STUDY OF THE PHOTO-DYNAMIC PROPERTIES OF CdSe QUANTUM DOTS IN INTRA-CELLULAR MEDIA

Nguyen Thanh Binh¹, Nguyen Dinh Cong¹, Pham Hong Minh¹, Marilou Cadatal-Raduban², Do Thi Thao³, Vu Thi Bich¹,⁴

¹Institute of Physics, Vietnam Academy of Science and Technology
²Centre for Theoretical Chemistry and Physics, Institute of Natural and Mathematical Sciences, Massey University, Albany, Auckland 0632, New Zealand
³Institute of Bio-Technology, Vietnam academy of Science and Technology
⁴Duy tan University, Danang

Abstract.

CdSe/CdS quantum dots (QDs) were seeded into Jurkat cells using Polyethylene glycol (PEG-1500) at different treatment times. Fluorescence microscopy images show that some QDs stick to the surface of the cells while others appeared to be inside the cells. As it is difficult to ascertain whether the QDs are indeed inside the cells or just behind the cells, additional spectroscopic studies were performed. Photoluminescence spectra show that the fluorescence intensities of the CdSe QDs are different between samples seeded at different treatment times. Interestingly, the fluorescence lifetimes are also different. This confirms the interaction between the CdSe QDs and the intra-cellular media and that the QDs were successfully seeded into the cells.

Fig.1. (a) Fluorescence microscopy image of QDs seeded into Jurkat cells and (b) fluorescence decay times of samples seeded at different treatment times.
FEMTOSECOND LASER INDUCED PERIODIC SURFACE STRUCTURES ON POLYIMIDE

S.Y. Kok, S.S. Yap, C.H. Nee and T.Y. Tou

Faculty of Engineering, Multimedia University, Cyberjaya 63100, Selangor, Malaysia

Abstract.

Femtosecond laser interactions with materials differ from that using a nanosecond laser because of the generation of a high local electric field and the absence of lattice heating effects. These can contribute to the formation of nano-surface patterns (or ripples) after irradiation with multiple femtosecond-laser pulses, which have been observed for polymer, semiconductor and metal. These nano-surface patterns are often called laser-induced periodic surface structures, or LIPSS. In this work, laser-induced periodic surface structures are formed after irradiated repeatedly by 500-fs laser pulses on the polyimide film. The spatial periods of the nano-scale ripples are compared with those formed by shorter laser pulses and wavelength at 514 nm. Similarly, the orientation of the ripples are found to depend on the polarization angle of the laser beam, and 2-dimensional arrays of pyramidal pits are obtained.
INFLUENCES OF SPONTANEOUSLY GENERATED COHERENCE AND RELATIVE PHASE ON GROUP VELOCITY IN A THREE-LEVEL ATOMIC MEDIUM: ANALYTICAL APPROACH

Le Nguyen Mai Anh\textsuperscript{1,2}, Dinh Xuan Khoa\textsuperscript{1}, Le Van Doai\textsuperscript{1}, and Nguyen Huy Bang \textsuperscript{1,*}

\textsuperscript{1}Vinh University, 182 Le Duan Street, Vinh City, Vietnam.

\textsuperscript{2}Nong Lam University, Ho Chi Minh city, Vietnam

\textsuperscript{*}E-mail: bangnh@vinuni.edu.vn

Abstract.

Electromagnetically induced transparency (EIT) is a quantum interference effect that leads to reduction of resonant absorption and steeper dispersive for a probe light field [1]. Therefore, the discovery of EIT effect has opened up an excellent solution to control and slow down the group velocity of light [2].

It is now well known that another kind of quantum interference of spontaneously emission in the atomic systems with near-degenerate levels occurs due to the non-orthogonality of dipole matrix elements induced by coherent fields. Such interference can create an additional atomic coherence, usually called spontaneously generated coherence (SGC) [3]. In the presence of SGC and phase can modify greatly absorption and dispersion of EIT medium [3, 4] that leads to significant change of group velocity of light [4, 5].

Up to date, influences of SGC and phase on group velocity of light have studied by numerical method, but there still lack of analytical representation of the group velocity expression. A precise knowledge of the group velocity expression as a function of the controllable parameters is needed to optimize the control of group velocity.

In this paper, we will derive the expressions for group velocity of light in three-level cascade atomic medium in the presence of SGC and relative phase between the probe and coupling fields. The influences of SGC and relative phase on the absorption, dispersion and the group velocity of light are studied.

REFERENCES


DETERMINATION OF THE EFFECTIVE POTENTIAL CURVE FOR THE $2^1\Pi$ STATE OF NaLi

Nguyen Tien Dung, Dinh Xuan Khoa, Vu Ngoc Sau, Luong Thi Yen Nga, Lam Trung Hieu and Nguyen Huy Bang

Vinh University, 182 Le Duan Str., Vinh City, Nghe An
E-mail: tiendungunivinh@gmail.com

Abstract.

In this paper, we determined the potential curve for the $2^1\Pi$ state of NaLi with the dimensionless root mean of squares of deviation $\sigma = 0.29$. Using this potential curve, we determined the effective potential curve for different rotational states. This study results are consistent with the predictions of theoretical works.

REFERENCES

EFFECT OF RAMAN SCATTERING AND HIGHER ORDER DISPERSION ON SUPERCONTINUUM SPECTRUM

Do Thanh Thuy¹, Dinh Xuan Khoa¹, Nguyen Thanh Vinh¹,
Bui Dinh Thuan¹ and Cao Long Van²

¹Vinh University, 182 Le Duan Street, Nghe An, Vietnam
²Institute of Physics, University of Zielona Góra, A. Szafrana 4a, 65-516 Zielona Góra, Poland

E-mail: thuanbd@vinhuni.edu.vn

Abstract.

In this paper, we consider the influence of the raman scattering and higher order dispersion effects on supercontinuum (SC) generation in microstructure fibers by studying the temporal and frequency dependence of the ejected pulse. By solving the higher-order nonlinear Schrödinger equation, we show that the Raman scattering effect can lead to the breakup of higher-order solitons through the phenomenon of soliton fission. This effect plays an essential role in several nonlinear phenomena, in particular in the so-called supercontinuum generation in optical fibers. Moreover, we can use third order dispersion to compress pulses as well as changing the frequency.
CO₂ HYDROGENATION TO CH₄ FUEL GAS OVER NICKEL CATALYST SUPPORTED ON SANTA BARBARA AMORPHOUS

Nguyen Phung Anh¹*, Luu Cam Loc¹,², Nguyen Truong Giang², Phan Quoc Dai², Nguyen Thi Thuy Van¹, Nguyen Tri¹, Hoang Tien Cuong¹

¹Institute of Chemical Technology – VAST, 01 Mac Dinh Chi Str., Ho Chi Minh City, Vietnam
²University of Technology – VNU-HCM, 268 Ly Thuong Kiet Str., Ho Chi Minh City, Vietnam
E-mail: phunganhnguyenhd@gmail.com

Abstract.

A series of catalysts with varying nickel contents supported on Santa Barbara Amorphous (SBA-15) synthesized by the combination method of sol–gel and hydrothermal were prepared by the impregnation method and treated at various conditions of calcination in air and activation in H₂ steam. The physico-chemical catalysts were also characterized using BET nitrogen adsorption, XRD, SEM, TEM and H₂-TPR. The activity of obtained catalysts was investigated in hydrogenation of CO₂ recognized as undesirable greenhouse gas to CH₄ fuel gas in temperatures range of 225 – 400 °C. The obtained results showed that the function of SBA-15 provided a high dispersity of NiO particles due to their stabilization within the channels of the mesoporous silicate network, and the catalysts having nanoparticle size with high surface area (172.6 – 214.7 m².g⁻¹) and large pore volume (0.24 – 0.31 m³.g⁻¹) performed highly activity. Among nickel catalysts, the sample 50 wt.% NiO/SBA-15 calcined at 600 °C for 4 hour activated in H₂ steam of 50 ml.min⁻¹ at 450 °C for 4 hours was the best one. With optimum CO₂/H₂ ratio (1/4) on this catalyst, CO₂ conversion and CH₄ selectivity reached 100% at reaction temperature of 400 °C.

Keywords: CO₂ hydrogenation, CH₄ fuel gas, nickel catalyst, Santa Barbara amorphous.
CONTROLLING GROUP VELOCITY OF LIGHT IN A DOPPLER BROADENED FIVE-LEVEL EIT MEDIUM

Nguyen Tuan Anh\textsuperscript{1,3}, Doan Hoai Son\textsuperscript{2}, Le Van Doai\textsuperscript{1} and Nguyen Huy Bang\textsuperscript{1,*}

\textsuperscript{1}Vinh University, Vietnam
\textsuperscript{2}Ha Tinh University, Vietnam
\textsuperscript{3}Ho Chi Minh University of food industry, Vietnam

*E-mail: bangnh@vinuni.edu.vn

Abstract.

Electromagnetically induced transparency (EIT) is a quantum interference effect that makes a resonance medium become transparent and steeper dispersive for a probe light field under induction of other strong coupling light field. The effect was first observed in 1991 [1]. Since then, EIT has attracted a tremendous interest over the last years due to its unusual properties and promising potential applications. One of the most promising applications concerning to EIT is slow-light group velocity [2].

In the beginning of studies on this topic, three-level configurations were the main objects giving a narrow spectral in which group-velocity is controlled to slow-down or speed-up. From practical perspective, extension from single to multi-window EIT is currently of interest due to it gains diversifying usefulness. An example is to simultaneously support slow group velocity for pulses at different frequencies [3-5] in which light fields has advantage in production of quantum entanglement.

So far, studies on control of group velocity of light in multi-window EIT media have often neglected the Doppler effect [3-5]. However, it is fact that photonic devices often operate at different temperature conditions, so one needs to take into account the influence of Doppler broadening. In recent work [6] we have derived analytical expressions of the absorption and dispersion spectra of the five-level atomic system under Doppler broadening. The results show that the height and slope of dispersion curve strongly depend on the temperature of medium. Growing of this interest, in this work, we study extensively the group velocity of light in the Doppler broaden five-level atomic medium by using analytical method. It is shown that the group velocity of light can be controlled with the parameters of laser fields and temperature of medium.

REFERENCES


INFLUENCES OF SPONTANEOUSLY GENERATED COHERENCE AND PHASE ON OPTICAL BISTABILITY IN A THREE-LEVEL EIT MEDIUM: ANALYTICAL APPROACH

Le Thi Minh Phuong1,2, Dinh Xuan Khoa1, Le Van Doai1 and Nguyen Huy Bang1

1 Vinh University, 182 Le Duan street, Vinh City, Vietnam
2 Sai Gon University, 273 An Duong Vuong, Ho Chi Minh City

*E-mail: bangnh@vinuni.edu.vn

Abstract.

Optical bistability (OB) is one of the most interesting fields of research in nonlinear optics because it has a large number of potential applications in both optical sciences and photonics technology. In the early year of the OB research for atomic media, a great interest was focused on using two-level atomic systems [1]. Although the usual OB behaviors of the two-level atomic system were observed experimentally but there is still lack of applications due to only one optical field being employed for both applying and switching, thus lack of control for switching intensity thresholds.

The advent of electromagnetically induced transparency - EIT [2] provides excellent media that make an impressive progress in OB research because of their controllable optical properties [3]. Due to such controllable optical properties, both switching intensity thresholds and width of OB can be simply controlled and reduced significantly [4].

Besides the OB behaviors in EIT media can be controlled by either intensity or frequency of applied fields, due to the laser field is also characterized by other important parameters as phase and polarization (may create spontaneously generated coherence - SGC), therefore, they also have a significant influence on the OB behaviors. Recent studies [5, 6] show that the OB behaviors are very sensitive to phase and polarization.

Although, the influences of SGC and phase on OB behaviors have studied by numerical method, but there still lack of analytical representation of the input-out intensity relation. Such shortage has hampered implementation of further studies related to OB behaviors, e.g., controlling threshold intensity and width of OB.

In this work, we develop a analytical method on the bistability behavior of three-level atomic systems in the SGC and relative phase. The influences of controllable parameters of the coupling light, cooperation of atomic medium and SGC and relative phase on OB behaviors are investigated.

REFERENCES


SUBCRITICAL VERSUS SUPERCritical Bifurcation Characteristics of Symmetry Breaking in Nonlinear Double-Channels Systems

Nguyen Duy Cuong 1,2*, Dinh Xuan Khoa 1, Cao Long Van 3, M. Trippenbach 4,5 and Bui Dinh Thuan 1, Do Thanh Thuy 1

1Vinh University, 182 Le Duan Street, Vinh City, Vietnam.
2Industrial University of Vinh, 26 Nguyen Thai Hoc Street, Vinh City, Vietnam.
3University of Zielona Góra, ul. Licealna 9, 65-417 Zielona Góra, Poland.
4Institute of Theoretical Physics, Physics Department, Warsaw University, Hoża 69, PL-00-681 Warsaw, Poland.
5Soltan Institute for Nuclear Studies, Hoża 69, PL-00-681 Warsaw, Poland

*E-mail: duycuonghui@gmail.com

Abtract.

Recently, considering the effects of spontaneous symmetry breaking (SSB) in nonlinear systems have attracted much interest of scientists [1-8]. In optics, the SSB occurs as a result of the interplay between the nonlinearity and waveguiding structures, when the strong nonlinearity partly suppresses the linear coupling between parallel guiding cores, for example in self-focusing Kerr medium [1]. The onset of a sharp symmetry-breaking instability in a double-hump two component spatial optical soliton was demonstrated experimentally in a planar nonlinear waveguide [2]. The analysis of the SSB for soliton modes was performed in models of dual-core fiber Bragg gratings with the Kerr nonlinearity [3], and coupled waveguides with the quadratic [4] and cubic-quintic [5] nonlinear terms. However, to the best of our knowledge, SSB phenomena in nonlinear double-wells optical system have not been complete studied yet.

In this work, we propose a double-channel model, in each channel include a nonlinear single-well potential (alias a single-well pseudopotential) and linear coupling between two channels, with the objective to study an alternative implementation of the spontaneous symmetry breaking (SSB) in nonlinear dual-cores optical fibers.

In the limit case when the nonlinear single-well potential structure is induced by the local nonlinearity coefficient represented by a single delta functions, a fully analytical solution is obtained for symmetric, antisymmetric, and asymmetric states. Numerical analysis, based on both direct simulations and computation of stability eigenvalues, demonstrates that, while the symmetric states are stable up to the SSB bifurcation point, both symmetric and emerging asymmetric states, as well as all antisymmetric ones, are unstable in the model with the delta functions. In this solvable model, the SSB bifurcation has a fully subcritical character. In the general model with a finite width of the nonlinear-potential wells, based on Imaginary-Time Method (ITM), and computation of stability eigenvalues show that, the asymmetric states quickly become stable, the SSB bifurcation is also the subcritical type. A full diagram for the existence and stability of the trapped states in the model is produced.
REFERENCES

THERMAL LOCAL TRANSLATION REMOTE CONTROL WITH SINGLE GOLD NANOCRESCENT

Xuan Hoa Vu\textsuperscript{1,}\textsuperscript{*}, Nguyen Vu Anh Tuyet\textsuperscript{1}, Nguyen Vu Anh Nguyet\textsuperscript{1}, Pham Thi Thu Ha\textsuperscript{1} and Emmanuel Fort\textsuperscript{2}

\textsuperscript{1}Thai Nguyen University of Science (TNUS), Tan Thinh, Thai Nguyen City, Vietnam
\textsuperscript{2}Centre d’Imageries Plasmoniques Appliquées, Institut Langevin ESPCI ParisTech, CNRS UMR 7587, & INSERM ERL U979, 1 rue Jussieu, 75231 Paris Cedex 05, France

E-mail: hoavx@tnus.edu.vn, tuyetlychy@gmail.com

Abstract.

Developing nanodevices able to probe materials at the nanoscale and to act on them is of critical importance to understand complex and multiscale systems such as heterogeneous fluids or living cells, the very local properties of such systems differing from the macroscopic ones.

Here, we propose to use gold semi-coated magnetic nanoparticles, called gold nanocrescents, both to access the local properties of such complex systems and to perturb them at the nanoscale. These particles are produced by nanosphere lithography, evaporating a 30 nm thick layer of gold on magnetic 160 nm nanospheres.

These gold nanoparticles possess a strong plasmon resonance which gives them a strong scattering crosssection. They can thus be easily tracked using darkeld microscopy. Moreover, their asymmetrical shape induces a splitting of the plasmon resonance. This optical anisotropy allows one to follow their rotational dynamics. From the autocorrelation of the scattered intensity signal one can access the nanocrescent rotational diffusion time. Hence, from both, the translational and rotational Brownian diffusions of the nanocrescents it is possible to probe the local nanorheology of a material.

Moreover, these nanoparticles can also serve as active nanosensors. Due to their magnetic properties, they can be submitted to an external force via an applied magnetic gradient. Besides, using an incident laser at the wavelength of the plasmon resonance, the nanocrescents can be heated. The environment can thus be perturbed locally in a tunable and remote way, the same nano-object being simultaneously a nano-source and a nano-probe.

We will present results showing that this technique is very promising for performing active nanorheology on complex materials and in particular on living systems such as intracellular compartments.

