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Samia Danuta Brejão de Souza et al., Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-011

# CHARACTERIZATION BY ENF OF SAMPLES WELDED BY ELECTRIC RESISTANCE WELDING PROCESS AND CONDITIONED IN UV RADIATION CHAMBER

**Samia Danuta Brejão de Souza, Edson Cocchieri Botelho** and **Luís Rogerio de Oliveira Hein**
São Paulo State University, Brazil

One of the limitations of the use of composites is to obtain parts without the presence of joints or joints between their components, which they are necessary due to inherent limitations in the manufacturing process. The union of pieces with thermoplastic composites can be a critical factor, because depending on the type of union used, they can generate concentration points and be susceptible to fracture (COSTA, 2011). Resistance welding is a specific technique for joining thermoplastic composites. The process uses the property of flow of the thermoplastic matrix when heated above the melting temperature (semi-crystalline polymers). It can be characterized as the union of parts through the fusion and consolidation under pressure. The ENF (end notched flexure) test was done to obtain the value of fracture toughness GIIc. The PEEK/CF samples had the highest value (1114.8±157.2 J/mm) in relation to the welded sample (679.6±346.0 J/mm) and to the welded sample conditioned in the UV chamber (724.4±421.4 J/mm). This behavior can be attributed to the non-existence of the metal mesh at the welding interface, which acts as a cracking propagation concentrator. With the results of ENF, it can be concluded that the shearing stress average is close to the yield strength average for PEEK pressed samples (801.5±58.6/795.9±57.6 MPa), PEEK welded (341.9±55.9/314.6±50.7 MPa) and PEEK welded and conditioned in the UV chamber (449.5±111.9/414.9±115.7 MPa). However, the fracture toughness mode is relatively low, when compared to the available values in the literature for other composites involving thermoplastic matrices and carbon fibers.

## BIOGRAPHY

Samia Danuta Brejão de Souza did her Bachelor of Science in Materials Engineering from UNESP– Universidade Estadual Paulista in São Paulo, Brazil. Her graduate thesis was addressed the ceramic materials field, for prosthesis parts as well as filters. Furthermore, she has worked abroad at Institut für Verbundwerkstoffe (Germany) as a guest Scientist on induction welding process for PEEK/CF laminates to compare these samples with results from specimens manufactured through electrical resistance welding. At present, she is pursuing her Pos-doc in UFRGS (Federal University of Rio Grande do Sul – Brazil). The project is about composites for ballistic armor.

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# RADIATION DOSE RESPONSE AND DOSE MODIFICATION FACTOR OF *PHYLLANTHUS NIRURI* ON SWISS ALBINO MICE STANDARDIZATION OF RADIOPROTECTIVE EFFECT

**Indu Thakur**
Barkatullaha University, India

This study was aimed to assess the optimum route administration for *Phyllanthus niruri* (family - Euphorbiaceae) alcoholic extract with maximum radioprotection by evaluating dose modification factor (DMF) and dose response on mice against different strengths of irradiation to establish the dosage profile. To optimize route of administration *P. niruri* alcoholic extract was administered via intraperitoneal (i.p), intramuscular (i.m), intravenous (i.v) and oral route 1 hr before 4 Gy irradiation and after 24 hr the percentage of aberrant cells were calculated. DMF was calculated by observing survival rate following whole body irradiated with 8, 9, 10 and 11 Gy radiation exposure with and without 200 mg/kg, i.p, *P. niruri* alcoholic extract before 1 hr of exposure. Radiation dose response effect of 200 mg/kg of *P. niruri* alcoholic extract was observed against 1, 2, 3 and 4 Gy gamma ray exposure by scoring different types of chromosomal aberrations from bone marrow metaphase plates. The i.p administered group showed significantly reduced aberrant cell percentage compared to i.m, oral, i.v and sham control group. DMF was calculated to be 1.12 as evaluated by radiation LD50 determination with and without *P. niruri* alcoholic extract at 200 mg/kg dose. *P. niruri* alcoholic extract significantly ($P<0.05-0.001$) reduced percent aberrant cell and major aberrations like breaks, rings and polyploidy against 4 Gy radiation. The dose of 200 mg/kg was found to have maximum radioprotective potential in i.p route. It showed DMF of 1.12 with improved survival rate, delayed occurrence of lethality and radiation sickness. Alcoholic extract of *P. niruri* decrease the complex aberrations like rings, dicentrics and SDC indicating significant protection of bone marrow against double strand breaks and the multiple lesions in chromosomes. The optimum dose of *P. niruri* alcoholic extract is established to be 200 mg/kg, i.p., having safe and effective radioprotector efficiency.

