP preamplifier, and DSA-LX digital multi-channel, was used in this work. Analytical and comparative samples were prepared in powder form with known concentrations. The iron element concentration, calculated from the C-Q method, was compared to the non-corrected analysis method and initial sample value. The results showed that the C-Q method calibrated well the concentration of the iron element as well as other elements with a small difference from the initial value.

Keywords: *Claisse – Quintin, matrix corretion, X-ray fluorescence, Si(Li) detector*

P_CAEP – 29

HIGH ADSORPTION CAPACITY OF URANIUM FROM AQUEOUS SOLUTION BY REDUCED GRAPHENE OXIDE – POROUS POLYANILINE COMPOSITE

Tran Quang Dat*, Nguyen Tran Ha, Nguyen Vu Tung, Pham Van Thin

Le Quy Don Technical University, 236 Hoang Quoc Viet Street, Hanoi

*E-mail: dattqmta@gmail.com

In this study, the composite based on porous polyaniline has been synthesized on the surface of reduced graphene oxide. The obtained material was characterized by scanning electron microscopy (SEM), X-ray diffraction (XRD), Raman spectroscopy (RAMAN) and Fourier transform infrared spectroscopy (FTIR). The adsorption experiments were conducted to assess the uranium adsorption properties of this adsorbent. The results indicated that the adsorption processes were well described by the Langmuir and the pseudo-second order models. The maximum adsorption capacity of the composite for uranium was calculated to be 2650 mg/g at pH = 7 and 4 hours of contact time. This value is higher than those of other adsorbents. Additionally, after six cycles, the adsorbent can be effectively regenerated and maintained a high adsorption level. This research exhibited that the RGO-porous PANI composite was promising adsorbent in the extraction of uranium from aqueous solution.

Keyword: *porous, polyaniline, reduced graphene oxide, uranium, adsorption*.

P_CAEP – 30

EVALUATION OF COLLECTIVE EFFECTIVE DOSE DUE TO EXPOSURE FROM TENORM IN FLY ASH FOR A RESIDENTIAL AREA AROUND A COAL FIRED POWER PLANT IN VIETNAM

Trương Thi Hong Loan[1,2], Vu Ngoc Ba[1], Le Do Loc[2], Nguyen Quang Dao[2], Truong Thi Xuan Truong[2], Mai Thanh Man[2], Le Xuan Thuyen[3], Tran Van Luyen[4]

[1]*Nuclear Technique Laboratory, VNUHCM - University of Science, Linh Trung Ward, Thu Duc District, Ho Chi Minh City, Viet Nam*

[2]*Faculty of Physics and Engineering Physics, VNUHCM - University of Science, 227 Nguyen Van Cu Street, District 5, Ho Chi Minh City, Viet Nam*

[3]*Faculty of Biology and Biotechnology, VNUHCM - University of Science, 227 Nguyen Van Cu Street, District 5, Ho Chi Minh City, Viet Nam*

[4]*Radiation Protection and Environment Monitoring, Center for Nuclear Techniques Ho Chi Minh City, Viet Nam.*

In this study, the UNSCEAR calculation model was used to evaluate the collective effective dose from Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM) in fly ash for the resident around a coal-fired power plant in Vietnam. The first results showed about 662 MBq, 572 MBq, 510 MBq, 112259 MBq of ^{232}Th, ^{238}U, ^{226}Ra and ^{222}Rn radionuclides respectively per 1 GW electric power from two coal fired power plants are discharged to the atmosphere. The collective absorbed and effective dose for different organs caused by the amount of radioactivity are lower than the corresponding value published by UNSCEAR 1982. In the case of inhaling radionuclides from fly ash, the organs most affected by radiation are the lung and the bone surface, the lowest is the spleen and the radionuclide ^{232}Th plays the main role (54.5×10^{-2} manSv/GW).

Key words: *UNSCEAR, Coal Fired Power Plant (CFPP), TENORM, Fly ash, Collective effective dose*.

P_CAEP – 31

XÂY DỰNG KÍNH HIỂN VI HUỲNH QUANG SIÊU PHÂN GIẢI DỰA TRÊN KĨ THUẬT ĐỊNH VỊ ĐƠN ĐIỂM VÀ PHÁT QUANG NGẪU NHIÊN RỜI RẠC

Nguyễn Trọng Nghĩa*, Nghiêm Thị Hà Liên, Nguyễn Đình Hoàng, Vũ Văn Sơn, Trần Hồng Nhung

Nhóm NanoBioPhotonics, Trung tâm Điện tử Học lượng tử, Viện Vật Lý, Viện Hàn lâm Khoa học và Công nghệ Việt Nam.