Keywords: plasmon, nanoparticle, translation temperature, Brownian motion, scattering correlation spectroscopy.
FINITE DIFFERENCE METHOD TO DETERMINE LATERAL LOAD BEARING CAPACITY OF PILE BY TAKEN INTO ACCOUNT SOIL AND PILE INTERACTION

Dang Hong Lam¹, Tran Ngoc Tuyen²

¹Faculty of Civil engineering, University of Transport and Communication, No.3 Cau Giay Street, Lang Thuong Ward, Dong Da District, Hanoi, Vietnam

²Faculty of Engineering and Technology, Hatinh University, No.447 Road 26-3, Hatinh, Vietnam

E-mail: dang.hong.lam@utc.edu.vn

Abstract.

The lateral load bearing capacity of pile is an attractive issue not only in road and bridge construction field but also in industry one. Some first studies are proposed by Broms B. B. (1964) [1], Matlock H. (1970), Reese L. C. (1974), etc... to determine the ultimate lateral load bearing capacity and they are favorite for tentative estimation of the lateral load bearing capacity of single pile with many prior assumptions. These results need to be developed for various cases in which the prior assumptions may not satisfy such as the aquifer is complicated to stratum. Recent decades, base on the expanse of computer science, some numerical methods, such as finite difference method, were proposed and studied with the aptness of soil-pile interaction [2]. This interaction is major factor to distribution of shear load and moment load of longitudinal pile, called P-y curves. Finite difference method is implemented [3] in this paper to determine the lateral load bearing capacity of a pile in conjunction with soil and pile interaction. The calculated results are then compared with the results from widely used FB-Pier program. Finally, comments and recommendations are given for lateral load bearing capacity determination in engineering practices and current standards for example 22TCN 272-05, ASSHTO.

Keywords: Lateral load bearing capacity, Pile, Finite difference method, FB-Pier, Soil and pile interaction, P-y curves.

REFERENCES


DETERMINATION OF FAULTS IN THE MEKONG DELTA USING MAGNETIC DATA

Nguyen Hong Hai$^{1,2}$

$^1$An Giang University
$^2$VNU HCM – University of Science
E-mail: honghaiatn@gmail.com

Abstract.
Magnetic exploration is one of the important geophysical methods for identifying deep geological structures. In this article, we determined faults in the Mekong delta (interior of Southern Vietnam) based on the magnetic data. The magnetic map of the study area was first corrected by the application of the Reduction To the magnetic pole (for low latitude area). Among the different processing techniques that can be applied to the magnetic data, we chose to use the total horizontal derivative, the tilt-angle and the analytical signal, which aim at locating and delineating the faults. The results verified the faults mentioned before and determined new faults (if any).

REFERENCES

MAXIMIZING THE ROBUSTNESS OF DATA ANALYSIS IN MULTICHANNEL ANALYSIS OF SURFACE WAVE

Nguyen Nhat Kim Ngan¹, Truong Phuc Thinh², Nguyen Thanh Van¹, Vo Manh Khuong¹

¹Geophysics Department, University of Science, HCM National University, 227 Nguyen Van Cu, District 5, Ho Chi Minh City
²East Sea Star Software company, 22D8 Saigon Pearl, HCM City
E-mail: nnkngan@hcmus.edu.vn

Abstract.
Multichannel analysis of surface wave (MASW) is one of novel seismic methods in geophysics. MASW is used to survey the stiffness of the soil though shear velocity \( V_S \) by analyzing the spectral image of surface wave. We have conducted the 1D data using MASW at one borehole on area, which belongs to the residential development project, district 2, Ho Chi Minh City with different orientations and offsets of source Then we combined seismic data to maximize the robustness of data analysis including minimize adverse influence from the near-field effects and average the lateral variation of the subsurface velocity model. From the obtained data, we carried out the geophysics inversion problem to define the shear velocity \( V_S \) of the soil under the ground. The achieved results were compatible to petrographic components in geological borehole and another seismic method (downhole). Comparing to \( V_S \) values of downhole following every meter depth, the relative error of interpretation of combined data is less than or equal to 10%.

Keywords: MASW, shear velocity, downhole.
DEFINING THE CHARACTERISTICS OF SOIL ENVIRONMENT USING MULTICHANNEL ANALYSIS OF SURFACE WAVE AND ELECTRIC IMAGING METHOD

Nguyen Nhat Kim Ngan, Vo Minh Triet, Nguyen Van Thuan

Geophysics Department, University of Science, HCM National University, 227 Nguyen Van Cu, District 5, Ho Chi Minh City

E-mail: nnkngan@hcmus.edu.vn

Abstract.

We conducted the survey on the constructive foundation to define velocities, elastic parameters and resistivity of soil by the combination of Multichannel Analysis of Surface Wave (MASW) as one of seismic methods and Electric Imaging method. The obtained results of two methods were displayed in 2D profiles (along survey line and depth) and exhibited good agreement about the structure of geology under the ground. The soil structures from the surface to 20 m depth could be divided in to three layers: fine sand, soft dark-gray organic silty clay and stiff green-gray lean clay. Every layer with diverse velocities and resistivity showed the difference of petrographic component, elastic properties and electrical impedance of the soil under the ground. In addition, the results from MASW and Electric Imaging were consistent with those of borehole’s petrographic component at the same area of collected data.

Keywords: MASW, resistivity, seismic, Electric Imaging.
THE UPHILL DIFFUSION AND DIFFUSION BARRIER IN SINGLE COMPONENT SYSTEMS

Vu Ba Dung, Ho Quynh Anh, Tong Ba Tuan and Dinh Van Thien
Hanoi University of Mining and Geology, Viet Nam
E-mail:zung305@gmail.com

Abstract.

Uphill diffusion and diffusion barrier are interesting diffusion processes. The diffusing flux of the uphill diffusion goes to a higher concentration area and the diffusing flux of diffusion barrier does not vanish although concentration gradient equals to zero. Most of the uphill diffusion and diffusion barrier takes place in multicomponent systems and their cause are the diffusion flux of any species is coupled with that of its partner species. In this paper, based on the kinetic theory of gasses and thermodynamics the uphill diffusion and diffusion barrier in single component systems (single uphill diffusion and single diffusion barrier) are studied and discussed. Results showed that: i) The uphill and osmotic diffusion can take place for only one component systems; ii) the cause of single uphill and osmotic diffusion is thermal velocity of molecules in low concentration region is larger than that in high concentration region; iii) The single uphill diffusion and the single diffusion barrier opposite to Fick’s laws, but which agree with the increasing entropy principle of the thermodynamics theory.
THE EXPERIMENT SINGLE UPHILL DIFFUSION OF GLYCEROL IN WATER

Vu Ba Dung, Tong Ba Tuan, Ho Quynh Anhand Dinh Van Thien

Hanoi University of Mining and Geology, Vietnam

E-mail:zung305@gmail.com

Abstract.

Sing uphill diffusion has been demonstrated by the kinetic theory of gasses and the thermodynamics theory. Uphill diffusion is a process of mass transmission in which the diffusion flux goes up to high concentration region and the mass flux of osmotic diffusion is not vanishing, when concentration gradient is equal to zero. Most of the uphill and osmotic diffusion takes place in multicomponent systems and the cause of uphill diffusion is the diffusion flux of any species is coupled with that of its partner species. In this paper, the uphill diffusion in single component systems is studied by experiment for glycerol in water. Results showed that: i) The uphill diffusion can occur in single component systems; ii) the cause of single uphill and osmotic diffusion is thermal velocity of molecules in low concentration region is greater than that in high concentration region; iii) the experimental results agree with the theory.
P-17

CONTROL THE TRAPPED PARTICLES IN ACOUSTO-OPTICAL TWEEZERS BY ACOUSTIC FREQUENCY

Nguyen Van Thinh¹, Nguyen Mạnh Thang², Nguyen Thu Loan³, Thai Doan Thanh⁴, Quy Ho Quang⁴

¹University of Baclieu, 178 Vo Thị Sau, Bac Lieu.
²Academy of Military Science and Technology, 17 Hoang Sam, Cau Giay, Hanoi
³Tran Nguyen Han College of Hai Phong
⁴Faculty of Electric Technology & Electronics, Food industry University of HCM City, 140 Le Trong Tan, Tan Phu, HCM City

E-mail: nguyenvanthinh0711@gmail.com, contact@imst.info, thuloannguyen2012@gmail.com, tzthanh@cntp.edu.vn, hoquangquy@gmail.com

Abstract.

The systematical equations using to control the trapped particles in 3D space of acoustic-optical tweezers (Fig.1) is introduced. The facts influence on the position of trapped particles in 3D space are discussed. The trajectories of trapped particle under the different single tweezers (Fig.2) are theoretically observed by the calibration of initial phase and frequency of acoustic waves. The obtained results show that the acoustic frequency is the fact only can be used to control the trapped particles in 3D space, that is different to the classical optical tweezers, which uses two facts at least.

Keywords: Acousto-optical tweezers, Tweezers arrays, Dielectric particle, Position control.

Fig. 1. Model of acousto-optical tweezers (left), and propagating directions of two acoustic waves (right).

Fig.2. The trajectories of position of single tweezer $T_{ij}$ and $T_{ij}$ with calibration of frequency.

REFERENCES

P-18

SHIFTED-LOCALIZED SURFACE PLASMON RESONANCE ABSORPTION BASED CONTROL THE SYNTHESIS OF SILVER NANOPARTICLES BY PHOTOCHEMICAL METHOD

Pham Thi My Hanh², Pham Thanh Binh¹, Dang Duc Toan², Pham Van Dai¹,
Do Thuy Chi², Bui Huy¹, Ngo Quang Minh¹, Pham Van Hoi¹

¹) Institute of Materials Science, VAST, 18 Hoang Quoc Viet Rd, Cau giay Dist, Hanoi, Vietnam
²) Thai Nguyen University of Education, 20 Luong Ngoc Quyen Rd, Thai Nguyen city, Vietnam
E-mail: binhpt@ims.vast.ac.vn

Abstract.

Nanoparticles of noble metal such as gold, silver, palladium… have been immense attention due to the wide range of new applications in various fields of industry. Specially, silver nanoparticles (AgNPs) have significant interested in medical application, chemical-biosensor, and industry application because of their unique properties such as size and shape depending optical, antimicrobial, and electrical properties. There are many of preparation techniques for the synthesis of AgNPs such as laser ablation, gamma irradiation, electron irradiation, chemical reduction, photochemical methods, microwave processing, and biological synthetic methods. In this paper, photochemical methods have been realized for the synthesis of AgNPs, the advantages of this method are that they have excellent spatial and temporal control, avoid the use of harmful strong reducing agents and are frequently room temperature procedures. The size and shape of AgNPs have been controlled through irradiating a solution of AgNP seeds in the synthesis processing. The achieved triangle-plates AgNPs with particle size 10nm÷80nm corresponding to LED irradiation 520 nm with exposed time 5 hours÷24 hours. Optical properties of AgNPs are drastically influenced by their size and shape. Shifted-localized surface Plasmon resonance absorption peak of AgNPs from 412 nm to 1090 nm was achieved. The outcomes of this study may provide leads to study of localized surface Plasmon resonance (LSPR)-based optical sensor systems with immobilized AgNPs on optical fibers.

REFERENCES

P-19

ISOLATION STUDY OF THE GmNFYB GENE INVOLVED IN DROUGHT – STRESSED RESPONSES

Nguyen Thi Thu Nga, Nguyen Thi Tuyet

Faculty of Biology, TNU - University of Education, Thai Nguyen city,
20 Luong Ngoc Quyen Street, Thai Nguyen City, Vietnam

Abstract.

Improved productivity under periodic drought stress is a major challenge for global agriculture. Increasing the yield of agricultural crops grown under drought conditions is challenging because of the low heritability of the trait, the unpredictable nature of most periods of drought stress encountered in growing areas, and gaps in our understanding of drought biology. As a consequence, new approaches were sought for improving the performance of crops grown under periodic drought conditions.

Because there are many mechanisms by which plants can tolerate drought, and because transcription factors are well established as regulators of genetic pathways, we reasoned that additional transcription factors would exist that modulate drought responses. A genome-wide systematic analysis of Arabidopsis transcription factor families was conducted to identify genes that improve tolerance to environmental stress. A selection of transcription factors was discovered from a range of families that condition enhanced abiotic stress tolerance when constitutively expressed in plant.

Nuclear factor Y (NF-Y) is an evolutionarily conserved trimeric transcription factor complex present in nearly all eukaryotes. The heterotrimeric NF-Y complex consists of three subunits, NF-YA, NF-YB, and NF-YC, and binds to the CCAAT box in the promoter regions of its target genes to regulate their expression.

NF-Y transcription factors typically act in concert with other regulatory factors to modulate gene expression in a highly controlled manner. In plants, NF-Y genes have been amplified with ≈10 different genes encoding each subunit of the transcription factor complex. Amplification of the family raises the possibility that new and divergent functions of heterotrimeric complexes have evolved in plants.

We identified an NF-YB gene from Glycine max responsive to plant responses to drought tolerance. GmNF-YB gene was successfully isolated from mRNA by RT-PCR reaction with specific GmNF-YB-F/GmNF-YB-R primers. The isolated 529 nucleotide fragment, coding 169 amino acid. The nucleotide sequence of the GmNF-YB gene (DT2008) is similar to the nucleotide sequence coded at XM00356285 of 99.1% on the gene bank. These results can be used for further studies on drought tolerance in plants.

REFERENCES

STUDY OF OPTICS CREATING A LASER GAUSSIAN BEAM FOR OPTICAL TWEEZERS

Doan Quoc Tuan\textsuperscript{1}, Nguyen Thu Cam\textsuperscript{2}, Quy Ho Quang\textsuperscript{3}

\textsuperscript{1}Center for Standards, Measurement and Quality
\textsuperscript{2}Institute of Applied Physics/Academy of Military Science and Technology
\textsuperscript{3}Faculty of Electric Technology & Electronics, Food industry University of HCM City

E-mail: doanquoctuan78@gmail.com, hoquangquy@gmail.com

Abstract.

In this paper, the optical system for creation the laser Gaussian beam used for optical tweezers is proposed. Based on transfer matrix the optical system is designed and optimized by the Zemax software. The optical properties of system are evaluated based on enucleated results. The dependence of intensity distribution round of target plane on some system’s parameters is investigated and then discussed about the condition to use its for optical tweezers to trap the dielectric particles with lower refractive index.

Keywords: Optical tweezers, Optical system, Zemax software, Gaussian distribution.

Fig.1. Optics designed by Zemax software (a) and optical field distribution at target.

REFERENCES

[6]. Lei Gong, Weiwei Liu, Qian Zhao, Yuxuan Ren, Xingze Qiu, Mincheng Zhong and Yinmei Li, Scientific Reports 6, 29001 | DOI: 10.1038/srep29001 (2015).
CLASSIFICATION AND DETECTION OF ELECTROENCEPHALOGRAPHY WAVES

Hanh Thi Hong Nguyen, Tuan Van Huynh

Faculty of Physics and Engineering Physics, University of Science, Vietnam National University, Ho Chi Minh City, Viet Nam

E-mail: nthhanh@hcmus.edu.vn, hvtuan@hcmus.edu.vn

Abstract.

Advancements in biomedical signal processing techniques have led Electroencephalography (EEG) signal is widely used to analyze neural activity within the human brain for detection of any abnormalities. Since the EEG signal is dynamic by nature and changes constantly a highly sensitive yet robust system is required to monitor the activities.

EEG is an electrophysiological monitoring method to record electrical activity of the brain. It is typically noninvasive, with the electrodes placed in different positions on the scalp corresponding to the region of the cortex on the computer graph [1, 2]. Regarding to different areas of the brain, the human brain is divided into 3 parts e.g. cerebrum, cerebellum and brain stem. The cerebrum is the largest and upper most portion of the brain. The cerebellum controls coordination of muscle activity and maintains balance. The brain controls the function alities of the heart, the lungs, production of hormones and the thoughts [1, 3]. All our thoughts, emotions and behaviors are the communications between masses of neurons within our brains leading to a production of brainwaves by synchronized electrical pulses. Specific, neurons in the brain communicate through electrical impulses that give rise to both electrical and magnetic fields which are categorized into five different band limits. These waves can be measured outside the skull through an EEG. Thus, by placing the brain-wave sensors on the scalp, we are able to acquire the brain signals. These signals reflect differences of actions and the mental status of a person. Therefore, the brain wave signals have been applied widely in diagnosis and monitoring in health care and multiple applications in different fields. In this research aims to use Emotiv EPOC+ to collect the EEG signals in order to analyze and determine the characteristics of people's status as "closed-eyes", "opened-eyes" and "funny" by two different methodologies e.g. the Digital Filters (DF) and the Discrete Wavelet Transform (DWT). The results have identified states such as "closed-eyes", "opened-eyes" and "funny" on both methods. Furthermore, this research concluded that the DF method is more effective than the DWT method.

