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September 06-07, 2018 | Bangkok, Thailand

# DAY 1

## Scientific Tracks & Abstracts

# Day 1
# SESSIONS

September 06, 2018

**Nanophysics | Organic & Molecular Electronics | Plant & Agricultural Biotechnology | Biomass & Bioenergy**

## Session Introduction

**Session Chair**
**Gurumayum Jitendra Sharma**
Manipur University, India

**Session Chair**
**Anita Sadadevan Ethiraj,**
VIT-AP University, India

Title: **Prospects of microalgae biorefinery start-up in northeast India for generation of green energy and other novel products**
**Mohan Chandra Kalita,** Gauhati University, India

Title: **Production of lovastatin by soil micro fungi *Rhizopus oryzae***
**P.Anusha,** The American College, India

Title: **Continuous production of biopolymer (PHB) from by-product of biodiesel industry (glycerol) using high cell density culture**
**Ashok Kumar Srivastava,** Indian Institute of Technology, India

Title: **Photocatalytic antibiofouling nanocoating for marine and fresh water environments**
**Tanujjal Bora,** Asian Institute of Technology, Thailand

Title: ***In-vitro* anti-oxidant and anti-diabetic evaluation of *Premna herbacea* Roxb**
**Rantumoni Sharma,** Gauhati University, India

Title: **Tuning radical interactions in PPH radical dendrimers**
**Vega Lloveras,** Instituto de Ciencia de Materiales de Barcelona – CSIC, Spain

Title: **Radical dendrimers**
**José Vidal Gancedo,** Instituto de Ciencia de Materiales de Barcelona – CSIC, Spain

Title: **Investigation of biogenic Ag nanoparticles using medicinal plant extract and their antimicrobial study**
**Anita Sadadevan Ethiraj,** VIT-AP University, India

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EMERGING MATERIALS AND NANOTECHNOLOGY
September 06-07, 2018 | Bangkok, Thailand
Mohan Chandra Kalita et al., Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-010

# PROSPECTS OF MICROALGAE BIOREFINERY START-UP IN NORTHEAST INDIA FOR GENERATION OF GREEN ENERGY AND OTHER NOVEL PRODUCTS

**Mohan Chandra Kalita, Banasree Sharma, Jinu Medhi and Priyanka Paul**
Gauhati University, India

Microalgae have been the immense source of global attraction as a highly potential and promising renewable biomass source of energy, biomitigation and sustainable valuable products. Biotechnological explorations of the underutilized bountiful indigenous algae diversity of NE India, have potentially opened a new avenue for sustainable product development including green energy production. Several microalgae species have been marked as potential source of naturally occurring high valued products such as lipids, vitamins, proteins, carbohydrates, antioxidants, colorants, food supplements and other bioactive molecules. The North East India, apart from being one of the mega biodiversity hotspots in the world, has bestowed upon with vivid freshwater microalgal resources. These diverse bio-resources of the region are yet to be explored to the extent for their potential biotechnological applications. Recent studies carried out are envisaged with the isolation and screening of freshwater biodiesel potential microalgae of the region yielding with the isolation of 24 indigenous freshwater microalgae species, which require further works for possible commercial utilizations and biotechnological applications. Among the isolated microalgae, *Chlorella* sp, *Botryococcus braunii, Ankistrodesmus* sp, *Scenedesmus* sp, *Euglena* sp, *Haematococcus* sp, *Navicula* sp, and *Nitzchia* sp are known to be a few oleaginous microalgae noteworthy for biofuel production. Oil (lipid) contents were quantitatively evaluated in laboratory cultures of isolated *Ankistrodesmus* sp, *B braunii, Scenedesmus* sp, *Chlorella* sp and *Chlorococcum* species. The lipid content of some of the isolated microalgae species grown in normal BG11 medium were found to be in the range between 11.3–42.0% of dry weight. Analysis of the carotenoid contents of the selected native microalgae species also revelled higher content of lutein, lycopene and astaxanthin, which can be produced as other high valued products for additional fund generation during liquid biofuel production. The liquid hydrocarbon producing green microalgae *B braunii* is found to be significant among the isolated microalgae, which exhibited hydrocarbon in the range between 21.9-60.7% of dry weight. Some of these isolated microalgae e.g. *Scenedesmus* sp (8-56% protein; 10-52% carbohydrate), *Chlorella* sp (51-58% protein; 12-26% carbohydrate), *Euglena* sp (39-61% protein; 14-18% carbohydrate and 14-20% lipid) are also reported to contain high percentage of carbohydrate and protein in addition to its moderate to high lipid content, which justify the enough scope for utilization of these species in developing a technology for potential biofuel production and other value added products of commercial potential based on biorefinery approaches.