Note:

## BIOGRAPHY

Indu Thakur, Biologist, Scientist, Educator completed her BSc from Barkatullaha University, Bhopal and MSc in Botany specialization from Biotechnology. She received her PhD. Degree in Life Sciences from, Barkatullaha University Bhopal under Senior Research Fellowship awarded by Indian Council of Medical Research New Delhi. She also recieved Junior research fellowship from Defense Reseaearch Development Organisation, New Delhi for 2 years. She served as a faculty in Indore Public School, Indore,and aslo worked as clinical hypnotherapist certified by califorinia University, New Delhi. Her present research projects are focused on phytopharmacological work on active isolated constituents from Indian folklore medicine directed to explore their therapeutic potential and attempting on formulation of standardized product by following the modern herbal Ayurvedic monographs and international guidelines. Her field of research focuses on pharmacological screening, pharmacokinetic, pharmacodynamic and bioavailability studies, drug-food interactions, and standardization method development for herbals and chromosomal aberrations study on animal model.

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# IMPROVEMENT OF MECHANICAL PROPERTIES OF CAST ZA-27 TREATED WITH ADDITION OF NANO ZINC OXIDE

**Mohamed Ahmed AbdelKawy** and **Abdulslam K Almuhamady**
CMRDI, Egypt

An investigation has been carried out on making and characterization of ZA-27 alloy treated with zinc oxide nanoparticles. This was aimed at developing high performance ZA-27 alloy with low density. The particle size and morphology of the zinc oxide (ZnO) nanoparticles were investigated by Transmission Electron Microscope (TEM) and the elemental composition was obtained from Energy Dispersive Spectroscopy (EDS) attached to TEM and x-ray fluorescence spectroscopy (XRF). ZA-27 nano alloy samples were developed using 0, 1, 2, 3, 4 and 5 wt% of ZnO nanoparticles by induction furnace casting technique. Mechanical properties and Microstructural examination were used to characterize the composite samples produced. The results show that hardness and ultimate tensile strength of the composite samples increased progressively with increase in weight percentage of ZnO nanoparticles. Increase in ultimate tensile strength (UTS) of 10.2%, 21.1%, 22.3%, 35.5%, 33.4% and increase in hardness value of 8.2%, 14.8%, 21.7%, 27.9%, 27.1% were observed for Zn -27 alloy treated with 1 wt%, 2 wt%, 3 wt%, 4 wt%, and 5 wt% ZnO nanoparticles respectively in comparison with untreated alloy. It was generally observed that alloy containing 4 wt% of treated has the highest tensile strength and hardness values. However, the fracture toughness and percent elongation of the composites samples slightly decreased with increase in ZnO nanoparticles content. Results obtained from the Microstructural examination using optical microscope and Scanning Electron Microscope (SEM) show that the nanoparticles were well dispersed in the ZA-27 alloy.

# CAVITATION: A TECHNOLOGICAL SOLUTION FOR THE GENERATION OF PHARMACEUTICAL NANO-EMULSIONS AND FUNCTIONALISED CARBON NANOMATERIALS

**Sivakumar Manickam**
University of Nottingham, Malaysia

An increasing number of newly developed drugs are sparingly soluble in water and are often also insoluble in organic solvents, and thus the formulation of these drugs is a key impediment to their clinical application. Owing to their exceedingly low solubility, these drugs frequently also possess poor bioavailability. Common ways of solving this problem include the use of solubilizers, cyclodextrins, and mixtures of solvents. But these methods have various shortcomings. An alternative in attempts to overcome the obstacles existing with these methods is the formulation of drugs as nanoemulsions induced by simple processing as any new simple process technology in the generation of nanoemulsions will have direct impact and great promise for the future of cosmetics, diagnostics, drug therapies and biotechnologies. Cavitation offers a simple way to generate various pharmaceutical nanoemulsions. Besides nanoemulsions, cavitation is also very powerful in the generation of functionalised carbon nanomaterials to be employed potentially in the pharmaceutical area. Where, cavitation seems to be promising in terms of reducing the time, avoiding the use of toxic or complicated agents, reducing the number of stabilisers/surfactants and reducing the separation/purification problems. In case of graphene, it results in an exceptionally stable dispersion. Whereas, for CNTs cavitation renders them dispersing into water and stabilised them longer. For fullerene, it enhances the number of hydroxyl groups on the surface which in turn increased the solubility in water. Overall, employing cavitation provides a facile strategy to overcome the inherent disadvantages existing with the traditional methods in the generation of nanoemulsions and in the functionalisation and dispersion of carbon nanomaterials, the resultant of which are very useful in drug delivery and in biosensing.

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# ENGINEERING AT THE NANOSCALE: A STRATEGY FOR DEVELOPING HIGH PERFORMANCE FUNCTIONAL ECO-FRIENDLY POLYMER NANOCOMPOSITES

**Sabu Thomas and Hanna J Maria**
Mahatma Gandhi University, India

This talk will concentrate on various approaches being used to engineer materials at the nanoscale for various applications in future technologies. The case of clay, carbon nanostructures (e.g., nanotubes, graphene), metal oxides, bionanomaterials (cellulose, starch and chitin) will be used to highlight the challenges and progress. Several bio-degrdable polymer systems will be considered such as rubbers, thermoplastics, thermoetts and their blends for the fabrication of functional polymer nanocomposites. The interfacial activity of nanomaterials in compatibilising binary polymer blends will also be discussed. Various self-assembled architectures of hybrid nanostructures can be made using relatively simple processes. Some of these structures offer excellent opportunity to probe novel nanoscale behavior and can impart unusual macroscopic end properties. The author will talk about various applications of these materials, considering their multifunctional properties. Some of the promising applications of clay, metal oxides, nano cellulose, chitin, carbon nanomaterials and their hybrids will be reviewed.