REFERENCES

SYNTHESIS AND CHARACTERIZATION OF CESIUM TIN IODIDE PEROVSKITE THIN FILMS AS HOLE TRANSPORT MATERIALS

Lien Thi Dao Thach¹², Thanh Tien Nguyen¹², Dong Chung Nguyen¹, Oanh Thi Tu Nguyen¹, Hieu Si Nguyen¹, Chung Vu Hoang¹, Chi Ha Le¹*, Long Duy Pham¹*

¹) Institute of Materials Science, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet street, Hanoi, Vietnam
²) University of Science and Technology of Hanoi (USTH), 18 Hoang Quoc Viet street, Hanoi, Vietnam
E-mail: chilh@ims.vast.ac.vn, longphd@ims.vast.ac.vn

Abstract.

Perovskite solar cells (PSC) have attracted enormous attention due to the rapid growth of efficiency to 22.1% in recent years. Here we report the solution processed approach for lead-free molecular iodosalt compounds to fabricate cesium tin iodide perovskite thin films. The impact of the concentration of SnF₂ additive on the crystalline structure, morphology and properties of cesium tin iodide perovskite was investigated. The phase transformation of the pure - CsSnI₃ perovskite and SnF₂ additive - CsSnI₃ perovskite materials to more stable Cs₂SnI₆ perovskite under ambient condition were observed. The absorbance and photoluminescence spectra exhibit the bandgap of semiconducting cesium tin iodide perovskites. The electrical properties of the perovskite films were measured by a Hall Effect system. These optoelectronic properties demonstrate that cesium tin iodide perovskites with high hole mobility can be used as a hole transporter for solid state solar cell applications.
THE OPTICAL AND ELECTRICAL PROPERTIES OF p-TYPE Cu_2O:N THIN FILMS PREPARED BY REACTIVE DC MAGNETRON SPUTTERING

Nguyen Huu Ke¹*, Luong Xuan Toan Nguyen¹, Kieu Loan Phan Thi¹, Dao Anh Tuan¹, Cao Vinh Tran², Le Vu Tuan Hung¹

¹Department of Applied Physics, University of Science, VNU-HCM
²Laboratory of Advanced Materials, University of Science, VNU-HCM, 227 Nguyen Van Cu Street, Award 4, District 5, Ho Chi Minh City, Viet Nam

*E-mail: nhke@hcmus.edu.vn

Abstract.

In this work, the structural, optical and electrical properties of absorber layers based on nitrogen doped Cu_2O (Cu_2O:N) material are investigated. The Cu_2O:N thin films have been fabricated by reactive DC magnetron sputtering method. All films are p-type semiconductor and have high absorbance in visible range. The bandgap of Cu_2O:N semiconductor are various in range of 2.1-2.4 eV. The incorporating of nitrogen impurities in Cu_2O lattice caused blue-shift of absorption band edge. The Cu_2O:N thin films exhibited the hole concentration in magnitude of 10^{17} cm^{-3} associated with low resistivity of 10 Ω.cm which are suitable for photovoltaic applications.

Keywords: Cu_2O:N thin film, P-type semiconductor, Nitrogen doping, DC magnetron sputtering.
ASSESSMENT OF OIL CONTAMINATED WASTEWATER TREATMENT BY MICROBIAL BIOFILM ATTACHED ON COCONUT FIBER IN 2000 LITER-SYSTEM

Do Van Tuan\textsuperscript{1,2}, Le Thi Nhi Cong\textsuperscript{1,3}, Vu Ngoc Huy\textsuperscript{3}, Cung Thi Ngoc Mai\textsuperscript{3}, Hoang Phuong Ha\textsuperscript{1,3}

\textsuperscript{1)} Graduate University of Science & Technology, VAST, 18 Hoang Quoc Viet, Ha Noi, Viet Nam
\textsuperscript{2)} Son La college, Son La, Viet Nam
\textsuperscript{3)} Institute of Biotechnology, VAST, 18 Hoang Quoc Viet, Ha Noi, Viet Nam

E-mail: dotuan.cnsh@gmail.com, lenhicong@abt.ac.vn

Abstract.

Petroleum contamination poses significant health risks to humans, organisms and environment. Many industrial processing such as oil refining, oil storage, transportation, washing ... are making a big quantity oil contaminated wastewater in the world. Nowadays, application of microbial biofilm to the removal of oil and its derivatives from contaminated water and sediment was demonstrated to have good effective and friendly with ecosystem. Microbial biofilms are defined as complex coherent structure of microorganism biomass and cellular products, which are attached on a solid surface or an interface. In biofilm structure, microorganisms increase their ability to grow and survive in changing environmental conditions and increase their access to absorb substrates or nutrients. This study focused on the degradation of hydrocarbon components contaminated in oil polluted waste water by biofilm formed by a mixture of bacterial and yeast strains isolated from oil contaminated water in Viet Nam attached on coconut fiber carriers in 2000 liter-system. As the results, biofilm attached on coconut fiber could degrade 62\% after 5 days and 99,9\% after 7 days of the total amount of oil with the initial concentration of 31.950 mg/l. Phenol and polycyclic aromatic hydrocarbons (PAHs) also were degraded up to 99,9\% phenol and more than 94,8\% PAHs in oily wastewater. After 7 days biological treatment, microbial biofilm could remove 98,9\% BOD\textsubscript{5}, 98,7\% COD, 94,2\% total nitrogen and 94,1\% total phosphore in oil polluted wastewater. This result gave hint to develop new method to treat petroleum oil contaminated water in Vietnam.

Keywords: Biofilm, biodegradation, carrier, microorganisms, oil contaminated wastewater.
STUDY ON STERILIZING PLANT MATERIALS AND EFFECTS OF CYTOKININ, 2,4- D ON SHOOT FORMATION OF “YELLOW ALDER” (TURNERA ULMIFOLIA L.)

Pham Thi Thanh Nhan*1, Phan Thi Thuy2

1School of Biology, Thai Nguyen University of Education, Thai Nguyen city, Vietnam
2Master student K24, School of Biology, Thai Nguyen University of Education, Thai Nguyen city, Vietnam

*E-mail: ptnhansptn@gmail.com

Abstract.

“Yellow alder” (Turnera ulmifolia L.) is well-known for a popular medical plant in the Americas with the uses to enhance reproductive health, treat premature ejaculation and impotence in men. Arbutin in it has an effect on whitening our skin naturally due to the ability to inhibit enzymes, which produce melanin without harm side-effects, prevent anti-aging and free radicals, tighten and smoothen skin. The extracted solution from leaves stimulates the activity of antioxidant enzymes (glutathione peroxidase, superoxide dismutase and catalase). This paper presents the results of studying on sterilizing plant materials and effects of cytokinin and 2,4-D on shoot formation of T.ulmifolia from Americas in order to find a multiplication process to develop this plant in Vietnam.

The suitable formula for rapid shoot organogenesis from segments of the trunk is the basal MS medium supplemented with 3% sucrose, 0.8% agar, 1% activated carbon and 1.0 mg/l BAP (1.46 shoots/material). The suitable medium for callus formation in trunk is the basal MS medium supplemented with 1.0 mg/l 2,4-D. The basal MS medium supplemented with 2.0 mg/l BAP is good for shoot formation from callus (3,031 shoots/material).

Keywords: BAP, callus, Turnera ulmifolia L., kinetin, shoot formation
METABOLITES WITH ANTIMICROBIAL ACTIVITY FROM MARINE FUNGUS ASPERGILLUS FLOCCULOSUS ISOLATED IN NHA TRANG BAY, VIETNAM

Phan Thi Hoai Trinh$^{1,2}$, Ngo Thi Duy Ngoc$^1$, Vo Thi Dieu Trang$^1$, Phi Quyet Tien$^{2,3}$, Bui Minh Ly$^{1,2}$, Tran Thi Thanh Van$^{1,2}$

$^1$Nhatrang Institute of Technology Research and Application, Vietnam Academy of Science and Technology, 02 Hung Vuong, Nha Trang, Khanh Hoa

$^2$Graduate University of Science and Technology, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Ha Noi

$^3$Institute of Biotechnology, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Ha Noi

E-mail: phanhoaitrinh84@gmail.com

Abstract.

Marine fungi have been known for their ability to produce diverse bioactive molecules and potential source for drug discovery research [1]. In this study, three compounds including asteltoxin (1) [2], asterriquinone C1 (2) [3] and cycloechinulin (3) [4] were obtained from marine-derived fungus Aspergillus flocculosus 01NT.1.1.5, isolated from sponge Stylissa sp. at Nha Trang Bay, Vietnam (Figure 1). The structures of the compounds were determined by the extensive 1D- and 2D-NMR spectra and mass spectroscopic data. Compounds 1-3 showed activity against Pseudomonas aeruginosa ATCC 27853 with minimum inhibitory concentration (MIC) value of 32 μg/mL but inactive against Staphylococcus aureus ATCC 25923. Moreover, compounds 1 and 2 were found to be active against Bacillus cereus ATCC 11778 and Streptococcus faecalis ATCC 19433 with MIC values of 64 and 32 μg/mL, respectively. These compounds also exhibited antimicrobial activity against Candida albicans ATCC 10231 with MIC values ranging from 32 to 64 μg/mL, which was more potent than amoxicillin and cefotaxime (MIC>256 μg/mL), antimicrobial drugs as positive references. The remaining fractions and other bioactivities of these compounds are continuing research.

Fig. 1. Structure of compounds 1-3.

REFERENCES

P-27

TRANSFORMATION ZMDREB2.7 GENE ISOLATED FROM LOCAL MAIZE VARIETY – TE VANG 1 INTO NICOTIANA TABACUM

Huynh Thi Thu Hue, Nguyen Thuy Linh, Luu Han Ly, Pham Thi Hang, Nguyen Hai Ha, Ha Hong Hanh, Le Thi Thu Hien, Nong Van Hai

Institute of Genome Research, Vietnam Academy of Science and Technology
E-mail: hthue@igr.ac.vn

Abstract.

Maize (Zea mays L.) is one of the most planted crops world-wide and is also one of key cereal sources for human food and animal feed. However, maize and other crops have faced increasing drought recently. This situation requires many researches in genes related in plant drought tolerance through biotechnology. The AP2/ERF family is a large family of plant specific transcription factors that induce abiotic stress-responsive genes. Among subfamilies of AP2/ERF, many stress-inducible DREB subfamily members have been isolated and characterised in several studies about transgenic drought tolerant crops. With the completion of the sequencing of the maize B73 genome, a genome-wide analysis of maize DREB genes was made and reported that different ZmDREB genes exhibited variable expression levels in different tissue and developmental stages, as well as in response to dehydrated stress. Previous study have shown that ZmDREB2.7 was a potential transcription factor that exhibited high transactivation activity, improved drought stress tolerance in transgenic plants without effected plant growth and development. Therefore, we isolated ZmDREB2.7 gene from local maize variety - Te vang 1, which has good drought tolerance. Then, ZmDREB2.7 gene was inserted into plant expression vector driven by inducible RD29A promoter and introduced into tobacco Nicotiana tabacum K326 by leaf disc transformation. By using PCR for 15 random transgenic plants, we obtained 10 plants carrying ZmDREB2.7 transgene and 4 out of these had ZmDREB2.7 transcripts as a result of RT-PCR. This result showed that the vector containing ZmDREB2.7 genefunctioned in the model plant and can be used to transfer into other crops in order to improve drought resistance using plant transformation.

Keywords: drought tolerance, maize, Nicotiana tabacum, transformation, ZmDREB2.7 gene.
AGROBACTERIUM –MEDIATED SOYBEAN TRANSFORMATION WITH GENE RELATED TO DROUGHT TOLERANCE

Lo Thanh Son¹, Nguyen Thi Ngoc Lan², Vu Thi Thu Thuy², Nguyen Thi Hai Yen³, Chu Hoang Mau²

¹ Tay Bac University, Quyet Tam Ward, Son La city, Vietnam;
² Thai Nguyen University of Education, 20 Luong Ngoc Quyen Road, Thai Nguyen city, Vietnam
³ Thai Nguyen University of Sciences, Tan Thinh Ward, Thai Nguyen city, Vietnam

*E-mail: chuhoangmau@tnu.edu.vn

Abstract.

The genes related to drought tolerance of soybean plants are divided into two groups, regulatory genes, such as genes encoding transcription factors DREBs, NACs....and functional genes, such as related expansin genes to the development of roots, P5CS gene involved in synthesizing prolins... Expansin 1 (EXP1) has the ability to loosen plant cell walls and root elongation, thus EXP1 plays an important role in the development and growth of soybean root system. When soybean plants are impacted by prolonged drought, they will respond positively to drought stress by overexpression of EXP1 protein, thus drought tolerance of soybean plants will be enhanced. In this work, we present results of transformation and overexpression of GmEXP1 gene in soybean plants. The results showed that the pCB301_GmEXP1 vector was transformed into soybean via A. tumefaciens, and then there were nine transgenic soybean plants which survived in the greenhouse from 380 transformed leaf explants. Among nine transgenic soybean plants in generation T0, two transgenic soybean plants were positive to PCR and one transgenic line, DT04, expresses EXP1 recombinant protein. We will further evaluate drought-tolerance ability of DT04 transgenic soybean line through analyzing the development of the roots of transgenic soybean plants compared with non-transgenic control plants.

Keywords: Agrobacterium-mediated transformation, expansin 1, GmEXP1 gene, loosen cell wall, root elongation, transgenic soybean.

Fig. 1. Genetic transformation and regeneration of transgenic soybean plants

Fig. 2. A-GmEXP1 gene presence in T0 transgenic soybean plants. B-Western blot for recombinant expansin protein in transgenic soybean plants T0.
REFERENCES

IDENTIFICATION OF PARIS SPECIES FROM SAPA AND PULUONG IN VIET NAM USING DNA BARCODES

Vu Thi Thu Thuy, Nguyen Thi Ngoc Lan, Hoang Phu Hiep, Tran Thi Hong, Nguyen Thi Thu Nga, Sy Danh Thuong, Nguyen Huu Quan, Chu Hoang Mau*

Thai Nguyen University of Education; 20 Luong Ngoc Quyen Road, Thai Nguyen city, Vietnam

Abstract.

Paris species which has been included in the Pharmacopoeia is famous for its medicinal value. There are eight Paris species found in many provinces of Vietnam such as Laocai, Hanoi, Ninhbinh, Thainguyen, Langson, Hoabinh, Thanhhoa... The status of these species has been at the R (race) level and inaccurate identification of these species could lead to confound their effective conservation. Therefore, study on identification of Paris species in Vietnam to contribute to preservation and development of the genetic resources for Paris plants in Vietnam. In this work, we present the results of identification of Paris samples collected in Sapa, Laocai province and Puluong, Thanhhoa province, Viet Nam. On morphology, the Paris samples have from 4 to 6 leaves per each tree, so it is difficult to distinguish and identify species of Paris samples. However, application of DNA barcodes using ITS region and matK gene have identified Paris samples from Sapa, Laocai province and Puluong, Thanhhoa province the same species as Paris vietnamesis.

Keywords: DNA barcode, medicinal plants, ITS, matK, Paris vietnamesis.
REFERENCES

PURIFICATION AND PROPERTIES OF PROTEASE FROM LECANICILLIUM LECANII

Nguyen Huu Quan*, Chu Hoang Mau, Tu Quang Tan

Thai Nguyen University of Education, 20 Luong Ngoc Quyen road, Thai Nguyen city, Vietnam

*E-mail: quannh@dhsptn.edu.vn; nhquan.ibt@ibt.ac.vn

Abstract.

Lecanicillium lecanii is an entomopathogenic fungus with commercial potential for the biocontrol of aphids and cyst nematodes. Protease is a factor supports the process of killing insects by L. lecanii. Protease is enzyme catalyzing the hydrolysis of peptide bonds in molecule proteins into smaller peptides and amino acids. Protease had wide applications in many industries such as food processing, textiles, and detergents manufacturing. In this study, an extracellular protease from L. lecanii strain 43H was purified by ammonium sulfate precipitation and throughout Sephadex G100 gel filtration chromatography; it showed a molecular mass of approximately 40 kDa with a specific activity of 78.73 U/mg protein, and the purification factor of 2.3 with a yield of 17%. Optimum temperature and pH were observed at 40°C and pH 6.0, respectively.

Keywords: Characterization, Lecanicillium lecanii, protease, purification.
ISOLATION AND CHARACTERIZATION OF ENDOPHYTIC ACTINOBACTERIA FROM CINNAMOMUM CASSIA PRESL IN VIETNAM

Vu Thi Hanh Nguyen¹, Chu Ky Son², Nguyen Quang Huy³, Phi Quyet Tien¹*

¹Institute of Biotechnology, Vietnam Academy of Science and Technology
²School of Biotechnology and Food Technology, Hanoi University of Science and Technology
³University of Science and Technology of Hanoi

*E-mail: tienpq@ibt.ac.vn

Abstract.
Endophytic actinobacteria in medicinal plants have proved as a natural source of valuable bioactive compounds that can be applied in medical, pharmaceutical, agricultural and other industries. Nevertheless, the characterization and diversity of endophytic actinobacteria associated with medicinal plants in Vietnam is little known. This study aimed to evaluate the diversity and the potential to synthesize bioactive compounds of endophytic actinobacteria isolated from Cinnamomum cassia Presl in Laichau, Vietnam. A total of 69 endophytic actinobacteria were obtained in which isolates were most frequently recovered from roots (35, 50.7%), followed by stems (21, 30.4%) and leaves (13, 18.84%). Fourteen out of 69 isolates were evaluated for antimicrobial activity and all of them showed inhibitory activity against at least one of the 9 tested human pathogens. By analyzing 16S rRNA gene sequencing, these isolates belonged to genera Streptomyces, Micromonospora, Microbacterium and Saccharothrix. The amplification of biosynthetic genes revealed polyketide synthases type I and type II (14.3% and 92.9%, respectively), and nonribosomal peptide synthetases (64.3%). Our results indicate that these isolates have a broad-spectrum antimicrobial activity and highlight the capacity of endophytic actinobacteria in Vietnamese medicinal plants with novel antimicrobial compounds.