## BIOGRAPHY

Mohan Chandra Kalita has completed his MSc (GAU), PhD (GAU), Postdoc (IARI, New Delhi), FLS (London). He has served as Head (2007-2010), Department of Biotechnology, Gauhati University and Founder Head (i/c) (2009-2014), Department of Bioengineering and Technology, Gauhati University Institute of Science and Technology (GUIST), Gauhati University. Till now he has 49 PhD degrees; and five Post doctorate degrees has been supervised under his guidance. A total of 162 research papers has been published in reputed journals. He also has two granted patents and six filed patents. He has completed 23 research projects of different funding agencies including one international collaboration with University of Rio De Jenerio, Republic of Brazil. (International Collaboration). He has h-index 14 and 527 citations.

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September 06-07, 2018 | Bangkok, Thailand
P Anusha et al., Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-010

# PRODUCTION OF LOVASTATIN BY SOIL MICRO FUNGI *RHIZOPUS ORYZAE*

**P Anusha** and **S Rajkumar Immanuel**
The American College, India

Natural statins like lovastatin which is mainly produced by fungal strains act as an inhibitor of HMG-CoA reductase, an enzyme involved in the biosynthesis pathway of cholesterol. The statins decrease the level of cholesterol in blood. The aim of the study was to determine the lovastatin producing potential of soil micro fungi. In the present investigation 10 soil fungi were screened for lovastatin production using shake flask culture. The screening of potential lovastatin producing fungus was carried out using bio-assay method against *Saccharomyces cerevisiae* as an indicator microorganism in the YPDA medium by measuring the zone of inhibition. The diameter of zone of inhibition ranged from 3.7 to 4.8 mm in *Rhizopus oryzae* which produced a maximum zone of inhibition. Among the lovastatin producing strains *Rhizopus oryzae* was found to be utilized maximum substrates. Genomic identification of the strain was done using 18S rDNA technique. The DNA of *Rhizopus oryzae* was extracted and purified by agarose gel electrophoresis and sequenced using the ˜˜1.5kb 18S rRNA fragment and was amplified using the primers. Phylogenetic analysis performed by the maximum parsimony (MP) method and molecular evolutionary relationship was inferred using neighbor–joining method and the identity was confirmed. The fungi *Rhizopus oryzae* was screened for lovastatin production using HPLC analysis after extraction of the compound from the fermentation broth with ethyl acetate. Lovastatin quantification was carried out on extracts from the culture broth and a production level of 20.39mg/l was recorded. Hence, from this investigation it was concluded that rapid method of determination of lovastatin can also be employed to screen lovastatin producing fungal isolates from soil and the isolate *Rhizopus oryzae* being recommended for further studies as a potent lovastatin producer.

## BIOGRAPHY

P Anusha is a pursuing her PhD at The American College, India. She is examining her PhD under RajKumar Immanuel. S RajKumar Immanuel is as of now filling in as the Associate Professor and Head of the Postgraduate Department of Environmental Science and Dean for Curriculum Development and Research at The American College, Madurai, Tamil Nadu, India. His zone of research is Fungal Biotechnology.