*E-mail: trongnghia@iop.vast.ac.vn

Độ phân giải không gian tương đối thấp của kính hiển vi quang học đã hạn chế đáng kể các quan sát các cấu trúc dưới tế bào. Cấu trúc dưới tế bào và phức hợp phân tử cần thiết cho chức năng sinh học có kích thước từ vài nanomet đến micromet. Tuy nhiên, do giới hạn nhiệu xạ quang học, các cấu trúc nhỏ hơn ~0.2 µm bị nhòe và không thể phân biệt bằng kính hiển vi huỳnh quang thường. Trong báo cáo này, chúng tôi trình bày việc xây dựng kính hiển vi huỳnh quang siêu phân giải dựng ảnh quang học ngẫu nhiên (STORM) cho phép thu hình ảnh phân giải cao dựa trên sự kết hợp của hai kỹ thuật định vị đơn điểm và phát quang ngẫu nhiên rời rạc. Đây là lần đầu tiên loại kính hiển vi này được xây dựng tại Việt Nam. Giới hạn độ phân giải ngang của thiết bị có thể đạt được là 20 nm. Độ phân giải đo được trên ảnh huỳnh quang của vi ống của tế bào Hela là 120-160 nm.

P_CAEP – 32

GIẢI PHÁP ỨNG DỤNG HIỆU ỨNG PIN NHIỆT-ĐIỆN PELTIER ĐỂ ỔN ĐỊNH CÔNG SUẤT PHÁT CỦA LASER RẮN YAG:ND BƠM BẰNG MA TRẬN LASER BÁN DẪN PHÁT XUNG CÔNG SUẤT LỚN, TẦN LẶP CAO DÙNG TRONG ĐO XA LASER

Nguyễn Văn Thương [1*], Vũ Quốc Thủy [1]

[1] Viện Vật lý kỹ thuật/Viện KH-CN quân sự

[*] Email: sonythuong@gmail.com

Tác giả trình bày kết quả khảo sát ảnh hưởng của nhiệt độ của đến công suất và bước sóng phát của ma trận laser bán dẫn. Trên cơ sở đó, đưa ra giải pháp và kết quả ứng dụng hiệu ứng pin nhiệt-điện Peltier để ổn định các thông số của ma trận laser bán dẫn bơm, qua đó ổn định công suất phát của laser rắn YAG:Nd bơm bằng laser bán dẫn, sử dụng trong đo xa laser tần lặp cao, cự ly đo xa.

Từ khóa: Laser, Vật lý laser, làm mát laser bán dẫn, hiệu ứng Pin nhiệt điện, ma trận laser bán dẫn, laser YAG:Nd, laser YAG:Nd bơm bằng laser bán dẫn, ổn định thông số laser bán dẫn.

P_CAEP – 33

EXTENDING TUNABLE WAVELENGTH RANGE BY USING CONFIGURATION OF SECOND ORDER BRAGG REFLECTION

Đỗ Quang Hòa[+], Trần Thị Trung Thủy[*], Vũ Dương, Nghiêm Thị Hà Liên

Trung tâm Điện tử học – Lượng tử, Viện Vật lý, Viện HLKH&CN Việt Nam

[+] email: hoado@iop.vast.ac.vn

A continuously tunable laser to be possible to selection of monochromatic laser beam in wide range of 543÷600 nm is studied. The laser operated based on second-order distributed feedback configuration using single and mixed laser dyes of rhodamine 560, rhodamine 590, and rhodamine 610 with different weight ratios is isvestigated. In principles of laser emission from second-order Bragg reflection, the dye laser wavelength closed to pumping wavelength were observed. The investigation to find the optimal value of pumping energy shows the dependence of laser efficience on the polarisation of pumping beam. Additionlly, the certain ratio of dye molecules in mixed dye is defined due to the different of absorption and stimulated emission crsoss section.

Key words: laser dye, distributed feedback laser, energy transfer.