Keywords: Antimicrobial activity, cinnamon plant, endophytic actinobacteria, polyketide synthases, nonribosomal peptide synthetases.
IN VITRO ANTI-PLATELET AGGREGATION ACTIVITY OF DIFFERENT FRACTIONS OF CANNA EDULIS KER

Le Hong Luyen, Nguyen Thi Van Anh, Vu Thi Thom, Duong Thi Ly Huong

1Department of Pharmacological, Medical and Agronomical Biotechnology; University of Science and Technology of Hanoi; 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam

2School of Medicine and Pharmacy; Vietnam National University; 144 Xuan Thuy, Cau Giay, Hanoi, Vietnam

E-mail: le-hong.luyen@usth.edu.vn

Abstract.

Canna edulis Ker of the family Cannaceae is grown in all parts of Vietnam, especially in the northern limestone mountains such as Hà Giang, Cao Bằng, Bắc Kan, Thái Nguyên and Lạng Sơn. According to Hoang Sam et al. [1], Canna edulis Ker has been used in supporting the treatment of heart failure, hypertension, and myocardial ischemia. However, the main bioactive molecules and the mechanism of action of this plant remain unclear.

The study aims to investigate the in vitro anti-platelet aggregation activity of different fractions of Canna edulis Ker.

Plant samples were dried and macerated 3 times with ethanol 95° at room temperature. The crude extract was then continuously distributed with increasing polarity solvents in order to obtain 4 different fractions including n-hexane (HX), dichloromethane (DM), ethyl acetate (EA) and water (WT). The in vitro ADP-induced anti-platelet aggregation activity of more polar fractions including EA and WT extracts at 2, 4 and 8 mg/ml in DMSO was studied. Platelet aggregation was evaluated using the turbidity measurement based on the Chrono-log Corporation process [2]. The study was conducted on platelets harvested from healthy volunteers, after obtaining written informed consent.

The results showed that the EA extract of plant leaves expressed the strongest anti-platelet activity with the percentage of ADP-induced platelet aggregation of 37%, 4% and 1% at a dose of 2, 4 and 8 mg/ml, respectively. The EA extract of Canna edulis Ker’s roots exhibited lower effect with 64%, 49% and 16% of platelet aggregation at the concentration of 2, 4 and 8 mg/ml, respectively. Unfortunately, WT extracts of both leaves and roots showed very poor effect against platelet aggregation.

EA extracts of leaves and roots of Canna edulis Ker could be beneficial and used for preventing cardiovascular diseases. Further studies on chemical constituents isolated from this plant might contribute to the development of new agents inhibiting platelet aggregation in the treatment of thrombosis.

REFERENCES

Abstract.

Phenol is one of the most aromatic toxic compounds, which means that it constitutes a threat when released to the environment. Phenol is highly toxic even at low concentration and is considered as one of the most dangerous contaminants in nature. Exposure to phenol may affect mucous membrane, respiratory tract or leads to disorder of central nervous system, and myocardial depression. Due to its high toxicity and harmful effect that phenol causes to human and environment, it is important to find an effective way in which phenol is safely removed from the environment. Among methods to remove phenol, biodegradation by using biofilm formed by microorganisms is considered as low cost, high effective and friendly to environmental approach. Recently, there are a number of publications on forming biofilm organisms. However, there are rare of papers concerning to purple photosynthetic bacteria (PPB) which have high capacity of biofilm formation and phenol degradation in Vietnam. It is published that biofilm forming PPB have higher effective ability of phenol removal than other microorganisms especial in anaerobic condition. This report was described on the first results of 8 PPB strains which could well form biofilm and grow on phenol. As the results, the strain LCM1 degraded 92.2% phenol with the initial concentration of 250 ppm; the strains MI1 and DG12 degraded 93.2 and 93.4% phenol with the initial concentration of 150 ppm after 7 days, respectively. These results may give a new insight into the potential role of biofilms formed by such PPB species in the bioremediation of phenol and other recalcitrant aromatic compounds.

Keywords: Biodegradation, biofilm, phenol, photosynthetic purple bacteria.
DETERMINATION THE AMMONIUM SEPARATING IN GROUND WATER BY USING POLYURETHANE-DERIVED CARRIER WITH MICROBIAL FILM TECHNIQUE

Ngan H.T, Khanh D.D, Ha N.T

Department of Environmental Chemistry, Institute of Chemistry,
Vietnam Academy of Science and Technology

Abstract.

Groundwater is dramatically polluted by ammonium ($\text{NH}_4^+$) in recent years, especially in Red River delta area, in terms of both scale and degree. In southern of Hanoi, Ha Nam and Nam Dinh district, the pollution of ammonium is relatively high level. There are many ammonium treating methods, such as: chlorination, ion exchange, aerating and microbial… According to aforementioned methods, microbial is proved to be one of the best methods with ecofriendly, economical and treatment efficiency. This article targets on researching the separating capacity of ammonium using microbial technique with polyurethane derived carrier. In order to determine the ammonium treating efficiency, there are several factors, such as: carrier size and dimension, the volume of carrier, ammonium concentration… which impact to nitrification rate by 02 techniques: moving and fixed bed microbial film. The results indicated that with moving bed microbial film technique, the best size and dimension of carrier is 1x1x1 cm cubic, the content of carrier is of 20% in volume. However, fixed bed microbial film technique is favored by the 2x2x2 cm cubic carrier, the content of 50% in volume.
Abstract.

Research, prediction of longevity of explosives is an important issue for serving on preservation and store of products. There are many methods as DTA, TGA, evaluation of vacuum stability - the Stabil, each of them provides data for evaluation of chemical stability of explosives. This paper presents several researched results of effect of phlegmaticnesses (ceresin, stearin, mixture of ceresin and stearin, mixture of ceresin and stearic acid) on vacuum stability of composition of RDX, TNT, and aluminum by using the Stabil.
SEVERAL INITIAL RESULTS OF RESEARCHING INTO THERMOBARIC COMPOSITIONS IN VIETNAM

Tran Quang Phat, Ngo Van Giao, Ninh Duc Ha, Nguyen Khac Phuong Hoa
Institute of Chemistry and Materials, Academy of Military Science and Technology,
17 Hoang Sam Street, Cau Giay District, Hanoi, Vietnam
E-mail: quangphat17@gmail.com

Abstract.
Thermobaric compositions are a hybrid explosive compositions, which are researched and developed in the last two decades of 20 century in countries as: the Soviet Union and the USA. Weapons have spectacular features as using this compositions. In Vietnam, thermobaric compositions recently are researched for advantage weapons. This paper presents several initial results of researching, manufacturing this compositions with domestic technical and technological conditions.

REFERENCES
SYNTHESIS OF REDUCED GRAPHENE OXIDE/ TiO$_2$ (rGO/TiO$_2$) BY PHOTO-CATALYTIC EXPERIMENTS IN DIFFERENT SOLVENTS

Pham Hoang Tuyen, Nguyen Tuyet Phuong*
Faculty of Chemistry, University of Science – Vietnam National University Ho Chi Minh City
E-mail: htuyen.pham@gmail.com

Abstract.
Reduced graphene oxide/TiO$_2$ (rGO/TiO$_2$) materials were synthesized by photocatalytic experiments of colloidal mixtures of TiO$_2$ and graphene oxide (GO) under ultraviolet (UV, 9W) irradiation. Solvents played an important role in the reduction mechanism of GO assisted by shining UV light with TiO$_2$ as a photocatalyst reagent$^1$. The work investigated influence of different solvents e.g. water, ethanol and propanol-2, on the reduction of GO as a function of irradiation time. Structures and morphologies of the products were then characterized by XRD; Raman spectroscopy; SEM and TEM. The reduction of GO was followed carefully by semi-quantitative infrared spectroscopy and electrical conductivity. Results showed that the reduction of GO was carried out more efficiently in alcohol solvents than in water. This can be explained by the formation of solvent radicals and electrons irradiated TiO$_2$.

Keywords: rGO/TiO$_2$ materials, reduced graphene oxide, TiO$_2$ photocatalyst.

REFERENCES

VALIDATION OF ELISA IN DETERMINATION OF URINE COTININE AS BIOMARKER FOR SECONDHAND SMOKE EXPOSURE

R Isah¹, DA Bruzon²

¹ Philippine Ambulatory Pediatric Association, Inc., Pasay City, Philippines
² Institute of Chemistry, College of Science, University of the Philippines Diliman, Quezon City 1101, Philippines

E-mail: rrisah@up.edu.ph

Abstract.
Cotinine, a metabolite of nicotine, is used as an appropriate biological marker for secondhand smoke (SHS) exposure because of its stability, sensitivity and specificity. Its detection in human biological fluids had been the subject of clinical diagnostic researches as SHS exposure is implicated as risk factor for numerous diseases. Several chromatography-based analytical methods have been developed as described in literature, but disadvantages include their availability, high cost and tedious sample preparation. In this study, validation was done in the determination of cotinine in human urine via commercially available competitive enzyme-linked immunosorbent assay (ELISA) since it allows for rapid, multiple sample analysis and minimal sample preparation. The mechanism involves competition between cotinine and cotinine enzyme (HRP) conjugate to bind with the anti-cotinine antibody in the well. Urine samples were collected from 73 children (ages 0 to 14) with varying degrees of SHS exposure. Standard curves generated were linear in the range of 1 to 100 ng/mL and correlation coefficients (r²) greater than 0.99. Limits of detection (LOD) ranged from 1 to 8.87 ng/mL using 10 µL of urine sample. Majority (53.4%) of the children had concentrations below 10 ng/mL. Cotinine concentrations tend to increase with the number of smokers in the household with a Spearman correlation of 0.23 (p=0.0482). Children with no household smokers had mean concentrations of 12.8 ng/mL (± 16.2) while those with 3-5 smokers had mean concentrations of 38.1 ng/mL (± 56.2). Results suggest the validity of urine cotinine as biomarker for measuring SHS exposure and ELISA as a quantitative method.

REFERENCES

P-39
PREPARATION COLLAGEN-WOUND DRESSING FROM SKIN AND TENDON BOVINE BY RECOMBINANT COLLAGENSE FROM LYSINIBACILLUS SPHAERICUS VN3
Bạch T. M. Hoa¹ and Nguyen P. Nhue¹

Department of Fermentation Technology, Institute of Biotechnology, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Ha Noi, Viet Nam
E-mail: btmhoa@ibt.ac.vn

Abstract.
Collagenases of Clostridium sp. plays an essential role for invasion step on animal and human and used in a variety of industrial processes to create industrial applications as cosmetic, medicine, food and detergent. In this study, we report characterization of recombinant collagenase from Lysinibacillus sphaericus VN3 that can digested skin and tendon of bovine to produce soluble collagen type I and II. There are many types of research described strains of L. sphaericus as insect pathogen and without harmful to humans and animals. Recently, we determined high collagenase activity from L. sphaericus VN3. Moreover, completed genome sequences of L. sphaericus C3-41 (NC_010382.1) could identify the existence of collagenase gene. Gene col 3.2 kb encoded collagenase was amplified, digested and ligated target vector pRFS-Duet1. pRFS::col transformed into E. coli BL21(DE3). 12.5 Purified collagenase (12.5 U/ml) can digest small species skin and tandem of bovine (0.1 g/ml) into 1-1.2µm collagen fragment after steering 48 h at 30°C with 0.02 M sodium phosphate buffer pH 7. Sterilized collagen soluble fraction used for making collagen-wound dressing with and without antibiotic that treatment for thermal injury model in the rabbit body. Image measurements revealed that after one week treatment with collagen wound dressing burn wound scars were 26 and 56 % smaller than the initial wound scars with and without antibiotic, respectively. These results suggest that recombinant collagenase of L. sphaericus VN3 is a new approach to produce medical grade collagen biomaterials.

Keywords: Bacterial collagenase, Lysinibacillus sphaericus.
Abstract.

*Cordyceps militaris*, a medicinal mushroom, is one of the well-known insect fungi that contain many bioactive compounds such as polysaccharides, cordycepin, adenosine, etc. These compounds show remarkable biological activities, for example, antitumor, immunomodulating, antioxidant, and pro-sexual agent.

Thus, the aim of this work is to characterize and optimize the biosynthesis of exopolysaccharides from *C. militaris* FNA5 strain using submerged fermentation. The strain FNA5 was isolated in the Pu Mat National Park, Nghe An province. Then, ITS region of the strain FNA5 was PCR amplified and used as a molecular marker for identification of fungal species. The output showed that this strain belongs to the genus *Cordyceps militaris*. The optimal physical and nutritional conditions for production of exopolysaccharides were investigated by individually varying one variable at a time. The suitable physical conditions were determined as follows: pH 6, temperature 25°C, rate of inoculum 3% (v/v), inoculum age 84h, incubation time 15 days. The optimal medium proportion was 3% glucose, 1% peptone, 0.05% K_2HPO_4, 0.07% KH_2PO_4, and 0.05% MgSO_4.7H_2O. At such conditions the maximum yield of exopolysaccharides (EPS) was achieved as 2031.2 mg/L. These findings indicated that newly developed medium could be used in the industrial production of EPS and other bioactive substances from the FNA5 strain contributing to promote public health in Vietnam.

**Keywords:** *Cordyceps, Cordyceps militaris,exopolysaccharides, ITS region, submerged fermentation.*
CURRENT PHYSICAL AND CHEMICAL OCEANOGRAPHIC PROPERTIES OF THE BOLINAO CHANNEL

Narvarte, B.C., Bangot C.G., Bautista, D., Decapia, R., Dumalagan, E., Lim, R.T., Purganan, D.J

Marine Science Institute, University of the Philippines, Diliman 1101, Quezon City, Philippines
E-mail: ben.narvarte@gmail.com

Abstract.
The occurrence of fish kills and massive algal blooms serves as the reason why the properties of an oceanographic setting should be monitored. Monitoring can help avoid these destructive events. On March 10, 2017, the different physical and chemical oceanographic parameters of Bolinao channel were evaluated using ADCP (Acoustic Doppler Current Profiler) and CTD (Conductivity, Temperature and Depth). Bolinao channel is an embayment in the Province of Pangasinan, Philippines at about 250 km north of Metro Manila and is bounded by Lingayen Gulf in the western side and west Philippine Sea in the north eastern side [1]. Several transects were made and nine stations were monitored by deploying CTD. Data from ADCP showed that the current flows towards the inner part of the channel. Also, the velocity of the surface current was slower compared to the deeper currents. Data from CTD measurements showed that temperature is around 27.4 to 28.2 °C, salinity is 33.5 to 33.7 PSU, density is 1021.3 to 1021.6 kg/m³, chlorophyll concentration is 0.35 to 0.70 mg/m³, dissolved oxygen is 2.9 to 5.7 mg/L. All these values signify that the Bolinao channel is in good condition to sustain aquatic life and to avoid algal blooms.

REFERENCES

SYNTHESIS AND CHARACTERISTICS OF THE NITRATE CELLULOSES FROM ACACIA CELLULOSE

Khai Minh Doan¹, Nhan Duc Phan¹, Hoanh Dac Trinh²

¹ Le Quy Don Technical University
² Institute of Military Science and Technology

Abstract.

Acacia pulp is a useful and popular material in tropics. It has been widely used for manufacturing papers. Cellulose with high alpha-cellulose (above 92%) from acacia pulps is able to be utilized for preparing derivatives of cellulose. Nitrate cellulose (NC), which is a derivative of cellulose, is applied for lacquers, vanishes, propellants, etc. The synthesis and quality of NC significantly depend on type of cellulose including its structure. In this paper, some NCs from acacia cellulose were prepared by nitrating with nitric acid in presence of sulfuric acid and water. The FTIR spectra and XRD spectra of the NCs were examined. The technical characteristics of the NCs were determined such as the content of nitrogen, viscosity in acetone, thermal stability, dissolubility in organic solvents. The fraction of molecular weight and nitrogen content of the NCs were considered. The results show that the NCs from acacia cellulose with low content of nitrogen (NC-2) have the similar characteristics to those of NC from softwood cellulose. However, the NC from acacia cellulose with high content of nitrogen (NC-1) only reaches 13.22%N as a limited content of nitrogen. The nitrogen content of this NC is moderately lower than that of NC from softwood cellulose (13.38%) in the same conditions of reaction. The fraction of molecular weight focuses on in the range from … to … for NC-1 and in the range from … to … for NC-2. The fraction of molecular weight and content of nitrogen of this NC are more diffractive than that of NC from softwood cellulose.