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Annual Congress on
EMERGING MATERIALS AND NANOTECHNOLOGY
September 06-07, 2018 | Bangkok, Thailand
Ashok Kumar Srivastava et al., Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-010

# CONTINUOUS PRODUCTION OF BIOPOLYMER (PHB) FROM BY-PRODUCT OF BIODIESEL INDUSTRY (GLYCEROL) USING HIGH CELL DENSITY CULTURE

**Ashok Kumar Srivastava** and **Kamakshi Gupta**
Indian Institute of Technology, India

Versatile qualities of strength and lightness of petroleum derived plastics have an ever-increasing demand in society but are restricted primarily due to its non-biodegradable nature and its production from disappearing petrochemical resources. Alternatives are therefore, sought for the polymer of similar properties which is not only biodegradable but also produced from renewable resources. Some microbes have shown a distinct ability to accumulate biodegradable polymer PHB (poly-hydroxybutyrate) when grown under limiting concentration of nitrogen and phosphates. However, the cost of production of these polymers is significantly higher than that derived from fossil fuel resources. Attempts are made to use glycerol (by product of bio-fuel industry) as substrate to economize the production. To further increase concentration, yield and productivity of bio/copolymer, the process is optimized to be carried out in fed batch followed by continuous mode with cell retention or cell recycle device. Batch cultivation of C necator in glycerol exhibited a long lag phase. To overcome this, attempts were made to use glycerol and glucose as mixed substrate for above cultivation to improve the process performance. Statistically optimized concentrations of glycerol and glucose, 25g/l and 5g/l were used to study growth kinetics in batch mode. The results were used to develop a mathematical model for the growth of biomass and accumulation of PHB, which was further extrapolated for fed batch and continuous mode. To establish a better method for high cell density, both spin filter (cell retention device) and inclined settler (cell recycle device) were used in separate sets of experiments. It was observed that spin filter, the cell retention device, has higher retention efficiency as it produced 12.7g/l biomass and 8.6g/l PHB as opposed to 10.98g/l biomass and 6.9 g/l PHB in case of inclined settler. The advantages and limitation of use of either devices for cell retention.

## BIOGRAPHY

Ashok Kumar Srivastava has received his PhD degree from the McGill University, Montreal in 1990. He has 40 years of industrial research teaching experience in Biochemical Engineering and Biotechnology. He has 110 international journal papers, 154 international/national presentations and two patents to his credit. He has supervised 16 PhD (five continuing) and 73 master's theses. His major interest is in modelling simulation, optimization and control of bioprocesses, microbial/plant cell/hairy root cultivations for important metabolite production (bio/copolymer production, podophyllotoxin, azadirachtin, ajmalicine, shikimic acid production etc) and novel bioreactor development.

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Annual Congress on
EMERGING MATERIALS AND NANOTECHNOLOGY
September 06-07, 2018 | Bangkok, Thailand
Tanujjal Bora et al., Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-010

# PHOTOCATALYTIC ANTIBIOFOULING NANOCOATING FOR MARINE AND FRESH WATER ENVIRONMENTS

**Tanujjal Bora, Nitsuphang Kongsa, Oleg Shipin** and **Gabor L Hornyak**
Asian Institute of Technology, Thailand

Biofouling is a natural process that involves accumulation of microorganisms, plants, algae, or animals on a surface that is in contact with an aqueous environment. Biofouling is typically a multistage process, which usually starts with organic or molecular fouling – accumulation of macromolecules, like proteins and carbohydrates, from water, which further leads to the attachment of microbial cells. Although the process is natural, it has plagued many industrial sectors, such as shipping industry, aquaculture, desalination and even oil-refineries by resulting in surface corrosion costing them billions of dollars yearly to overcome it. There have been numerous efforts to prevent biofouling that have been made with varying success rates till date. These typically includes protecting the surface with wax type materials, standard paints, chemical antifouling coatings as well as introduction of toxic biocides such as tributyltin (TBT) containing compounds as surface coating. When the introduction of toxic biocides helped the industries to prevent the biofouling up to certain degree, at the same time it has started to affect the aquatic ecosystem as well making the use of biocides an environmentally serious issue. In our research we are addressing this issue by developing environment friendly antibiofouling coatings based on biocompatible photocatalytic nanomaterials. Our approach is simple and can be easily up-scaled. Using metal oxides, such as zinc oxide (ZnO) and titanium dioxide (TiO2), we have developed nanoscale coatings and tested their antibiofouling properties in both marine and fresh water environment. Compared to the commercially available copper based antifouling paints, our coatings have shown better antibiofouling properties and more durability. Experiments conducted in real world suggest that these photocatalytically active nanocoatings can be a potential alternative to the commonly used toxic antibiofouling paints for the prevention of biofouling in aquatic environment.