P_CAEP – 34

DESIGN AND FABRICATION OF HIGH POWER LED FISHING LAMP COMBINED WITH ASYMMETRIC LENS

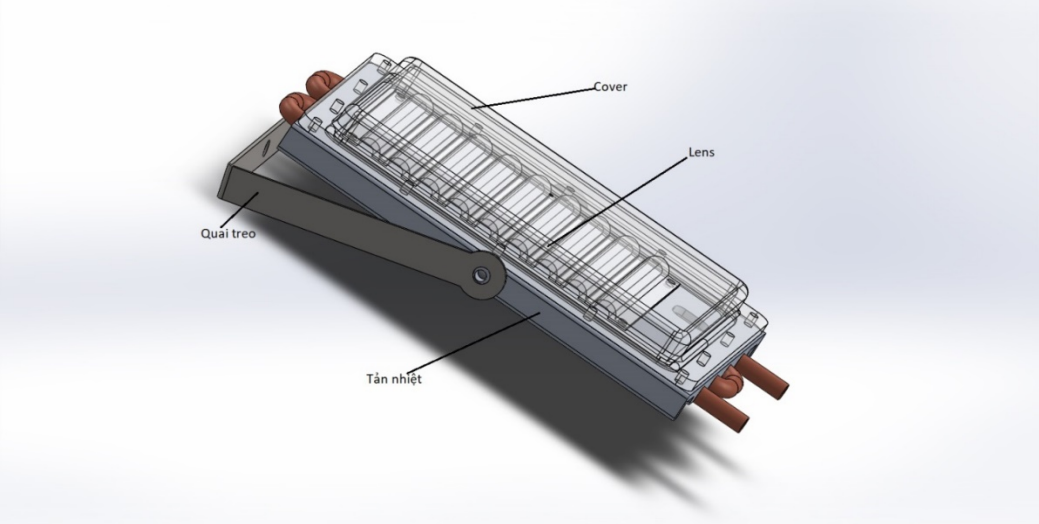
Duong Thi Giang, Tran Quoc Tien, and Pham Hong Duong

Institute of Materials Science, Vietnam Academy of Science and Technology (VAST)
18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam

*E-mail: dtgh3_lt@yahoo.com

The work refers to a structure of light-emitting diodes (LED) combined with asymmetric lenses used for fishing luminaire to create outstanding lighting efficiency, saving energy and protecting eyesight of fishermen. More specifically, the work refers to a high-power LED structure, combining asymmetric lenses to create a distribution of light intensity at a narrow vertical angle and Priority is given to the far field beam, while the horizontal angle distribution is still wide enough, ensuring the efficiency of fish attracting superior to conventional LED fishing luminaires and traditional Metal-Halide (MH) lamps.

Key word: LED, fishing lamp, freeform optics, lighting.



P_CAEP – 35

SYSTEM DESIGN OF PERISCOPIC ELECTRO – OPTICAL SIGHT

Nguyen Quang Minh[1] , Nguyen Van Binh[1] , Nguyen Đinh Van[1]
Ta Van Tuan[2] , Nguyen Anh Tuan[3]

[1)] National Center for Technological Progress

[2)] The Vietnam Physical Society

[3)] Technical Department of Armored Army

E-mail: lipro.csei@gmail.com

A system layout of periscopic, multi-channel electro-optical system based on modern thermal imager, CCD camera, laser rangefinder, visual optics and electronic ocular is presented. Primary calculations of system parameters of such equipment based on analysis of specific user requirements and system functions were carried out. The proposed system design of periscopic electro-optical system can be used for armored vehicles as the day/night gunner sight that is compatible with modern fire control systems.

REFERENCES:

[1] Сергей Суворов, *Системы Управления Огнем Танков и БМП* , ж. Техника и Вооружение, № 11-12 (2004).
[2] Dohwan Jeong, Jun Ho Lee, Ho Jeong, Chang Min Ok, and Huyn-Woo Park, " *Infrared Dual-field-of-view Optical System Design with Electro-Optic/Laser Common-aperture Optics*", Curr.Opt.&Phot., Vol.2, No.3, (2018), pp.241-249.
[3] И. С. Гайнутдинов, Р. С. Сабиров, В. А. Иванов, Е. А. Несмелов, Р. Д. Алиакберов, Р. Г. Сафин,*"Оптические покрытия для современных тепловизионных систем*". Изд. : АО НПО Орион (Москва), Прикладная физика № 1, (2007), с. 134-136.
[4] Е. Н. Котликов, Е. В. Хонинева, В. Н. Прокашев, А. Н. Тропин, *"Спектроделительные покрытия в лазерных системах для видимой и инфракрасной областей спектра"*. Оптический журнал, 76, (11/ 2009).
[5] Bruce H. Walker, "Optical Design for Visual Systems", Tutorial Texts in Optical Engineering, Vo. TT45, SPIE PRESS, (2000
[6] Max J. Riedl, " Optical Design Fundamentals for Infrared Systems", Tutorial Texts in Optical Engineering, Vo. TT48, 2nd Ed, SPIE PRESS, (2001).