REFERENCES

SYNTHESIS AND SOME CHARACTERISTICS OF THE NITRATE CELLULOSES FROM ACACIA CELLULOSE

Khai Minh Doan¹, Nhan Duc Phan¹, Hoanh Dac Trinh²

¹ Le Quy Don Technical University, 236 – Hoang Quoc Viet - Hanoi
² Institute of Military Science and Technology, 17 – Hoang Sam – Cau Giay - Hanoi

E-mail: khaihv@lqdtu.edu.vn

Abstract.

Acacia pulp is a useful and popular material in tropics. It has been widely used for manufacturing papers. Cellulose with high alpha-cellulose (above 92%) from acacia pulps is able to be utilized for preparing derivatives of cellulose. Nitrate cellulose (NC), which is a derivative of cellulose, is applied for lacquers, vanishes, propellants, etc. The synthesis and quality of NC significantly depend on type of cellulose including its structure. In this paper, some NCs from acacia cellulose were prepared by nitrating with nitric acid in presence of sulfuric acid and water. The FTIR spectra and XRD spectra of the NCs were examined. The technical characteristics of the NCs were determined such as the content of nitrogen, viscosity in acetone, thermal stability, dissolubility in organic solvents. The fraction of molecular weight and nitrogen content of the NCs were considered. The results show that a NC from acacia cellulose with low content of nitrogen (NC-2) have the similar characteristics to those of NC from softwood cellulose. However, a NC from acacia cellulose with high content of nitrogen (NC-1) reaches 13.22%N as a limited content of nitrogen. The nitrogen content of this NC is moderately lower than that of NC from softwood cellulose (13.38%) in the same conditions of reaction. The fraction of molecular weight focuses on in the range from 30,000 to 130,000 for NC-1 and in the range from 9,500 to 91,000 for NC-2. The distribution of nitrogen content of those NCs is larger than that of NCs from softwood cellulose.

Keywords: acacia cellulose, cellulose nitrate, technical characteristics, fraction.

REFERENCES

P-44

RESEARCH INTO EFFECT OF PHLEGMATICNESS, TEMPERATURE AND CONCENTRATION OF PHLEGMATICNESS ON DISTRIBUTIVE AREA OF THIS SUBSTANCE IN ONE-BASE PROPELLANT

Pham Quang Hieu¹, Pham Van Toai¹, Chu Chien Huu²

¹Institute of Propellants and Explosives, 192 Duc Giang Str, Long Bien District, Hanoi, Vietnam
²Institute of Chemistry and Materials, 17 Hoang Sam Street, Cau Giay District, Hanoi, Vietnam

E-mail: hieuphus@gmail.com

Abstract.

One-base propellant is a kind of colloidal structure based on nitrocellulose and is plastic by volatile solvent as etanol and ether ethylic. Phlegmatic propellant is a special one in group of one-base propellant and normally is used for charge of weapon with long barrel, high power. This paper presents process of manufacturing phlegmatic propellant, research into effect of phlegmaticness, temperature and concentration of phlegmaticness on distributive area of this substance in one-base propellant.
DEVELOPMENT OF GOLD NANOPARTICLES MODIFIED SCREEN-PRINTED CARBON ELECTRODE FOR LABELL FREE IMPEDIMETRIC BIOSENSOR APPLICATIONS

TruongTN Lien
School of Engineering Physics, Hanoi University of Science and Technology, No 1 Dai Co Viet, Hai Ba Trung, Hanoi, Vietnam

E-mail: truongtnlien@gmail.com; lien.truongthingoc@hust.edu.vn

Abstract.
In this review of my research, development of gold nanoparticles (AuNPs) modified screen-printed carbon electrode for labelless impedimetric biosensor applications is presented. Through specific examples, we describe the fabrication and surface modification of AuNPs-modified printed electrodes for sensitive and selective detection of cancer biomarkers as well as the precise quantification of a small molecule by using electrochemical impedance spectroscopy (EIS) method. We have developed a relatively sensitive quantitative EIS immunosensor for amyloid beta [1]. Three types of amyloid beta impedimetric immunosensors were fabricated in a step-wise manner in order to understand the effects that each surface modification chemistry had on detection sensitivity. We found that immobilization of AuNPs, to improve stability of the recognition element and also increase the surface area for immobilization, lowered the LOD by both ~ three orders of magnitude. In the case of aptamer sensor, AuNPs-modified electrode could help to avoid the effect of steric hindrance and the formation of intermediate states [2]. As we all know that three main binding states, known as “charge screening”, “soft complex” and “stable complex” can form between antigen and their. When aptamers are placed too close together, they will sterically hinder each other, preventing antigen binding. For molecularly imprinted polymer (MIP)-based sensor [3], MIP films were composed of compact spheres when grown on method electrodes, while it was possible to grow more homogenous thin MIP films on screen-printed carbon electrodes that were functionalized with gold nanoparticles.

REFERENCES
DEVELOPMENT OF CENTRIFUGAL MICROFLUIDIC TECHNOLOGY FOR ULTRA LOW-VOLUME QCM-BASED BIOSENSING SYSTEM

Phi Van Toan¹, Yoshiaki Ukita² and Truong TN Lien¹*

¹) School of Engineering Physics, Hanoi University of Science and Technology (HUST), Vietnam
²) Department of Interdisciplinary Research, Graduate School of University of Yamanashi, Japan

E-mail: truongtnlien@gmail.com; lien.truongthingoc@hust.edu.vn

Abstract.

Microfluidic is the science of manipulating and controlling fluid flows, usually in the range of microliters to picoliters, in networks of channels with dimensions from tens to hundreds of micrometers. This technology is used in many fields such as engineering, physics, chemistry, biochemistry and nanotechnology in order to make the miniaturization and automation systems that improve the precision of experiments, lowering limits of detection and running multiple analyses simultaneously. In biosensor applications, microfluidic chip is integrated to the current system to control the fluid flow to introduce reagent solution into reaction chamber through micro pumps or micro valves. However, the connecting tubes always contain an amount of consumption solution. This is a limitation of traditional microfluidic technology combined with bio-sensing system. On the other hand, to improve analytical performance by reducing the consumption reagents down to few of μL, reducing the analysis time, increasing reliability and sensitivity made possible by through automation and integrating multiple processes, such as on chip centrifugal blood separation and washing of the sensor surface, in a single device. In this work, the centrifugal microfluidic chip will be designed and manufactured to integrate onto QCM device for minimization of consumption reagent used in sensor fabrication and to establish the automation process for artificial bioreceptors MIP immobilization onto working electrode. The results show that the reagent consumption decreases dramatically from hundreds of microliters to dozens of microliters. Centrifugal microfluidic chips (it can be seen in Fig. 1) has unique strong advantage against conventional flow cell and even against other existing microfluidic devices.

Fig 1. Siphon type of centrifugal microfluidic chip that is integrated onto QCM device.
INFLUENCE OF PERIOD ON THE EXTRAORDINARY TRANSMISSION THROUGH ARRAY OF MICROHOLES IN THIN ALUMINUM FILM

Trang T.H. Nguyen1,4,5*, Sergey I. Kudryashov1,2,3*, Pavel A. Danilov1, Andrey A. Ionin1, Roman A. Khmelnitskii1, Andrey A. Rudenko1, Irina N. Saraeva1, Dmitriy A. Zayarny1 and Minh H. Pham6

1 Lebedev Physical Institute, Leninskiy prospect 53, 119991 Moscow, Russia,
2 National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), Kashirskoe shosse 31, 115409 Moscow, Russia
3 ITMO University, Kronverkskiy prospect 49, 197101 St. Peterburg, Russia, Russia
4 Moscow Institute of Physics and Technology, 9 Institutskiy Pereulok, 141701 Dolgoprudny, Moscow Region, Russia
5 Ha Tinh University, Ha Tinh, 447, 26/3 street, Dai Nai ward, Ha Tinh city, Viet Nam
6 Institute of Physics, 10 Dao Tan, Str. Ba Dinh, Hanoi, Viet Nam

*E-mail: trang.nguyenthihuyen@htu.edu.vn

Abstract.

In Fig.1 such normalized transmittance spectra are presented for aluminum Al-grating with different periods P = 6, 7 and 8 µm. The corresponding (1,0), (1,1) and (2,0)-peaks blue-shift monotonously versus decreasing P with their particular experimental spectral positions in the quantitative agreement with the predicted ones, considering the metal-dielectric (CaF2, IR dielectric constant εCaF2≈ 2 [1]), rather than metal-air (IR dielectric constant εair≈ 1), interface of the gratings. The fixed 4-µm hole diameter (perimeter, square) is favorable for increasing amplitudes (contrast) of the (1,1)- and (2,0)-peaks at increasing P, as the corresponding surface density of hole decreases versus P, decreasing the surface corrugation.

REFERENCES

CALCULATE SEDIMENT TRANSPORT AND BED TOPOGRAPHY VARIATIONS AT CU LAO DUNG (SOC TRANG PROVINCE) BY USING DELFT 3D MODEL

Nguyen Hoang Phong, Vo Luong Hong Phuoc

Oceanology, Meterology and Hydrology Department, Faculty of Physics and Engineering Physics, University of Science, 227 Nguyen Van Cu st., dist. 5, Ho Chi Minh city

E-mail: nhphong@hcmus.edu.vn

Abstract.

Cu Lao Dung is located on Hau River, between Tran De and Dinh An estuaries. The deposition process in Cu Lao Dung is influenced by sedimentation source and sediment transport from the two estuaries. In the period 1955-2000, Cu Lao Dung show an increase trend of 70-80m per year. Presently, deposition process decreases in speed and scale, and occurs at the two ends of the island, which leads to a formation of a large muddy flat at ebb tide. The modelling results show that sediment transport process changes by season, sediment concentration is least in flood season. The benthic terrain deposition and erosion process depend on season, the deposition process is dominant. Sediment from Dinh An estuary causes deposition at the northeastern head and sediment from Tran De estuary cause deposition at the southwest head of Cu Lao Dung.
GENERATION OF MAXIMALLY ENTANGLEMENT OUTPUT STATE BY A NONLINEAR QUANTUM SCISSORS INTERACT WITH TWO EXTERNAL FIELDS

Luong Thi Tu Oanh¹, Nguyen Thi Hong Sang¹, Chu Van Lanh¹, Doan Quoc Khoa²,*

¹Vinh University, 182 Le Duan, Vinh, Viet Nam
²Quang Tri Teacher Training College, Quang Tri, Viet Nam
*E-mail: khoa_dqspqt@yahoo.com

Abstract.

We study a model with two nonlinear oscillators which have different frequencies and interact with each other by a nonlinear interaction. In order to excite the system, we use two external fields. It follows from numerical simulation that evolution of the system is similar to that of a combination of n-photon states. Therefore, the considered system behaves as so-called nonlinear quantum scissor [1-3]. Nevertheless, evolution of the system generates Bell-like states in several times with very high probability. Because of the nonlinear properties of oscillators and their interaction, the system creates a truncation of optical states, which leads to obtain two-qubit states. Next, we compare our results with that achieved for systems in which interaction between oscillators is linear pumped in two modes [1,2], and also interaction between oscillators is nonlinear pumped in one mode [3].

REFERENCES

OPTIMIZATION OF PURIFICATION OF ARTIFICIAL HEMAGGLUTININ OF A/H5N1 VIRUS FROM PLANT

Van Thi Pham\textsuperscript{1,3}, Hoang Trong Phan\textsuperscript{1,2}, Ulrike Gresch\textsuperscript{2}, Hoa Thanh Le\textsuperscript{1,3}, Ngoc Bich Pham\textsuperscript{1,3}, Udo Conrad\textsuperscript{2}, Ha Hoang Chu\textsuperscript{1,3} and Trang Huyen Vu\textsuperscript{1,3}

\textsuperscript{1}Institute of Biotechnology (IBT), Academic of Science and Technology Vietnam (VAST), Hanoi, Vietnam.
\textsuperscript{2}Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Gatersleben, Germany
\textsuperscript{3}Graduate University of Science and Technology (GUST), VAST, Hanoi, Vietnam

E-mail: phamthivan1103@gmail.com or vuhuyentrang.ibt@gmail.com

Abstract.

Yearly, highly pathogenic avian influenza A/H5N1 virus cause many outbreaks with different strains in poultry in Vietnam, which poses the huge losses to the economy. The development of universal vaccine candidates is considered the best strategy for protection poultry resistant to many A/H5N1 strains at the same time. In this study, we designed an artificial hemagglutinin representing all of A/H5N1 strains clade 1 (HAc1) which occurred in poultry from 2003 until 2015 in Vietnam. So, HAc1 can be a universal vaccine candidate. HAc1 was transiently expressed in \textit{Nicotiana benthamiana} by agroinfiltration. The purification of HAc1 protein is performed and optimized by using immobilized metal ion affinity chromatography (IMAC) and size exclusion chromatography (SEC). Purified HAc1 was found immunogenic in rabbit at the first injection.
REMOVAL OF AMOXYCILLIN IN AQUEOUS SOLUTION USING MODIFIED ACTIVED CARBON

Ha Nguyen Nu My¹, Cam Bui Duy², Trung Do Quang², Ngoc Nguyen Hong², Le Tong Cam¹

¹Ha Tinh university, Ha Tinh
²Ha Noi university of science - Vietnam National University, Hanoi

E-mail: ha.nguyennumy@htu.edu.vn

Abstract.

Antibiotics have saved millions of lives and eases the the suffering of patients of all ages for more than 60 years; however, the rampant use in recent decades leads concerns about antibiotic resistance [1]. The consequences of antibiotic resistance are not only increase in sickness and deaths but also the burden of finance[2]. Some of studies have show that concentrations of pharmaceuticals (almost antibiotics) in surface water and groundwater are less than 0.1 μg/l [6]. There are many methods to remove antibiotics from water such as ozonation [3], photocatalytic degradation [4] and absorption[5]. Activated carbon is frequently applied for removing because of high surface area and inexpensive method.

The removal of amoxycillin (AMX) from aqueous solution were investigated using actived carbon modification (ACM). The ACM were prepared by halogen - Br₂ (BAC), sulfur (SAC), hydrogen peroxide (HAC), nitric acid (NAC); and characterized by determination of the point of zero charge, SEM spectrum, IR spectrum, BET. The result among the investigated active carbon shows that SAC were the best material to remove AMX in water. Moreover, when using 0.5 g each of AC, optimum pH is 6 for almost AC, exceptionally NAC. The equilibrium adsorption is practically achieved through a time of 90 minutes and 120 minutes for SAC and AC, respectively. The equilibrium data were in good agreement with Langmuir model for both AC and SAC. The adsorption capacity of AMX was significantly greater for the adsorption onto SAC than that of AC. The adsorption capacity is 40 mg/g for SAC, while for AC is 16 mg/g. In the desorption tests of AMX onto SAC, it is concluded that the desorption efficiency of AMX using alkaline solution is better than using acidic solution.

REFERENCES

THE USE OF DNA BARCODING IN IDENTIFICATION OF
Sarcandra SAMPLES COLLECTED IN LANG SON, VIET NAM

Nguyen Thi Hai Yen¹, Chu Hoang Mau²

¹Thai Nguyen University of Sciences; Tan Thinh Ward, Thai Nguyen City, Viet Nam
²Thai Nguyen University of Education; 20 Luong Ngoc Quyen Road, Thai Nguyen city, Vietnam

Abstract.

Sarcandra glabra (Thunb.) Nakai belongs to genus Sarcandra, the Chloranthaceae family which is a medicinal plants that has anti-stress, antioxidant, anti-inflammatory, detoxifying, blood activating, and anti-bacterial effects. Sarcandra glabra is an wild herb widely distribute in VietNam, especially in the provinces, at the North of VietNam. In this work, we present the results of identification of Sarcandra samples collected in Lang Son province, Viet Nam using ITS barcoding marker. The Sarcandra plants has a wooden trunk with 0.5-1.5 cm in diameter; single leaf opposite and elliptical leaf blade with 7-20 cm long, 3-5 cm wide, dark green on the inside, lightly on the underside; double flowers, few branches and short ones including white inflorescence rising from 3 - 8cm long flower bracts. Sarcandra has a small, berry-like fruit, approximately 4-7 mm in diameter. From genome of Sarcandra plants, ITS region has been isolated with 650 nucleotides in length. The BLAST analytic result showed that the ITS region of the Sarcandra samples collected in Lang Son province, Viet Nam is similarity to that of the ITS region of 99.7% of Sarcandra glabra species in GenBank (GenBank: JN407442, JN407443, KC840060, KP317601). Thus, the Sarcandra samples collected at the Lang Son province, Viet Nam belongs to Sarcandra glabra species. The this result opens the direction of application of DNA barcode to identify Sarcandra glabra plants in Vietnam. We suggest that the use of DNA barcoding is integrated into the work flow during medicinal herb studies, as this could significantly increase the number of identified specimens and improve knowledge about the medicinal species distributions.

Keywords: DNA barcode, medicinal plants, ITS, Sarcandra glabra.

Fig.1. Morphology of Sarcandra Glabra (Thunb.) Nakai (1) leaf, (2) flower buds (3) a bunch of flowers (4) fruit (5) roots.

Fig.2. Result of electrophoresis PCR products to ITS region. M: 1.0 kb DNA marker; 1, Sarcandra Glabra (Thunb.) Nakai collected in Langson province.
REFERENCES

Abstract.