## BIOGRAPHY

Tanujjal Bora is a Faculty in Nanotechnology field in Asian Institute of Technology, Thailand. He has completed his doctoral degree in Nanotechnology in 2012 from AIT, Thailand and then joined the Chair in Nanotechnology Research Group at Sultan Qaboos University, Oman as a post-doctoral Researcher. His major research interest is on nano-engineered materials for solar energy harvesting and environmental applications. He has more than 30 international journal publications with citations over 750 and h-index of 15.

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EMERGING MATERIALS AND NANOTECHNOLOGY
September 06-07, 2018 | Bangkok, Thailand

Rantumoni Sharma et al., Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-010

# *IN-VITRO* ANTI-OXIDANT AND ANTI-DIABETIC EVALUATION OF *PREMNA HERBACEA* ROXB

**Rantumoni Sharma, Jayashree Dutta** and **M C Kalita**
Rantumoni Sharma, Jayashree Dutta and M C Kalita

*Premna herbacea* Roxb (family- *Verbenaceae*), locally known as Keradaphini (Bodo) and Matiajam (Assamese), is an undershrub 7-20 cm high, with sessile leaves and the basal pairs lies flat on the surface. Leaves of *P herbacea* was collected from Holtugaon reserve forest under Manas National Park, Assam, India. The plant was authenticated in the GUBH. The GPS of Holtugaon forest division, from where the plant was collected is 81´ 13´´N and – 41´ 89´´E. The *in vitro* hypoglycaemic evaluation of the collected plant material i.e. alpha amylase and alpha glucosidase inhibition was determined. The anti-oxidant property for their free radical scavenging property was accessed by DPPH method. The plant material was further subjected to preliminary phytochemical screening using standard protocol of Harborne and Trease *et al.*, 1998. The leaf methanol extract of P *herbaceae* demonstrated alpha amylase inhibition with IC50 29.71 µg/mL compared to acarbose 344.83 µg/mL. While, chloroform extract, petroleum benzene and ethyl acetate extract demonstrated no inhibition of enzyme alpha amylase. In case of alpha glucosidase, the methanol extracts demonstrated the highest inhibition with minimum IC50 value of 382 µg/mL compared to acarbose 397.06 µg/mL followed by the ethyl acetate extract IC50 409.83 µg/mL. On the other side, chloroform and petroleum benzene demonstrated slight inhibition with high IC50 value compared to acarbose. The aqueous extract of *Premna herbacea* demonstrated the presence of many bioactive secondary metabolites like terpenoid, steroid, phenol, flavonoids, saponin, tannin, coumarin and sugar. However, alkaloid was not detected in *Premna herbacea*. *P herbaceae* demonstrated anti-oxidant property with IC50 value of 4.84 µg/mL compared to ascorbic acid 5.61 µg/mL. The results obtained showed that the plant sample is rich with therapeutic properties, which could be a futuristic alternative for prevailing medicines for anti-oxidant and anti-diabetic.

## BIOGRAPHY

Rantumoni Sharma has completed his MSc in Botany (2016) from Gauhati University, India. Currently he is working in a DBT project under the guidance of Prof Mohan Chandra Kalita, Department of Biotechnology, Gauhati University, and he has two publications in reputed journals till now including four poster presentations and one oral presentation.