P_CAEP – 36

CAVITY RING-DOWN SPECTROSCOPY OF THE $^{14}NH_2$ ISOTOPOMER RADICAL

Phung Viet Tiep[1], Stéphane Douin[2], Thomas Pino[2]

[1)] Institute of Physics, Vietnam Academy of Sciences and Technology,

10 Dao Tan, Ba Dinh, Hanoi, Vietnam

[2)] Institut des Sciences Moléculaires d'Orsay, UMR8214, CNRS, Université Paris-Sud,

Rue André Rivière, Bât. 520, F-91405 Orsay Cedex, France

E-mail: pvtiep@iop.vast.ac.vn

In solar system entities, the identification of nitrogen isotopic ratios is considered to be a key in order to obtain deeper insight about their evolution. Indeed, by determining these ratios in various bodies of the solar system, people will probably obtain helpful information associated with the origin of the solar system.

The $^{14}NH_2$ radical is a prototype molecule exhibiting a strong Renner-Teller effect in its electronic ground state. The doubly degenerated $^2\Pi$ split into two components, the strongly bent $\tilde{X}\ ^2B_1$ having a barrier to linearity equal to 10000 cm^{-1}, and a slightly bent $\tilde{A}\ ^2A_1$ having a barrier of about 700 cm^{-1}. The transition between these two components gives rise to a long vibrational progression covering the near IR to UV range. All of this work has been initiated by Dressler and Ramsay. The bending mode has a characteristic spacing of about 1500 cm^{-1} in the ground state and about 625 cm^{-1} in the excited state.

Here, we report the absorption spectroscopy of the $^{14}NH_2$ radical in its $\tilde{A}\ ^2A_1(0,9,0) \leftarrow \tilde{X}\ ^2B_1(0,0,0)$ vibronic band located around 16700 cm^{-1}. For that, a discharge in a mixture of $^{14}NH_3$ in Argon has been provided. We have also been able to extract the absolute density of the $^{14}NH_2$ radical, based on the hypothesis that the vibrational and rotational temperatures are both equal to 1750 K.

REFERENCES

[1] K. Dressler and D. A. Ramsay, *Philox Trans. R. Sot. London, Ser. A* **251**, 1959, 553-602.
[2] Ross et al, *J. Mol. Spec.* **129**, 1988, 436-470.
[3] Messenger S., *Nature*, **404**, 2000, 968-971.
[4] Marty B. et al., *Geochim. Cosmochim. Acta*, **74**, 2010, 340-355.
[5] Marty B. et al., *Science*, **332**, 2011, 1533-1536.
[6] Hily-Blant et al., *Icarus* **223**, 2013, 582-590.

P_CAEP – 37

DETERMINATION OF ELECTRON AND GAS TEMPERATURE OF A NON-EQUILIBRIUM PLASMA JET BY OPTICAL EMISSION SPECTROSCOPY

Dao Nguyen Thuan[1], Nguyen Nhat Linh[1] and Le Thi Quynh Xuan[1]

[1)]*Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Ba Dinh, Hanoi, Vietnam*

E-mail: thuandn@ims.vast.ac.vn

Atmospheric pressure plasmas jet is widely used in a variety of application such as materials processing, food processing, agriculture and plasma medicine. The effectiveness of the plasma jet in these applications depend on the plasma's properties, for instance the electron and gas temperature are very important factors. This work presents a configuration and characterization of both electron and gas temperature of an atmospheric pressure plasma jet. Collisional radiative model of Ar emission lines [1, 2] are used to calculate the electron temperature, while Boltzmann plots of Nitrogen Second Positive System are employed to calculate the rotational temperature of N_2 molecules [3] and thus the gas temperature of our plasma jet. The results are then compared with experimental data to validate our calculation.