We study the effects of a 650 mT external magnetic field (B-field) on the terahertz (THz) emission characteristics of p-GaAs, n-GaAs, p-InAs and n-InAs semiconductor wafers. The dominant THz emission in InAs is known to be the photo-Dember effect while it is the surface field effect in GaAs [1-3]. A mode-locked Ti:Sapphire laser with 800 nm central wavelength, 100 fs pulse duration, and 80 MHz repetition rate was used as excitation source. The THz emission from the samples was measured using a standard terahertz time-domain spectroscopy setup (THz-TDS). The B-field effects on the THz-TDS waveform polarity, amplitude, and bandwidth is discussed. Results have shown anomalous polarity reversal and B-field enhancement preference from the samples. We explain these results in the context of the drift-diffusion equation and the dipole reorientation model [4,7]. This could be useful in the design and optimization of THz devices with magnetic and optoelectronic applications.
ENHANCEMENT OF VISIBLE AND TERAHERTZ EMISSION IN NANOSTRUCTURED SILICON

Neil Irvin Cabello, Philippe Tingzon, Kerr Cervantes, Arven Cafe, Joybelle Lopez, Arvin Mabilangan, Alexander De Los Reyes, Maria Angela Faustino, Lorenzo Lopez Jr., Joselito Muldera, Dinh Cong Nguyen, Xuan Tu Nguyen, Hong Minh Pham, Thanh Binh Nguyen, Arnel Salvador, Armando Somintac, Elmer Estacio

1) Condensed Matter Physics Laboratory, National Institute of Physics, University of the Philippines, Diliman, Quezon City, Philippines
2) De La Salle University, De La Salle University, 2401 Taft Avenue, Manila, Philippines
3) Institute of Physics, Vietnam Academy of Science and Technology, 10 Dao Tan, Ba Dinh, Hanoi, Vietnam

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

Abstract.

We report on the ultrafast visible and far infrared emission properties of nanostructured silicon (nanoSi) materials, namely porous silicon (PSi) and silicon nanowires (SiNW). The PSi samples were fabricated using a standard lateral anodization setup [1], while the SiNW samples were fabricated using electroless etching [2,3]. The PL observed from the nanoSi were attributed to radiative recombination at the surface states. Ultrafast radiative lifetime in the order of 250 picoseconds were also observed from the strongly luminescent PSi samples. The enhanced THz emission were attributed to the increased photon absorption and more efficient photocarrier transport. An inverse relationship between THz emission and luminescence intensity was observed, as photocarrier transport and radiative recombination are competing mechanisms [4]. Understanding the carrier dynamics in nanoSi could pave way to novel and more efficient Si-based photovoltaic devices.

REFERENCES

ISOLATION AND CHARACTERIZATION OF AN ISOLATED ENTOMOPATHOGENIC FUNGUS IN THAI NGUYEN

Nguyen Thi Thanh Nga, Hoang Quynh Trang, Trinh Ngoc Hoang, Nguyen Thi Kim Cuc*

Department of Biotechnology, Thai Nguyen University of Sciences, Tan Thinh Ward, Thai Nguyen, Viet Nam

E-mail: kimcuctn@gmail.com/cucnt@tnus.edu.vn

Abstract.

Using bioinsecticides is an environmental friendly method to regulate of insect populations in field. Microbes, especially entomopathogenic fungi widely uses to produce commercial bioinsecticides. In this study, we reported an isolated entomopathogenic fungus from infected Scotinophara tarsalis that effectively kills Pieris rapae and Zophobas morio. Morphological and molecular classification indicated that the isolated strain is Beauveria bassiana named Beauveria bassiana TN1 has 98-100% homology in internal transcribed spacer (ITS) sequence compared with the available ITS sequence in the public database GenBank. The fungus strain grew well on temperature range from 28 to 38°C and optimal temperature was 33°C. Interestingly, the strain still grew and kept entomopathogenic capacity after 30 min continuously exposing UV light. Optimal condition to produce spores was established in solid-state fermentation using 80% rice, 10% soybean grain and 10% rice hulls. The liquid bioinsecticide from Beauveria bassiana TN1 was produced and obtained $10^9$ spores/ml. Those result suggested that Beauveria bassiana TN1 is potential strain to develop an effective bioinsecticide.

Keywords: Beauveria bassiana, Bioinsecticide, entomopathogenic fungus.

Fig. 1. Pieris rapae are killed by the Beauveria bassiana TN1.

REFERENCES

STUDIES ON THERMAL DECOMPOSITION BEHAVIOR OF PETN AND POLYMER-BONDED EXPLOSIVES BASED ON PETN USING THERMAL METHODS

Nguyen Trung Toan¹, Phan Duc Nhan¹, Vo Hoang Phuong²

¹) Le Quy Don Technical University, 236, Hoang Quoc Viet, Hanoi, Vietnam
²) Institute of Military Science and Technology, 17, Hoang Sam, Hanoi, Vietnam
E-mail: trungtoanktqs@gmail.com

Abstract.

The kinetics of exothermic reactions are important in assessing the potential of materials and systems for the thermal explosion. In this paper, the thermal behavior and decomposition kinetics of pentaerythritol tetranitrate (PETN) and polymer-bonded explosives (PBX) based on PETN were investigated using several thermal methods, such as Thermogravimetric analysis (TGA), Differential Scanning Calorimetry (DSC) and Vacuum Stability Test (VST). The Arrhenius activation energies and pre-exponential factors were determined by the Ozawa, Flynn, and Wall (OFW) and Kissinger-Akahira-Sunose (KAS) methods [1-4]. It was found that PBX based on PETN has a lower activation energy than pure PETN. Based on the overall kinetic parameters of decomposition reactions, the shelf life of PETN and PBXs based on PETN can be calculated and predicted [2,5].

Keywords: PETN, PBX, Thermal decomposition, Kinetics, DSC, TGA, VST.

REFERENCES

AGROBACTERIUM – MEDIA TRANSFORMATION OF CRY3CA1 GENE INTO KB1 SWEET POTATO

Vu Thi Lan¹, Pham Bich Ngoc², Le Tran Binh²

¹Faculty of Biotechnology, Thainguyen University of Science, Thainguyen University
²Institute of Biotechnology, VAST
E-mail: lanvt@tnus.edu.vn

Abstract.

Sweet potato Ipomoea batatas (L.) Lam. is an important food crop in the world as well as in Vietnam. Despite its many benefits, the production of sweet potatoes is restricted in many areas of the world by diseases, weeds, and, particularly, pests. As an alternative, genetic transformation provides them with resistance to conventional breeding to improve sweet potato to resistant to pest. In this study, shoot tips and leaf explants of KB1 sweet potato variety were infected with A. tumefaciens C58/pBI101/cry3Ca1. The selection was performed on callus producing medium (SM) containing 0.5 g/L picloram, 100 mg/L kanamycin and 500 mg/L cefotaxime. Survival embryogenic calli were then transferred to embryogenic callus producing medium (EG2) supplied with 1.0 mg/L ABA and 1.0 mg/L GA₃ after 3 weeks. Putative transgenic shoots regenerated on medium (RM) supplying 0.5 mg/L kinetin and 1.0 mg/L BAP were rooted on root producing medium (RR). The tentative transgenic lines were proved positively by PCR and finalized by Southern, and biotest in laboratory. Conclusionly, we obtained 62 putative transgenic sweet potato lines resistant to kanamycin. Among these lines, five putative transgenic lines were proved positively by Southern hybridization, confirming that the transgenic lines of KB1 cultivars obtain one copy of the cry3Ca1 gene.

Keywords: Agrobacterium tumefaciens, Ipomoea batatas L., cry3Ca1 gene, plant transformation, sweet potato weevil.

Fig. 1. Transformation of cry3Ca1 gene in sweet potato KB1. A) Explants infected with A. tumefaciens/pBI101/cry3Ca1 on co-cultivation medium for 2 days; B) Shoot regeneration from survival embryogenic callus after 4 weeks on regeneration medium; C) Transgenic lines in soil pots in the greenhouse; D) Confirmation of cry3Ca1 gene integration into the sweetpotatogenome by PCR (D) and Southern blotanalysis (E).

REFERENCES

Abstract.

The study was carried out to determine radioactivity concentration in surface soil samples of Thoulakhom District in Vientiane province, Lao PDR and associated potential radiological hazards. The natural radionuclide (\(^{226}\)Ra, \(^{232}\)Th and \(^{40}\)K) contents were determined for 10 locations throughout the geological surface formations in representative area in the city of Thoulakhom District in Vientiane province, Lao PDR, using high-resolution gamma-spectrometric analysis. The ranges of specific activity for \(^{226}\)Ra, \(^{232}\)Th and \(^{40}\)K were found to be 11.43↔30.98, 7.24↔44.56 and 9.79↔581.71 Bq kg\(^{-1}\), respectively. The anthropogenic radionuclide, \(^{137}\)Cs, was not observed in statistically significant amounts above the background level in the current study. The absorbed gamma dose rate in air at 1m above the ground surface, the outdoor annual effective dose equivalent, with all the soil samples in the present work were evaluated. The results indicate that the radiation hazard from promordial radionuclides in all soil samples from area studied in this curren work is not signifacant.

Keywords: Naturally occurring radioactive materials NORM; Gamma-ray spectrometry.

REFERENCES

OPTICAL SPECTRAL STUDIES OF Tb$^{3+}$ AND Sm$^{3+}$ IONS CO-DOPED IN ALKALI BORATE GLASSES

Hoang Sy Tai, Tran Ngoc

Faculty Natural of Sciences, Quang Binh University, Vietnam
E-mail: taihs@qbu.edu.vn

Abstract.
Spectroscopic properties of Tb$^{3+}$ and Sm$^{3+}$ ions doped alkali metal borate glasses ($70-x-y$)B$_2$O$_3$.15Li$_2$CO$_3$.15Na$_2$CO$_3$.xTb$_2$O$_3$.ySmO$_2$ (BLN:Tb,Sm) fabricated by melting method have been studied. The emission intensity of Tb$^{3+}$ or Sm$^{3+}$ in BLN:Tb or BLN:Sm glasses is influenced by the Tb$^{3+}$ or Sm$^{3+}$ doping content, and the optimum concentrations of Tb$^{3+}$ and Sm$^{3+}$ are 0.75 mol% and 1.0 mol%, respectively. The concentration quenching effect of Tb$^{3+}$ or Sm$^{3+}$ in BLN:Tb$^{3+}$,Sm$^{3+}$ glasses occurs. The BLN:Tb$^{3+}$,Sm$^{3+}$ glasses can produce color emission from green to red by properly tuning the relative ratio between Ce$^{3+}$ and Tb$^{3+}$. The results indicate that BLN:Tb$^{3+}$,Sm$^{3+}$ may be a promising double emission for white light emitting diodes.

Keywords:Tb$^{3+}$ and Ce$^{3+}$ ions; alkali metal borate glass, the concentration quenching mechanism.

REFERENCES

EFFECT OF DISSOLVED IONS ON STRUCTURE OF LANGMUIR MONOLAYER/WATER INTERFACE PROBED BY SUM-FREQUENCY VIBRATIONAL SPECTROSCOPY

Nguyen Thi Hue\textsuperscript{1,2}, Nguyen The Binh\textsuperscript{1}, Nguyen Anh Tuan\textsuperscript{1}

\textsuperscript{1}Department of Physics, VNU University of Science, Vietnam
\textsuperscript{2}Hung Vuong University, Phu Tho province, Vietnam

E-mail: huedhvh@gmail.com

Abstract.

Langmuir monolayer is a monomolecular layer formed on water surfaces, its structure resembles biological membrane. Study of the effect of dissolved ions on the structure of Langmuir monolayers on alkaline saline solution interfaces can provide important information relating to biological processes such as cell signalling and membrane fusion. In this report, we use a second-order nonlinear optical spectroscopy – Sum-Frequency Generation Vibrational Spectroscopy (SFG-VS) to investigate the interaction between \( \text{Na}^+ \), \( \text{K}^+ \) cations as well as \( \text{Br}^- \), \( \text{I}^- \) anions and Arachidic Acid (AA) monolayer/water interfaces. The obtained SFG spectra show that those ions affect the interface in different ways. As a result, the AA monolayer is spontaneously collapsed by those dissolved ions.

Keywords: Langmuir monolayer, interfacial structure, dissolved ions, Sum-frequency vibrational spectroscopy.

Fig. 1. SFG spectra of the AA monolayers on aqueous NaCl and KCl solutions and neat water
SCREENING ENDOPHYTIC YEAST IN MUSA SAPIENTUM (TIEU HONG BANANA) FOR APPLICATION IN POSTHARVEST BANANA

Chu Thanh Binh¹, Do Thi Thu Hong¹, Ngo Cao Cuong¹, Nguyen Phuong Nhue²

¹Vietnam - Russian Tropical Center, 63 Nguyen Văn Huyen Str., Hanoi
²Institute of Biotechnology, VAST, 18 Hoàng Quoc Viet Str., Hanoi
E-mail: chuthanhbinhv@gmail.com

Abstract.

Musa sapientum was a nutritious fruit and results high benefit due to growing easily, short cultivation time and all year around harvest. However, post-harvest preservation was not good cause rotten banana rate of 20%. This study aims to screen the yeast strain among 12 endophytic yeast strains isolated from Musa sapientum for banana preservation. These yeast strains were investigated for the production of three extracellular enzymes (amylase, cellulose, protease) by diffusion on agar plates method and grouped by fingerprinting technic. The obtained results showed that, there were four endophytic yeast strains producing from 2 to 3 extracellular enzymes. In combination with fingerprinting technic and antifungal capable investigation, four endophytic yeast strains against plant fungal pathogen as Verticillium theobromae, Piricularia grisea, Macphonia musae were selected. They were named N4.11, 2Y1, 36Y3, 36Y4. These selected strains were classified into the Meyerozyma species based on the ITS regional sequence analysis using ITS1 / ITS4 primers. These strains N4.11 and 2Y1 was identified similar to Meyerozyma caribbica, other strains 36Y3 and 36Y4 was identified similar to Meyerozyma guilliermondii. With their own biological characteristics, these four selected endophytic yeast strains can be used in Musa sapientum banana preservation to improve the quality of post-harvest banana.

Keywords: endophytic yeasts, fingerprinting, preservation, Meyerozyma, Musa sapientum.
ACOUSTIC ECHO CANCELLATION USING NEURAL NETWORK

Tung Duc-Minh Nguyen, Tuan Van Huynh

Department of Physics and Computer Science, Faculty of Physics and Engineering Physics, University of Science, VNU-HCM, 227 Nguyen Van Cu St., Dist. 5, Ho Chi Minh city, Vietnam

E-mail: nguyenducminhtung@gmail.com

Abstract.

Teleconferencing systems employ adaptive filter to acoustic echo cancellation (AEC) as a fundamental requirement of signal processing to increase the quality of teleconferences. In this paper, we proposed Volterra filter and neural network algorithms for the AEC system to reduce echo signal in nonlinear system. The influence of the neural network architecture and its learning algorithms used for echo cancellation will be covered in this paper. The least mean square (LMS) algorithm is used to train the weight vector of the neural network. The simulation results will present to test the effectiveness of the proposed AEC system in a nonlinear acoustic environment.

Keywords: acoustic echo cancellation, AEC, neural network.
NORMAL FAMILIES OF MEROMORPHIC MAPPINGS

Nguyen Thi Thu Hang

Department of Mathematics, Hai Phong University, 171 Phan Dang Luu – Kien An – Hai Phong – Vietnam

E-mail: hangnmt82@dhhp.edu.vn

Abstract.

The Little Picard Theorem states that if a meromorphic function on the complex plane omits three distinct points in $\mathbb{C}$, then it is a constant function; and the classical result of Montel says that the family $F$ of meromorphic functions on a domain $D \subset \mathbb{C}$ is normal if there are three distinct points $a$, $b$, $c \in \mathbb{C}$ such that each element of $F$ omits each of $a$, $b$ and $c$ in $D$. The Little Picard Theorem was generalized to the case of entire curves in the complement of $2n + 1$ hyperplanes in general position in $\mathbb{C}P^n$ by Green, and to the case of entire curves in the complement of $2n + 1$ hypersurfaces in general position in $\mathbb{C}P^n$ by Eremenko. According to Bloch’s principle, to every ‘Picard-type’ theorem, there should belong a corresponding normality criterion. The normality result corresponding to the aforementioned Picard-type theorems was proved by Tu, and Tu-Li. In this paper, we introduction this problem for the case where the mappings of the family can meet the hyperplanes (and hypersurfaces).
THE EFFECT OF ZEROVALENT COBALT NANOPARTICLE ON THE GROWTH, PHOTOSYNTHETIC PARAMETERS OF SOYBEAN GLYCINE MAX (L.) MERR. “DT26” AT DIFFERENT STAGES

Phan Hoang Tuan², Hoang Thi Lan Anh¹, Luu Thi Tam¹, Ngo Thi Hoai Thu¹, Dang Diem Hong¹*

¹) Institute of Biotechnology, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam

²) University of Science - University of Thai Nguyen, Thai Nguyen, Vietnam

E-mail: ddhong60vn@yahoo.com

Abstract.