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EMERGING MATERIALS AND NANOTECHNOLOGY
September 06-07, 2018 | Bangkok, Thailand
Vega Lloveras et al., Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-010

# TUNING RADICAL INTERACTIONS IN PPH RADICAL DENDRIMERS

**Vega Lloveras, Flonja Liko, Luiz F Pinto** and **José Vidal Gancedo**
Institut de Ciència de Materials de Barcelona ICMAB–CSIC, Spain

The spin-spin interactions between unpaired electrons in organic diradicals and polyradicals are of crucial importance in many areas, such as organic magnetism, molecular charge transfer, and multiple spin labeling in structural biology. The flexibility of the scaffold and the length of the linker between the unpaired electrons is expected to determine the extension of the spin exchange coupling. Thus, the properties of the scaffold must be carefully considered, when studying the spin-spin interactions in polyradicals. In this context, we have turned our attention to dendrimers, whose end-groups have been coupled to spin probes, allowing their study by electron paramagnetic resonance spectroscopy (EPR). To discover in what magnitude the spin exchange coupling could be tuned by changing the properties of the linker between the radicals and the dendrimer, two generations ($G_0$, $G_1$) of polyphosphorhydrazone (PPH) dendrimers were synthesized and fully functionalized with pendant TEMPO radicals via acrylamido ($G_n$-acrylamido-TEMPO) or imino ($G_n$-imino-TEMPO) group linkers. The EPR and cyclic voltammetry (CV) studies showed that there existed much higher interactions among pendant group radicals, when bounded to the dendrimer by imino group linkers. This was true in either polar or less polar solvents. To conclude, we were able to drastically change the way that the pendant radicals interacted, by the solely substitution of the dendritic radical linker.

## BIOGRAPHY

Vega Lloveras completed her PhD at the Autònoma University of Barcelona, Spain, in 2006. She has a permanent position at the Material Science Institute of Barcelona (ICMAB-CSIC, Spain) in charge of some spectroscopic equipment like Electron Paramagnetic Resonance (EPR). She has 40 publications that have been cited over 1450 times, and her publication H-index is 18.

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September 06-07, 2018 | Bangkok, Thailand
José Vidal Gancedo et al., Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-010

# RADICAL DENDRIMERS

**José Vidal Gancedo, Vega Lloveras Monserrat** and **Luiz Pinto**
Instituto de Ciencia de Materiales de Barcelona – CSIC, Spain

**Our interest is focused on the study of molecular materials based on radical dendrimers and their magnetic and/or electric properties as well as their possible biomedical applications. Dendrimers are a very special class of hyperbranched macromolecules, which are synthesized step-by-step to ensure a good monodispersed. The three-dimensional structure of these molecules proceeds from the central core with exponentially increasing number of repeated units and terminal groups. The term radical dendrimers have been used in the case of highly functionalized dendrimers with organic radicals. There are only few examples of fully functionalized dendrimers with organic radicals to study the magnetic behavior. Here we present a series of dendrimers built with phosphorus as branching points and with nitroxyl radicals as end groups. Molecules with many unpaired electrons, which possess high-spin ground state and stability at room temperature, are particularly challenging and promising targets. The interaction between pendant stable radicals at the exterior of the dendritic surface and their dynamic behavior can be studied using Electron Paramagnetic Resonance (EPR) spectroscopy. This is important to understand the magnetic properties of these functionalized dendrimers. We describe several generations of phosphorus dendrimers with stable radicals' end groups as well as the crystal.**

## BIOGRAPHY

José Vidal Gancedo is tenured Scientist at the Materials Science Institute of Barcelona, ICMAB-CSIC and at the Networking Research Center on Bioengineering, Biomaterials and Nanomedicine, CIBER-BBN, Barcelona, Spain. He is Scientist in charge of the ICMAB Electron Paramagnetic Resonance Laboratory and Secretary of The Spanish Electron Paramagnetic Resonance Group, GERPE. He co-authored more than 140 journal articles and book chapters and four patents and his H-factor is 32. His research interest focuses on molecular functional materials based in organic radicals, molecular nanoscience, and nanomedicine.