REFERENCES

[1] Mariotti D, Shimizu Y, Sasaki T, Koshizaki N, *Journal of Applied Physics*, **101**, 2007 (1), pp. 013307.

[2] Ghimire B, Sornsakdanuphap J, Hong YJ, Uhm HS, Weltmann K-D, Choi EH, *Physics of Plasmas*, **24** (7), 2017, pp. 073502.

[3] Bayram SB, Arndt PT, Freamat MV, *American Journal of Physics*, ***83*** (10), 2015, pp. 867-872.

P_CAEP – 38

INVESTIGATION OF STYRENE REMOVAL COUPLED WITH PLASMA CATALYSTS UNDER ATMOSPHERIC CONDITIONS

Van Toan Nguyen[1], Duc Ba Nguyen[1], Bhattarai Roshan Mangal[1], Young Sun Mok[1]*

[1)]Department of Chemical and Biological Engineering, Jeju National University, South Korea

Corresponding author: smokie@jejunu.ac.kr (Mok)

The conversion efficiency of styrene by catalyst is generally low at atmospheric conditions. In this work, Styrene removal have been carried out by the combination of plasma assisted catalytic under room temperature condition. Pb/ZSM5 catalyst packed bed inside DBD plasma reactor was used to for styrene removal. The result showed that the combination of plasma and catalytic were high obtained styrene removal at atmospheric conditions. It was significantly increased with increasing of energy density. Alternatively, some by-products formed during the plasma such as NO_x, O_3, CO could also successfully solve.

P_CAEP – 39

EFFECTS OF CURRENT DENSITY ON THE CHARACTERISTICS OF OXIDE LAYERS OF 6061 AL ALLOY BY PLASMA ELECTROLYTIC OXIDATION

Quang-Phu Tran[1*], Van-Da Dao[1], Van-Hoi Pham[2], Tsung-Shune Chin[3]

[1)]Department of Electrical and Electronic Engineering, Hung Yen University of Technology and Education, 39A Road, Dan Tien Commune, Khoai Chau District, Hung Yen Province, Vietnam

[2)]Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Road, Cau Giay District, Hanoi, Vietnam

[3)]Department of Materials Science and Engineering, Feng Chia University, No. 100, Wenhua Road, Xitun District, Taichung City, Taiwan 407

*Email: tranquangphu@utehy.edu.vn

Plasma electrolytic oxidation (PEO) is an atmospheric pressure surface treatment that provides excellent wear- and corrosion-resistant coatings on valve metals such as Al, Mg, Ti and their alloys. PEO is an application-specific surface-treatment technique extended from traditional anodizing via much higher applied voltages (200 ~ 600 V). A denser oxide-layer with excellent mechanical and electrochemical properties can be fabricated. Formation of PEO coatings is sensitively influenced by different factors such as type of electric power used (direct current, alternative current, pulsed current, etc.) type of substrate, electric field distribution, electrolyte characteristics (composition, pH, conductivity and temperature), behavior of discharge and also duration of treatment, which require detailed investigation.

Here we report effects of current density (CD) on beaviors of coating growth, microstructure and properties of coating grown on 6061 Al alloy by PEO in constant direct current (DC) mode. The electrolytes used were Na_2SiO_3 at 4 g/L, $NaH_2PO_2{\times}H_2O$ at 4 g/L and $Na_2WO_4{\times}2H_2O$ at 6 g/L. The CD adopted was 5, 7.5, 10, 12.5 A/dm^2, respectively, for a fixed treatment time 30 min. XRD, OES, SEM/EDS and a potentiostat were used to characterize the resultant coatings. Coating thickness is proportional to CD. As CD increases from 5 to 12.5 A/dm^2 the growth rate increases from 0.8 to 2.8 μm/h. This is an increment of 3.5 times. Hardness of the coating increases to HV1223, HV1255 and HV1293 at CD 5 A/dm^2, 7.5 A/dm^2 and 10 A/dm^2, respectively, then reduces to HV1260 with higher CD, 12.5 A/dm^2. Coatings obtained using CD 10 A/dm^2 shows the best corrosion resistance, showing corrosion current $1.009{\times}10^{-7}$ A/cm^2. XRD patterns revealed major phases of Mullite, γ-Al_2O_3, and α-Al_2O_3 as CD > 10 A/dm^2. We identified in XRD patterns the appearance of tungsten phase which was confirmed by OES. The variation in coating performance is explained by microstructure details, specifically quantitative analyses of pore size, pore area-fraction, flatten region, agglomerate bumps and interface versus current density.