Nanotechnology has widespread using in many fields such as electronic, environmental, cosmetic, pharmaceutical, material and agriculture applications. In section of agriculture, it has great potential for increasing crop yield and productivity, decreasing the amount of toxins and fertilizers, increasing the length of time spent to preserve farming productions. Soybean is an important crop and a source of food for humans and livestock. In this study, both zerovalent colbalt nanoparticles made from Vietnam and USA with different concentrations (0, 0.17 and 16.7 mg/kg seed) was used. The growth, photosynthetic parameters of soybean Glycine max (L.) Merr. DT26 were evaluated at first (V1), third (V3) and fifth (V5) trifoliate and begin at flowering (R1) stages.

Parameters such as Fo (initial fluorescence), Fm (maximal fluorescence), Fv/Fm (maximal photochemical efficiency), effective quantum yield of photosystem II (ΦPSII), photosynthetic electron transport rate (ETR), Pn (net photosynthetic rate) and chlorophyll a content of soybean seedlings which were treated with cobalt nanoparticles were higher than in the control. The value of these parameters had tended to gradually increased and reached maximum at V5 stage. The above mentioned parameters significantly decrease at R1 stage. Similar trend was observed in the growth indices (such as the plant height, dry weights of stems and leaves and leaf area). Crop yield of experimental formulas exceeded the control (5%) while the quality of grain was no significant different among plots. The obtained results also showed the efficiency of zerovalent cobalt nanoparticle originated from Viet Nam was similar to USA.

Keywords: photosynthesis, soybean, zerovalent cobalt nanoparticles.
ESTIMATE HADRONIC PROCESS FROM PARTONIC
AT HADRONS COLLIDERS

Chi Linh Nguyen
Faculty of Physics and Engineering Physics, University of Science,
227 Nguyen Van Cu Str. District 5, Ho Chi Minh City
E-mail: nclinh@hcmus.edu.vn

Abstract.

We build a C/C++ program which allow estimating cross section of hadronic process given
the formula of partonic amplitude. The study is based on the theory of quantum
chromodynamics (QCD) and parton distribution [1] of hadron in elementary particle
physics. The hadronic cross section is calculated by convoluting partonic amplitude with
parton distribution functions (PDFs) [2]. This fact causes the dimensions of integral
increase two comparing to the partonic cross section. The multiple integral of this study is
treated using adaptive Monte Carlo program [3].

Keywords: QCD, Standard model, LHC, PDFs, Monte Carlo.

REFERENCES

U.), New generation of parton distributions with uncertainties from global QCD analysis,


RESEARCHING ANATOMICAL CHARACTERISTICS AND ANTIBACTERIAL ACTIVITY OF *Capparis dongvanensis* Sy, B.H. Quang & D.V. Hai

Nguyen Phuong Thao⁴, Nguyen Huu Quan⁴, Pham Van Khang², Sy Danh Thuong¹*

¹) Faculty of Biology, Thainguyen University of Education, ThaiNguyen city, Vietnam
²) Faculty of Chemistry, Thainguyen University of Education, ThaiNguyen city, Vietnam
*E-mail: sydanhthuong@gmail.com

**Abstract.**

*Capparis dongvanensis* is an endemic plant of Vietnam, belonging to Capparaceae [2]. The research samples were collected in Dong Van District, Ha Giang Province. To study the anatomical structure, we collected young stems and leaves, then cut thin, double dyeing and observed on a microscope using Microscope manager software. The extract from *C. dongvanensis* was used for research antibacterial activity of *Staphylococcus aureus* and *Bacillus subtilis* [1].

The anatomical structure of *C. dongvanensis* is characteristic of the dicotyledon. Anatomy of the stem including: cork outside, thick 6μm. Cortex is about 80μm thick, including three types of tissue: angular collenchyma has 3-4 cell layers; parenchyma has 6-8 cell layers, chlorophyll; sclerenchyma concentrated into clumps. The vasculars include xylem, cambium and phloem arranged in a loop. Pit consists of cells with a diameter of 18-25μm.

Anatomy of the leaf including: epidermis, parenchyma and vein. Epidermis includes upper epidermis and lower epidermis. Parenchyma differentiated into palisade parenchyma and spongy parenchyma. Palisade parenchyma has 2-3 cell layers, contains chlorophyll, thick 10-14 μm. Spongy parenchyma has 10-12 cell layers, round or ovate, with a large intercalation area, thick 10 μm. The main vein contains the xylem above, the phloem below. Upper of xylem, there are 3-4 collenchyma layers. Parenchyma contains oval cells.

Ethyl acetate extract at 30 mg/ml showed maximum antibacterial activity on *S. aureus*, followed by ethyl acetate extract at 10 mg/ml, 100 mg/ml and chloroform extract at 10 mg/ml; the diameters of the inhibition cycles were 10 mm and 9 mm, respectively. Whereas ethanol extract at 10mg/ml, 100 mg/ml and chloroform extract at 30 mg/ml inhibited *S. aureus* lowest, the diameters of antibacterial is 4 mm. *B. subtilis* had the highest inhibitory activity by ethanol extract at 10mg/ml, 100 mg/ml and chloroform extract at 30 mg/ml; the diameters of the inhibition cycles were 13 mm, 11 mm and 9 mm, respectively. Etanol extract at 30 mg/ml inhibited *B. subtilis* lowest (the diameters of antibacterial was 4 mm).

So, the extracts of *C. dongvanensis* with ethanol, chloroform and ethyl acetate inhibited the development of *S. aureus* and *B. subtilis* at 10-100mg/ml, and antibacterial activity was different.

**Keywords:** Anatomy, antibacterial activity, Capparis, Capparaceae, Dongvan.

**REFERENCES**

SEGMENTATION OF TYMPANIC MEMBRANE USING POLARIZED IMAGING

Tran Van Tien, Le Thanh Tung, Nguyen Hai Dang, Bui Mai Quynh Linh, Ngo Ngoc Uyen, Phan Ngoc Khuong Cat, Huynh Quang Linh

Department of Applied Physics, Faculty of Applied Science, Ho Chi Minh City University of Technology, VNU-HCM

E-mail: tranvantien1985@gmail.com

Abstract.

Otitis media is one of the most common infections among children on over around the world. To diagnose otitis media, most physicians base on clinical symptoms and changes of tympanic membrane. Physicians usually use otical otoscope or pneumatic otoscopy to examine the tympanic membrane. Diagnosing children with acute otitis media is difficult, therefore, there are more and more algorithms developed to help physicians diagnose otitis media. In the present word, we focus on performing photograph of middle ear based on changing some properties of light source such as intensity or using polarized light. After that, we detect the tympanic membrane using some of the algorithmson the matlab platform.

Keywords: otitis media, endoscope, inflammation.

REFERENCES

STUDY ON CHROMATOGRAM LAYER METHODS FOR DETERMINATION ANTIMICROBIAL ACTIVITY OF MARINE BACTERIA EXTRACTS.

Tran Nguyen Ha Vy, Nguyen Thi Thuan, Vo Mai Nhu Hieu and Tran Thi Thanh Van

Chemical Analysis and Technology Development Department, Nha Trang Institute of Technology Research and Application, VAST, 02 Hung Vuong-Nha Trang-Khanh Hoa-Vietnam

E-mail: havy158@gmail.com

Abstract.

In recent years, several pathogenic bacteria present resistance against antibiotics, being necessary the search and develop new drugs with activity against resistant pathogens from various sources. Therefore, antimicrobial activity evaluating methods has been widely reported. Several antibacterial activity bioassays such as disk diffusion, well diffusion or agar dilution are well known and commonly used, but bioautography (thin layer chromatographic - TLC) is a new microbial detection method not only investigating biochemical processes and factors influencing bacterial growth, but also for testing various groups of compounds. In this article, we searched the antibacterial activity of several organic extracts from marine bacteria, which were isolated from near coast of Vietnam island from corals and sponges. Test bacteria were both Gram-negative (Pseudomonas aeruginosa and Escherichia coli) and Gram-positive (Listeria monocytogenes, Bacillus cereus and Staphylococcus aureus) human pathogenic bacterial strains. The results research confirm the potential use of marine bacteria extracts as a source of antibiotic compound and open the possibility of use of new drugs.

Keywords: Thin layer chromatographic – TLC, antimicrobial activity, marine bacteria extract.
EFFECT OF OXYGEN DEFECTS ON THE ELECTRONIC STRUCTURE AND THERMOELECTRIC PROPERTY OF BISMUTH OXIDE SELENIDE

Tran Van Quang

Department of Physics, University of Transport and Communications,
No. 3, Lang Thuong, Hanoi, Vietnam
E-mail: tranquang@utc.edu.vn

Abstract.

Bismuth oxide selenide, Bi$_2$O$_2$Se, was experimentally investigated as a good thermoelectric material due to the low thermal conductivity. In this study, we perform first-principles calculation and utilize the solution of Boltzmann transport equation in a constant relaxation-time approximation to study electronic structure and the thermoelectric properties of Bi$_2$O$_2$Se under some oxygen defect types, i.e. vacancies and point defects. Oxygen vacancies trap bands located inside the band gap of Bi$_2$O$_2$Se and lead it to be conducting with n-type semiconductor type. These bands are responsible for a drastic reduction of the Seebeck coefficient whereas the oxygen point defects remain the semiconducting feature. For the point defects, the power factor markedly increases during p-type doping compared with that during n-type doping. The optimal carrier concentrations are also discussed.
NON-LINEAR MARGINAL AND GENERALIZED LINEAR MIXED REGRESSION MODELS OF AIDS INCIDENCE IN BANGKOK

Pianpool Kirdwichai

Department of Applied Statistics, Faculty of Applied Science, King Mongkut’s University of Technology North Bangkok, 1518 Pracharat 1 Road, Bangsue, Bangkok, Thailand. 10800

E-mail: pianpool.k@sci.kmutnb.ac.th

Abstract.
This paper illustrates the use of modern regression methods in modelling annual AIDS incidence. In particular, the methods address issues such as non-normality of responses and non-linearity and lack of independence in the responses over time. Non-linear marginal regression models are considered when the normality assumption is valid while generalised linear mixed regression methods are used to develop models for estimation and prediction of incidence for subgroups of AIDS patients in Bangkok when the normality assumption fails. Annual incidence data covering the period 2005-2015 and obtained from Group Plans and Information AIDS TB and STIs Control Division of Bangkok Health Center is used in building the incidence models. The results show that the overall AIDS incidence in Bangkok decreases by roughly 80% year on year but this decrease is not reflected in all subgroups of the population. In particular, the decrease in incidence is shown to be slowing down in young men, older people and male prisoners. This latter group have been identified as a key group left behind in prevention strategies. On the other hand, the rate of decline in incidence appears to be increasing in people who inject drugs.

REFERENCES

COMPARING ANALYTICAL AND NUMERICAL SOLUTIONS IN IDENTIFICATION OF THE BUCKLING CAPACITY OF AXIALLY LOADED CASTELLATED STEEL COLUMNS

Tran Ngoc Tuyen¹, Dang Hong Lam ²

¹) Faculty of Engineering and Technology, Hatinh University; No. 447 Road 26-3, Hatinh, Vietnam
²) Faculty of Civil Engineering, University of Transport and Communication, No. 3 Cau Giay Street, Dong Da District, Hanoi, Vietnam

E-mail: tuyen.tranngoc@htu.edu.vn

Abstract.

The increasing demand for economy and architecture of steel structures for several years has raised questions about the analysis and design of I-shaped columns with web perforations, in particular, the elements with hexagonal perforations in the web called castellated I-shaped columns (castellated columns [1]). This paper aims at studying the elastic buckling load of axially loaded castellated columns and then comparing formulas of analytical computations [2, 3] with numerical methods from the finite element method (FEM) using the Code_Aster and the software ANSYS 16.0. In addition, the study also takes into account the influence of various end conditions on the buckling capacity. The application of the columns is efficient in cases with low axial loads, such as gable-columns, portal legs, wind-posts, and valley-columns.

Keywords: Castellated, columns, buckling, steel, finite element, Code_Aster, ANSYS...

REFERENCES

INTERPRETATION OF THE GROUND PENETRATING RADAR DATA USING THE WAVELET TRANSFORM MODULUS MAXIMA

Duong Quoc Chanh Tin¹, Duong Hieu Dau¹, Nguyen Thanh Van², Nguyen Van Thuan²

¹Can Tho University, Campus 2, 3/2, Ninh Kieu, Can Tho
²University of Science, VNU Ho Chi Minh City, 227 Nguyen Van Cu, District 5, Ho Chi Minh

E-mail: dqctin@tu.edu.vn

Abstract.

Ground penetrating radar (GPR) data processing takes too much time because it has many stages for calculation such as: data format, topographic correction, denoising, amplification and some others. In final analysis step, there crucial parameters: depth, position, and size of the buried objects were needed to determine. The determination for those parameters of a buried objects using traditional GPR methods has many difficulties since this calculation depends on electromagnetic wave velocity in the material, and this velocity varies very complex in all directions. In this paper, the wavelet transform modulus maxima (WTMM) method with the appropriate wavelet functions were introduced to interpret the GPR data, thereby it is easy to estimate of depth, size and position of the buried objects without the consideration of electromagnetic wave velocity in the material. This GPR analysis can be applied for the research of shallow geological structure.

Keywords: Ground penetrating radar, appropriate wavelet functions, detecting buried objects, wavelet transform modulus maxima.

REFERENCES

THE RESPONSE AND EFFICIENCY OF N-TYPE HPGe DETECTOR USING MONTE CARLO SIMULATION

Huynh Thi Yen Hong, Truong Huu Ngan Thy, Dang Thi Thao My, Vu Ngoc Ba, Truong Thi Hong Loan

Nuclear Technique Laboratory, University of Science, 227 Nguyen Van Cu, Ward 4, District 5, HCMC, Vietnam

E-mail: htyhong@hcmus.edu.vn

Abstract.

In this work, the response and efficiency of a n-type HPGe detector was investigated by Monte Carlo simulation using PENELOPE. The validity of the model was evaluated by comparing the simulated full-energy peak efficiency with the measured value. Modeling of the detector geometry was described in detail, and differences between the simulated and measured spectra were discussed. Effects at low energy region, Compton scattering, multiple Compton scattering and the low-energy tail of the peak were investigated for point sources emitting only single energy. For point sources emitting multiple energy were investigated additional effects in the photoelectric peaks region and high energy region.

REFERENCES

ELECTROENCEPHALOGRAPHY ANALYSIS USING NEURAL NETWORK

Ngan Vuong Thuy Nguyen, Tuan Van Huynh

Physics and Computer Science Dept., Physics and Engineering Physics Faculty,
University of Science, VNU-HCM, 227 Nguyen Van Cu Str., Dist. 5, Ho Chi Minh city, Vietnam
E-mail: nvtngan@hcmus.edu.vn

Abstract.

To gather information of human activities through brain wave - EEG signal, various algorithms have been introduced and researched relating to 3 main filters: digital filter, wavelet filter and neural network. By applying filters into identify some different states of EEG, this paper gives an insight of neural network performance, comparing with others, on simple activities of human brain. In details, researched human activities include states involving to eyes behavior, facial expression and thinking signal. The raw ECG signal has been acquired by Emotiv EPOC+ and analyzed with Matlab. Furthermore, the comparison of algorithms efficiency has been done with MSE value and other parameters which demonstrate the possibility of using neural network to analyze EEG signal.
DETERMINATION OF NATURAL RADIOACTIVITY AND PUBLIC DOSE ASSESSMENT IN SOIL SAMPLES KHAMMOUANE PROVINE, LAOS

Somsavath Leuangtakoun\textsuperscript{1,2*}, Bui Van Loat\textsuperscript{1}, Bui Thi Hong\textsuperscript{1}, Vu Thi Kim Duyen\textsuperscript{3}, Khong Nam Khang\textsuperscript{4}, SounthoneSingsoupho\textsuperscript{2}

\textsuperscript{1}Department of Nuclear Physics, Faculty of Physics, VNU University of Science, 334 Nguyen Trai, Hanoi, Vietnam

\textsuperscript{2}National University of Laos, P.O.Box: 7322, Dongdok Vientiane, Laos

\textsuperscript{3}Centre for Env. Trea. Tech., Ministry of Defence, 282 Lac Long Quan, Hanoi, Vietnam

\textsuperscript{4}Military Institute of Medical Radiology and Oncology.

Abstract.

This paper presents, the radiation protection viewpoint, is to study the activity concentrations of naturally occurring radionuclides in surface soils and the extent of their exposure to the population. The radioactivity concentrations of $^{226}$Ra, $^{232}$Th and $^{40}$K for samples of surface soil collected in Khammouane Provine, Lao, using an HPGe detector at VNU University of Science. From activity concentration of $^{226}$Ra, $^{232}$Th and $^{40}$K are calculated the radium equivalent activity and outdoor annual effective dose (E). The estimated average outdoor annual effective dose (E) and radium equivalent activity (Ra\textsubscript{eq}) are $0.18 \pm 0.01$ mSv.yr\textsuperscript{-1} and $168.44 \pm 15.10$ Bq.kg\textsuperscript{-1}, respectively.