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September 06-07, 2018 | Bangkok, Thailand
Anita Sadadevan Ethiraj, Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-010

# INVESTIGATION OF BIOGENIC AG NANOPARTICLES USING MEDICINAL PLANT EXTRACT AND THEIR ANTIMICROBIAL STUDY

**Anita Sadadevan Ethiraj**
VIT-AP University, India

Silver (Ag) nanoparticles exhibit significant role in the field of nanotechnology and nanomedicine owing to its physiochemical properties like antibacterial and antifungal activities, chemical stability, catalytic activity and good conductivity. These inorganic nanoparticles being safe and nontoxic can destroy disease-causing microorganisms. The potential applications of Ag nanoparticles include optical receptors for biolabelling, wound dressing, biosensors, medical devices, antimicrobial nanopaints, solar energy absorption as selective coatings, water purification and in electrical batteries as intercalation material. Amongst various existing physical and chemical methods, the biological methods are rapid, low-cost, ecofriendly hence mostly preferred for the synthesis of Ag-NPs. These methods utilize use of microorganisms, fungi, enzymes and plant extracts as reducing and stabilizing agents. The major advantage of using plant extracts is the elimination of cell culture. In literature many reports are available on the green synthesis of Ag-NPs from numerous plant extracts which includes widely used medicinal plants such as aloe vera, tulsi (*Ocimum tenuiflorum*), nilgiri (*Eucalyptus chapmaniana*), amla (*Emblicaofficinallis*), ashwagandha (*Withaniasomnifera*), hibiscus (*Rosa sinensis*), neem (*Azadirachta indica*) etc. The present talk will focus on some of the interesting work carried out by our research group on *Carica papaya* and *Alstonia scholaris* plants with good medicinal values where the leaf extracts itself acts as a reducing and stabilizing agent for the formation of Ag nanoparticles using green chemistry approach. The optical, structural and morphological characteristics of silver nanoparticles synthesized using various characterization tools like x-ray diffraction (XRD), atomic force microscopy (AFM), UV-Vis absorption spectroscopy, scanning electron microscopy (SEM) coupled with x-ray energy dispersive spectroscopy (EDS) and atomic force microscopy (AFM) will be presented. Later the impact of leaf condition on the formation of nanoparticles as well as the evaluated efficacy of the antimicrobial activity of biogenic Ag NPs from *A scholaris* will be discussed.

Note:

## BIOGRAPHY

Anita Sagadevan Ethiraj has completed her PhD from Department of Physics, University of Pune, India in 2006. She was a visiting Scientist and BK21 postdoctoral Researcher for the year 2006-2008 in POSTECH and SKKU, South Korea. She also worked on US defense sponsored project from 2010-2013 at North Carolina, USA. She is presently working as an Associate Professor in the Physics Department, VIT-AP University, India. Her research area of interest includes core-shell nanoparticles, quantum dots in diodes and LED's, thin film technology, photovoltaics, green chemistry, graphene/metal oxide-based nanocomposites for environmental and energy applications. She has delivered several invited talks in national and international conferences, served as Convenor, National Advisor Committee Member, Technical Committee Member and session chairs, holds membership in many professional organizations, reviewer for Elsevier and Springer publisher journals and has numerous peer reviewed impact factor papers to her credit.

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# DAY 2

## Scientific Tracks & Abstracts

# Day 2

# SESSIONS

September 07, 2018

**Nanoelectronics | Bionanotechnology | Advanced Nanomaterials | Genetic and Molecular Biotechnology | Environmental Biotechnology**

## Session Introduction

**Session Chair**
**Anita Sadadevan Ethiraj**
VIT-AP University, India

**Session Chair**
**Je-Lueng Shie**
National I-Lan University, Taiwan

Title: **Nanocarbon based field emission electrical propulsion system for nano satellite**
**Nirupama M P,** BML Munjal University, India

Title: **Controlled fluorescence in chemically modified porous silica nanoparticles**
**Shadmani Shamim,** Asian Institute of Technology, Thailand

Title: **Biofuel production from the torrefaction of unfriendly biowastes using carbon dioxide as upgraded agent**
**Je-Lueng Shie,** National I-Lan University, Taiwan

Title: **Mass spectrometry-based proteomics: challenges and opportunities**
**Medicharla Venkata Jagannadham,** CSIR-Centre for Cellular and Molecular Biology, India

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September 06-07, 2018 | Bangkok, Thailand
Nirupama M P et al., Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-010