REFERENCES

[1] Y.L. Wang, Z.H. Jiang, Z.P. Yao, Journal of Alloys and Compounds, 481 (2009) 725–729.

[2] I. J. Hwang, K. R. Shin, J. S. Lee, Y. G. Ko, D. H. Shin1, Materials Transactions, 53 (2012) 559 – 564.

[3] Wei-Chao Gu, Guo-Hua Lv, Huan Chen, Guang-Liang Chen, Wen-Ran Feng, Si-Ze Yang, Materials Science and Engineering, A 447 (2007) 158–162.

[4] Quang-Phu Tran, Yu-Cheng Kuo, Jian-Kai Sun, Ju-Liang He, Tsung-Shune Chin, High quality oxide-layers on Al- alloy by micro-arc oxidation using hybrid voltages, Surface and Coatings Technology 303 (2016) 61–67.

[5] Quang-Phu Tran, Jian-Kai Sun, Yu-Cheng Kuo, Chien-Yao Tseng, Ju-Liang He, Tsung-Shune Chin, Anomalous layer-thickening during micro-arc oxidation of 6061 Al alloy, Journal of Alloys and Compounds 697 (2017) 326–332.

[6] Quang-Phu Tran, Tsung-Shune Chin, Yu-Cheng Kuo, Chong-Xun Jin, Tran Trung, Chu Van Tuan, Dong Quang Dang, Diamond powder incorporated oxide layers formed on 6061 Al alloy by plasma electrolytic oxidation, Journal of Alloys and Compounds 751 (2018) 289–298.

P_CAEP – 40

INFLUENCE OF PLASMA TREATMENT ON THE DECOLORIZATION REACTION OF H_2O_2 WITH METHYLENE BLUE IN WATER SOLUTION

Do Hoang Tung[1], Nguyen Thi Thu Thuy[2,3] , Bui Thi Huyen Trang[1]

[1)]Institute of Physics, Vietnam Academy of Science and Technology, Vietnam, 18 Hoang Quoc Viet Street, Cau Giay District, Hanoi, Vietnam;

[2)]Faculty of Engineering Physics and Nanotechnology, VNU University of Engineering and Technology, 144 Xuan Thuy Road, Cau Giay District, Hanoi, Vietnam

[3)]University of Fire, Ministry of Public Security, Vietnam, 243 Khuat Duy Tien, Hanoi, Vietnam.
Email: dhtung@iop.vast.ac.vn

Abstract:

P_CAEP – 41

SIMPLE, HIGH ACCURACY WOUND IMAGING ANALYSIS BY COMBINING GRABCUT SEGMENTATION AND KNN CLASSIFICATION METHODS

Do Van Hoan[1], Do Hoang Tung[2]

[1)]Institute of Physics, Vietnam Academy of Science and Technology, Vietnam, 18 Hoang Quoc Viet Street, Cau Giay District, Hanoi, Vietnam;

[2)]University of Science and Technology of Hanoi Fire, 18 Hoang Quoc Viet Street, Cau Giay District, Hanoi, Vietnam.

Email: dhtung@iop.vast.ac.vn

Cold atmosphere plasma is an innovative technology and a breakthrough for medical applications. The PlasmaMed device created based on the principle of gliding arc discharge has been certified as a medical device and widely applied in many hospitals thought out Vietnam. Currently, the projection time to treatment for each patient takes a lot of time due to the small size of the plasma nozzle. To liberate medical staff from this problem, there are two possible approaches: increase plasma nozzle size or design a computer numerical controlled - CNC system to control the plasma torch. In this report, we have built a plasma wound treatment CNC system based on the principle of image processing by two main algorithms GrabCut and K nearest neighbor classification (KNN). The CNC system uses the post-treatment image to locate the wound site and to control the plasma nozzle. Two algorithms described the image processing optimization to improve automatic wound image detection with the CNC system.

Keywords: Cold atmosphere plasma, GrabCut, K-Nearest neighbor, CNC, plasma nozzle, plasma torch.