Keywords: Gamma spectrometry, Activity concentration, Radium Equivalent Activity, Absorbed gamma dose rate, Annual effective dose rate, Minimum Detection Limit.
ELECTROCHEMICAL FABRICATION OF PLASMONIC NANOCOMPOSITE BASED ON GOLD-GRAPHENE OXIDE AND SILVER-GRAPHENE OXIDE CLUSTERS.
Tran Thu Hien, Nguyen Thi Thu Thuy, Nguyen Thanh Liem, Pham Hong Minh, S A Tikhomirov, O. V. Buganov and Do Hoang Tung

1Institute of Physics, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam
2B I Stepanov Institute of Physics, National Academy of Sciences of Belarus, 68 Prospekt Nezavisimosti, 220072 Minsk, Republic of Belarus
E-mail: dhtung@iop.vast.ac.vn

Abstract.
Plasmonic nanocomposite based on gold-graphene oxide and silver-graphene oxide clusters were prepared by plasma assisted electrochemical method. Their morphologies were analysed with TEM showing GO flakes decorated with noble nanoparticles. Noble nanoparticles size shape and concentration can easily be tuned by varying plasma condition giving rise to different surface plasmonic resonances measured with UV-vis absorption spectroscopy.
PREPARATION OF PLASMONIC TiO$_2$-Ag AND TiO$_2$-Au
NANOCOMPOSITE MATERIALS BY PLASMA – LIQUID
INTERACTION METHOD

Nguyen Thi Song Thuong$^1$, Nguyen Thi Thu Thuy$^1$, Nguyen Thanh Liem$^1$, Pham Hong Minh$^1$, Pham Van Duong$^1$, S.A. Tikhomirov$^2$, O. V. Buganov$^2$ and Do Hoang Tung$^1$

$^1$Institute of Physics, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi, Vietnam

$^2$B I Stepanov Institute of Physics, National Academy of Sciences of Belarus, 68 Prospekt Nezavisimosti, 220072 Minsk, Republic of Belarus

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

Abstract.

Sensitivity of the surface plasmon resonance (SPR) of noble metal nanoparticles to dielectric properties of surrounding media is now strongly studied and is already applied at nanophotonics and optoelectronics for chemical, biological and medical sensing. Dependence of the SPR characteristics on metal nanoparticle sizes and shapes is considered as an effective way to the returning of the SPR spectral position as applied to specific targets. In this work, plasmonic TiO$_2$-Ag and TiO$_2$-Au nanocomposite materials were synthesised by plasma – liquid interaction method. Their morphologies were measured with TEM in accordance to their plasmonic properties analysed by UV-vis absorption spectroscopy.
HIGH-EXTRACTION EFFICIENCY, SIDE-PUMPED DIAMOND-CUT Ce: LICAF ULTRAVIOLET LASER OSCILLATOR AND AMPLIFIER

Pham Van Duong¹, Nguyen Xuan Tu¹, Bui T. Thuy Duong¹, Nguyen Van Diep, Pham Hong Minh¹, Marilou Cadatal-Raduban², Nguyen Van Phu³ and Nobuhiko Sarukura⁴

¹Institute of Physics, VAST, 10 Dao Tan, Ba Dinh, Hanoi, Vietnam
²Centre for Theoretical Chemistry and Physics, Institute of Natural and Mathematical Sciences, Massey University, Albany, Auckland, 0632 New Zealand
³Vinh University, Nghe An Province, Vietnam
⁴Institute of Laser Engineering, Osaka University 2-6 Yamadaoka, Suita Osaka 565-0871 Japan

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

Abstract.

A two-side pumping configuration for laser oscillation and amplification of ultraviolet pulses using a diamond-cut Ce³⁺:LiCaAlF₆ crystal is proposed. Owing to total internal reflection of the pump beam, a 50% improvement in absorption ratio is expected for a φ₁=103°, φ₂=φ₄=82°, φ₃=93°, L=0.64 cm diamond-cut crystal with a height of 2 cm and absorption coefficient of ~1.5 cm⁻¹. Calculation results provide a guideline when choosing crystal geometry, size, and absorption coefficient in order to achieve high extraction efficiency and homogeneity, which when combined with high-energy, multiple-beam pumping would enable the development of an all-solid-state ultraviolet laser operating at terawatt level.

Keywords: Ce:LiCAF crystal, ultraviolet, broadband, short pulse laser emission.
DEVELOPMENT OF A LASER PULSE AMPLIFIER BASED ON CHIRPED PULSE AMPLIFICATION TECHNIQUE FOR ULTRASHORT TITAN-SAPPHIRE LASER PULSES

Pham Huy Thong¹, Nguyen Xuan Tu¹, Pham Van Duong¹, Nguyen Thanh Dan¹, Pham Hong Minh¹*, Buganov Oleg² and S.A. Tikhomirov²

¹Center for Quantum Electron, Institute of Physics, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Hanoi
²B.I. Stepanov Institute of Physics, National Academy of Science of Belarus

*E-mail: phminh@iop.vast.vn

Abstract.

Chirped-Pulse Amplification (CPA) technique has been used widely to produce intense ultra-short laser pulses. We have developed successfully a laser pulse multi-pass amplifier based on CPA for femto-second titan-sapphire laser pulses. This amplifier was pumped at 532 nm at 10 Hz by a high power Nd:YAG laser. The amplifier was well combined with:

A pulse selector which selects single ser pulses at 10 Hz from the mode-locked femto-second titan-sapphire laser pulses of 80 MHz;

A single grating (1200 graves/mm)-based pulse stretcher. This stretcher of a horizontal beam size of 4 cm on a grating surface well stretched single laser pulses of 150 fs (at 800 nm and 10 Hz) to 36 ps corresponding to a large stretching factor.

A single grating (1200 graves/mm)-based compressor which works in a similar way to the pulse stretcher or compressor using a pair of gratings and well compressed single amplified laser pulses of 36 ps to 150 fs.

In energy, this multi-pass CPA amplifier has been successfully used for amplifying pulse energy of femto-second titan sapphire laser pulses from 10 nJ to 70 µJ, corresponding to a factor of 7000.
THE FORMATION OF REDUCED GRAPHEN OXIDE
FROM GRAPHITE BY MODIFIED HUMMERS PROCESS

Nguyen Chi Thang, Ha Xuan Vinh

Nhatrang Institute of Technology Research & Application, Viet Nam Academy of Science and Technology (VAST)

E-mail: thangnc@nitra.vast.vn

Abstract.

Recently, graphene oxide (GO) and reduced graphene oxide (rGO) were studied with many interesting features at 2D structures. The GO, rGO could be obtained from different fabrication methods. In this work, the reduced graphene oxide (rGO) material was synthesized by the modified Hummers method; the pre-material was graphite powder; the final materials obtained from this synthesis process were rGO powder and rGO solution. The formation of rGO was via four steps: graphite → graphite oxide → graphene oxide (GO) → rGO, at each step, the morphological and features of the material were investigated and analyzed by SEM, FTIR, DLS. The results described the oxidation of the graphite layers and showed the exfoliation of the layers to form the rGO. In addition, they indicated the reduction of functional groups when forming rGO from graphene oxide (GO).

The results showed a clear view of the material forming process, and they showed the ability to synthesize rGO by the modified process. This process had high efficiency in reducing of functional groups, which influence to the conductivity of the rGO.

Keywords: rGO, graphene oxide, Hummers, electronic devices.
Abstract.

Pyruvic acid (pyruvate) is a central intermediate in all organisms. It is widely used as a starting material in the industrial biosynthesis of pharmaceuticals and is employed for the production of crop-protection agents, polymers, cosmetics, and food additives.

Halophilic microorganisms, especially *Halomonas* genus, are potential candidates for producing valuable products as polyhydroxyalkanoates (PHA), ectoine, enzymes and pyruvate. In this study, a moderate halophilic, Gram-negative, and aerobe designated as strain HC3 isolated from salter in Nam Dinh province was shown to produce the pyruvate. The isolate was rod-shape, 0.56 - 3.16 μm in length. Colonies on solid medium were circular, smooth and yellow. The strain grew under environment conditions of 0.5 - 20% (w/v) NaCl, pH 5 - 12 and at temperature from 20°C to 45°C. Test for oxidase, catalase activities were positive. This strain reduced nitrate to nitrite. G + C content of HC3 strain was 62.8 mol%. The predominant fatty acids profile of this strain was C\(_{16:0}\), C\(_{18:1}\) \(\omega_7c\), C\(_{16:1}\) \(\omega_7c\) and C\(_{12:0}\) \(3\text{OH}\). Phylogenetic analyses based on 16S rRNA gene sequence has shown that this strain was belonging to the genus *Halomonas*. Based on physiological, biological and chemotaxonomic data, it is proposed that the strain HC3 be assigned to the genus *Halomonas* as *Halomonas* sp. HC3.

**Keywords:** *Halomonas*, Halophile, pyruvate, taxonomy, 16S rRNA genes.
INFLUENCE OF SURFACE PLASMON EFFECT FROM GOLD NANOPARTICLES ON FLUORESCENCE EMISSION OF Cy3 DYE

Chu Viet Ha¹, Le Thuy Linh¹, Nguyen Thi Bich Ngoc², Tran Hong Nhung²

¹Thai Nguyen University of Education, Thai Nguyen, Vietnam
²Institute of Physics, Vietnam Academy of Science and Technology, Hanoi, Vietnam

E-mail: chuvietha@tnu.edu.vn

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

Fig. 1. The fluorescence spectra of Cy3 dye in the present of 10 nm gold nanoparticles.

REFERENCES

EFFECT OF ANNEALED TIMES ON STRUCTURAL, OPTICAL
AND COMPOSITIONAL PROPERTIES ON THE CZTSSe

Dao Tuan Anh, Phan Thi Kieu Loan, Nguyen Huu Ke, Le Vu Tuan Hung

Faculty of Physics and Engineering Physics, University of Science, Vietnam National University
Ho Chi Minh city, 227 Nguyen Van Cu St., Ward 4, District 5, Ho Chi Minh City, Vietnam
E-mail: daotuan@hcmus.edu.vn

Abstract.
CZTSSe absorber thin films is fabricated by Sol-Gel method, the precursor sol solutions were spin coated on glass substrates. Then, the precursor thin films were annealed in selenium atmosphere at temperature at 540°C for an hour. Effect of annealed times on structural, optical and compositional properties on the CZTSSe thin films were analyzed by X-ray diffraction, Raman method, UV-vis spectra and Energy-dispersive X-ray spectroscopy (EDS). The result of analyze by XRD and Raman method showed that CZTSSe thin film exists kesterite structure with (112), (220/204), (312/116) planes. The bandgap energy of CZTSSe thin films were from 1.2 to 1.6 eV, depending on annealing temperature condition and ratio of Se content.

Keywords: CZTSSe, Sol-gel, absorber Thin film, Kesterites.

REFERENCES
APPLICATION OF THE COLLECTIVE MODEL TO DETERMINE SOME VIBRATIONAL BANDS OF $^{140}$LA NUCLEUS

Nguyen Duc Hoa$^1$, Nguyen An Son$^1$, Le Viet Huy$^1$, Pham Ngoc Son$^2$

$^1$ Dalat University, 01 Phu Dong Thien Vuong st., ward 8, Dalat city, Lam Dong Province
$^2$ Nuclear Research Institute, Nguyen Tu Luc st., Dalat city, Lam Dong Province

E-mail: huylv@dlu.edu.vn

Abstract.

$^{140}$La is created from the thermal neutron capture reaction of $^{139}$La, which is the product of the fission reaction. It makes some effects into the components of the nuclear reactor core. Understanding the properties and structure of $^{140}$La is important in operating the nuclear reactor. Besides that, nuclear structure models are very effective in explaining the properties of nuclear structure. There are many nuclear structure models to solve those problems, such as Liquid Drop Model, Shell Model, Fermi Model, etc. Among them, the Collective Model has been very successful in describing the variety of nuclear properties, especially energy levels in deformed nuclei that the Shell Model and the Liquid Drop Model does not apply. This paper presents the application of the Collective Model to determine some vibrational bands of $^{140}$La nucleus. This experiment is performed at channel No.2 of Dalat Research Reactor (DRR), Prompt gamma neutron activation analysis method (PGNAA) is used. The result has found 8 vibrational bands of $^{140}$La nucleus. It’s quite relevant to the theoretical calculation. The deviations are less than 1.6%.

Keywords: Collective model, $^{140}$La, vibrational band.

REFERENCES

MEASUREMENT OF IN-PHANTOM THERMAL NEUTRON FLUX DISTRIBUTION IN DALAT RESEARCH REACTOR BORON NEUTRON CAPTURE THERAPY BEAM LINE

Pham Dang Quyet¹, Pham Ngoc Son² and Trinh Thi Tu Anh¹

¹ Nuclear Engineering Department, Dalat University, 01-Phu Dong Thien Vuong, Dalat, Vietnam
² Center for Nuclear Physics and Electronics, Nuclear Research Institute, 01-Nguyen Tu Luc, Dalat, Vietnam

E-mail: quyetpd@dlu.edu.vn

Abstract.

The present result of in-phantom thermal neutron flux distribution was measured by the activation method using the filtered neutron beam at Dalat research reactor. Water has been chosen for the inside of the phantom and $^{51}$V standard foils have been used. The induced activities in the irradiated samples were measured by a high resolution HPGe digital gamma-ray spectrometer. The results of this study are also compared with those of other studies.

REFERENCES


CALCULATION AND SIMULATION OF THE TWO-PHASE FLOW AND 3D VOID-FRACTION DISTRIBUTION IN THE BFBT EXPERIMENTS USING ANSYS FLUENT CODE

Nguyen Thi Minh Sang\textsuperscript{1} and Nguyen Minh Tuan\textsuperscript{2}

\textsuperscript{1}Dalat University, 01 Phu Dong ThienVuong, Dalat
\textsuperscript{2}Nuclear Research Institute, 01 Nguyen Tu Luc, Dalat
E-mail: sangntm@dlu.edu.vn

Abstract:
BFBT (BWR Full-size Fine – Mesh Bundle Test), which are a series of experimental tests in order to measure high resolution and full scale experimental characteristics of two-phase flow in BWR fuel bundle under actual operating conditions, has been performed by NUCPEC (Nuclear Power Engineering Corporation) of Japan, NRC (Nuclear Regulator Commission) of the United States and OECD organization. This experimental database is very valuable in understanding and verifying capabilities of calculation models of complex two-phase flow that is used in thermal-hydraulics safety analysis. This paper presents the results of calculation simulating two-phase flow and 3D void-fraction distribution in the BFBT experiments using ANSYS FLUENT. The input data used in the calculation were taken from the BWR Full-size Fine-Mesh Bundle Test Benchmark and calculation results are compared with the experimental test data.

Keywords: BFBT (BWR Full-size Fine – Mesh Bundle Test), sub-channel, void-fraction, grid spacer, boiling water reactor (BWR).

REFERENCES


STUDY ON THE EFFECTS OF METAL LAYER THICKNESS ON RESPONSE FUNCTIONS OF BONNER SPHERE EXTENDED SPECTROMETER BY MCNP CALCULATION

Mai Nguyen Trong Nhan¹, Trinh Thi Tu Anh²

¹Department of Nuclear Engineering, Ulsan National Institute of Science and Technology, Republic of Korea
²The Research Management and International Cooperation Department, Dalat University, Vietnam
E-mail: trongnhan217@gmail.com

Abstract.

The response functions of the Bonner Sphere Extended spectrometer were calculated using MCNP program. For incident neutrons above 10 MeV, tungsten was an excellent heavy material as it yielded the highest response among tested materials. In addition, the thickness of the heavy-metal layer had a considerable effect on the response. Based on calculated results, recommended thickness for Bonner Sphere Extended spectrometers was also presented. This study was valuable not only in understanding the behavior of Bonner Sphere Extended Spectrometer but also provide data for future experiments.

Keywords: Bonner Sphere Extended spectrometer; Metal thickness; Response.

REFERENCES

EFFICIENCY CALCULATION FOR PLASTIC SCINTILLATOR IN IN-SITU BETA MEASUREMENT SYSTEM USING MCNP6

Mai Nguyen Trong Nhan¹, Trinh Thi Tu Anh²

¹Department of Nuclear Engineering, Ulsan National Institute of Science and Technology, Republic of Korea
²The Research Management and International Cooperation Department, Dalat University, Vietnam

E-mail: trongnhan217@gmail.com

Abstract.

The efficiency of plastic scintillator was calculated based on MCNP simulation, with various thickness of the plastic scintillator layer taken into consideration. The plastic scintillator was a good candidate in measuring high energy beta emitters (³²P or ⁹⁰Sr/⁹⁰Y). However, poor counting efficiency was expected for ³H and ¹⁴C due to the short range of beta in aqueous environment. Based on the energy deposition and the effect of gamma rays/background, a thickness of 1mm of plastic scintillator was suggested for the upcoming device.

Keywords: Beta rays, in-situ device, plastic scintillator, efficiency.

REFERENCES

[1] In-situ radiation detection demonstration, Stephen W. Duce, Amir H. Mohagheighi, Mark L. Miller, Robert R. Reese and David R. Miller. WM'00 Conference, February 27 – March 2, 2000, Tucson, AZ.