# NANOCARBON BASED FIELD EMISSION ELECTRICAL PROPULSION SYSTEM FOR NANO SATELLITE

**Nirupama M P** and **B S Satyanarayana**
BML Munjal University, India

Small satellites play a significant role in the era of information and communication technology (ICT) and internet of things (IoT). The advancement in technology today allows the satellites to become smaller and yet carry greater capacity and capability payloads. Small satellites are expected to be used for applications in domains including environment, agriculture, climate change, mapping, navigation and scientific research. The Indian Space Research Organization (ISRO) which has launched over nine student satellites, is expanding the scope of small satellite launch. The extension of useful life of these small satellites depends very much on the ability to provision propulsion capability in these satellites. Hence the current effort is to develop indigenous capability for the development of nanocarbon based field assisted electron emitter arrays to be used in field emission electrical propulsion (FEEP) system for nano satellite.

## BIOGRAPHY

Nirupama M P is currently working as Faculty at BML Munjal University. She is a recipient of PhD assistantship under TEQIP and pursuing PhD from Jain University, Bangalore. She received her MTech (Electronics Engineering) degree from B M Sreenivasiah College of Engineering, Bangalore and B E (Electronics and Communication Engineering) from Dayanand Sagar College of Engineering, Bangalore. She involves herself in social work to support and empower women and children. With this interest in mind she obtained post graduate diploma in human rights from Indian Institute of Human Rights, New Delhi. She was a Project Assistant at NAL (National Aerospace Laboratories), Bangalore, India, during her B E and MTech final projects. She also worked as Research Scholar and Senior Research Fellow (SRF) at R V College of Engineering, Bangalore, India. She has over 10 years of teaching and industrial experience. Her areas of research include nanotechnology, aerospace, novel electronics materials and devices and vacuum nanoelectronics.

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Shadmani Shamim et al., Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-010

# CONTROLLED FLUORESCENCE IN CHEMICALLY MODIFIED POROUS SILICA NANOPARTICLES

**Shadmani Shamim, Tanujjal Bora, Daniel Crespy** and **Gabriel L Hornyak**
Asian Institute of Technology, Thailand

Porous silica nanoparticles are a special class of nanoparticles with potential applications in numerous areas, such as drug-delivery systems, bio-sensing, bio-labeling, or as additives to polymer coatings. For these applications, fluorescence property is suitable and therefore modification of silica nanoparticles to make them fluorescent is becoming a regular process. In our research, the synthesis of porous silica nanoparticles was performed through a simple and cost-effective wet chemistry route using cetyltrimethyl ammonium bromide (CTAB) as a template and structure directing agent and tetraethyl orthosilicate (TEOS) as silica precursor. Various characterization techniques, such as electron microscopy, FTIR (fourier transform infrared spectroscopy), and helium-pycnometry were used to characterize the porous nanoparticles. The fluorescence properties of the silica nanoparticles were further investigated by modifying the synthesized nanoparticles with 3-aminopropyl triethoxysilane (APTES). Silane modified silica nanoparticles were found to exhibit visible light fluorescence with variable intensity and wavelengths that were controlled by calcinating the nanoparticles at different temperatures. X-ray photoelectron spectroscopy (XPS) analysis of the calcined nanoparticles revealed the presence of C, N, and O within the silica lattice, suggesting these impurities as the possible source for the visible light fluorescence exhibited by the porous silica nanoparticles. Such defects were found to be removed when nanoparticles were calcined at higher temperatures (800°C), resulting in the disappearance of visible light fluorescence from the porous nanoparticles.

## BIOGRAPHY

Shadmani Shamim has completed her Master of Engineering degree in Nanotechnology in December 2017 from Asian Institute of Technology, Thailand. Previously she did her bachelor's degree in Electrical and Electronic Engineering from Ahsanullah University of Science and Technology, Bangladesh. Currently, she is working as a Researcher in the Center of Excellence in Nanotechnology, AIT, Thailand. Her primary research interest is synthesis and characterization of nanomaterials.

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Annual Congress on
EMERGING MATERIALS AND NANOTECHNOLOGY
September 06-07, 2018 | Bangkok, Thailand
Je-Lueng Shie et al., Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-010

# BIOFUEL PRODUCTION FROM THE TORREFACTION OF UNFRIENDLY BIOWASTES USING CARBON DIOXIDE AS UPGRADED AGENT

**Je-Lueng Shie** and **Yi-Ru Liau**
National I-Lan University, Taiwan

Unfriendly biowaste (sweet potato vine, oil camellia shell and building demolition wood) will have adverse effects and harms on agricultural land and the environment, and it is not suitable for direct disposal and reuse on-site. The torrefaction procedures of cracking furnace and plasmatron reactor used in this study are advanced heat treatment technology. The gas, liquid and solid products can be achieved effectively from the thermal-treatment of unfriendly biowastes using carbon dioxide as upgraded agent at the high-temperature reactors. The operational parameters include furnace types, temperature, carrier gas, $CO_2$ concentration, batch and semi-batch feeding of samples etc. The samples from the pre-treatment, products of liquid, gas and solid from the experiment were all processed under the characteristic analyses, including approximately analysis, heating values, GC-MS, GC-TCD, EA, FTIR, TGA etc. The thermal effect of $CO_2$ in the exhaust gas on the torrefaction of the biowastes proved that $CO_2$ activation can accelerate and improve the calcination reaction. The main reaction mechanisms are water shift reaction and Boudouard reaction; it should be due to that the gaseous $CO_2$ reacted with $H_2$ and carbon, respectively, while resulting in the conversion from $CO_2$ to CO. This study confirmed that unfriendly biowaste not only can be converted into solid fuels completely but also a large syngas is produced. This technology shows a great future potential development.

## BIOGRAPHY

Je-Lueng Shie is a Professor at the Department of Environmental Engineering, National I-Lan University, Taiwan. He has publications of 84 articles in scientific journals (including 66 SCI journals), 115 articles in conference proceedings, 37 reports, and five patents. His study fields are focusing on: thermal plasmatron technology; photoelectric material and catalyst applications; waste biomass refinery for advanced biofuels and biomaterials, and environmental pollution and GHG control.

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allied academies Joint Event on
Global Congress on
BIOTECHNOLOGY
&
Annual Congress on
EMERGING MATERIALS AND NANOTECHNOLOGY
September 06-07, 2018 | Bangkok, Thailand
Medicharla Venkata Jagannadham, Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-010

# MASS SPECTROMETRY-BASED PROTEOMICS: CHALLENGES AND OPPORTUNITIES

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Mass spectrometry-based proteomics is extensively used for the identification of proteins from complex mixtures, their expression, quantification, post-translational modifications and study the interactions among proteins. Using proteomics, the biology of several complex diseases was studied. However, the problems associated with reproducibility, false discoveries, lack of proper standards, problems in *de novo* sequencing lead the researcher to look for validation methods. A thorough understanding of these techniques and their limitations is crucial in facilitating the development of new strategies to overcome the existing problems and advancement of the technology. The limitations associated with the sensitivity, comprehensiveness involved with mass spectrometry should be understood. Sample preparation, handling and data analysis plays a critical role on the results. The huge amounts of MS data generated is analyzed using different algorithms. These algorithms require the protein/genome data base for the identification of proteins. This approach cannot be used for the species whose genome sequence is not known. In this situation, *de novo* sequencing followed by homology search is the method of choice for the identification of proteins. The opportunities in developing different technologies and strategies in the proteomics work flows play a critical role in utilizing proteomics effectively.

## BIOGRAPHY

Medicharla Venkata Jagannadham is working as a senior Principal Scientist and Project Leader at the Centre for Cellular and Molecular Biology. He has vast experience in protein chemistry and proteomics. He published more than 50 research papers, with some papers having more than 100 citations. He trained several students, conducted meetings and workshops in proteomics. He received Bharat Jyothi award from India International Friendship Society, New Delhi in 2014 and Eminent Mass Spectrometrist award from the Indian Society for Mass spectrometry (ISMAS) in 2015. His current research interests are proteomics, particularly in improving the *de novo* sequencing efficiency of peptides using MS techniques, structural and functional studies of outer membrane vesicles of Gram-negative bacteria.

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