# NEXT GENERATION THERMAL BARRIER COATINGS FOR AEROENGINE APPLICATIONS; BOND COAT MATERIALS

**A D Chandio**
NED University of Engineering and Technology, Pakistan

Bond coats (BCs) based on βNiAl matrix are commonly employed in thermal barrier coating systems (TBC) for aero-engine applications. The addition of reactive elements (REs) such as; Zr, Hf and Y in βNiAl are being researched extensively since they offer improved oxidation performance at high temperatures. In this study, experimental findings will be presented on the βNiAl matrix-based BCs that were prepared onto CMSX-4 superalloy with and without additions of Zr and Hf using an *in-situ* chemical vapor deposition (CVD) method. The BCs were isothermally oxidized at 1150°C for 100 hours in laboratory air. The processing of REs-βNiAl and their effects on oxidation were studied in comparison to undoped βNiAl. This was followed by characterization techniques including TEM, FIB, ASTAR analysis; SEM, XRD, Proto iXRD and Raman spectroscopy/PLPS. The REs doped βNiAl were successfully prepared using *in-situ* CVD technique. BC performance is discussed in detail such as thermally grown oxide (TGO) phases, stresses, morphologies etc. In general, TGO formed due to oxidation of REs doped samples consisted of alpha alumina alone; on contrary mixture of $TiO_2$, $NiAl_2O_4$, $\theta$-$Al_2O_3$ and $\alpha$-$Al_2O_3$ was seen in their undoped counterparts. In addition, the TGO growth rate and residual stresses on REs-βNiAl were found to be lower than that of the undoped βNiAl. In addition, oxide pegging (OP) due to REs were also analyzed using TEM with the aid of FIB this was followed by ASTAR indexing. The OP was emerged to be one of key features of REs doped BCs which is crtical factor for lifespan of the TBC.

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# SUSTAINABLE GRAPHENE - BASED NANOCOMPOSITES FOR VEHICLE STRUCTURES

**Ahmed Elmarakbi**
University of Sunderland, UK

The automotive industry is widely viewed as being the industry in which the greatest volume of advanced composite materials will be used in the future to produce light vehicles. Nowadays, several advanced materials are widely used in automotive industry. Because of its multifunctional properties and promising applications, many expectations in composite materials are related to graphene. However, no application of graphene-based materials is currently marketed in the automotive sector. Therefore, research activities are under development to study the potentiality of these systems and all the value's chain of automotive needs to be involved in this effort. One of most challenge aims is the economic impact of the innovative structures on the vehicle market, all the value's chain must address their effort to get the final cost of the innovative products as low as possible. The present initiative provides a summary overview on graphene related materials (GRMs) for automotive applications and investigates efficient ways to integrate graphene as polymer reinforcements within composite materials for energy-efficient and safe vehicles (EESVs). The idea is based on the concept-oriented lightweight design aiming of combination of light structures with novel multifunctional materials. For such a purpose, GRMs are addressed with respect to some challenging factors, for instance the large-scale production of graphene or the non-existence of constitutive material models for high performance structural applications like crashworthiness. Therefore, accurate material models need to be developed to support simulation of structural design for these vehicles. A focus on the hierarchical modelling of GRMs with an emphasis on the multiscale constitutive behaviors of each material phase is elaborated in the framework of the graphene flagship to well understand such limitations for a full applicability of graphene. It is anticipated that this initiative will advance innovative lightweight graphene nanocomposites and their related modelling, designing, manufacturing, and joining capabilities suitable for automotive industry which requires unique levels of affordability, mechanical performance, green environmental impact and energy efficiency. This leads to complete understanding of the new graphene nanocomposites and their applicability in high-volume production scenarios.

# SPIN NANO-DIODES BASED ON DOPED HEXAGONAL BN

**Igor Lukačević[1] and Sanjeev K Gupta[2], Haiying He[3] and Ravindra Pandey[4]**
[1]Josip Juraj Strossmayer University of Osijek, Croatia
[2]St Xaviers College, India
[3]Valparaiso University, USA
[4]Michigan Technological University, USA

Recent advances in the synthesis and characterization of h-BN monolayers offer opportunities to tailor their electronic properties via aliovalent substitutions in the two-dimensional lattice. In this talk, we present a h-BN monolayer doped with Si, C or Ge, and show that dopants modify the Fermi level of the pristine h-BN monolayer. Three-fold coordinated dopants relax to the convex-shaped structures, while four-fold coordinated ones retain the planar structures. The doped structures can be readily characterized using the STM imaging technique. The modifications, in turn, lead to unique features in the electron transport characteristics including significant enhancement of current at the dopant site, diode-like asymmetric current–voltage response, and spin-dependent current. We also show that the spin-polarized transport properties of the doped BN monolayers could be used for the next-generation devices at the nanoscale.

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# LINEAR PROPULSION OF GOLD-NICKEL-PLATINUM NANOJET STEERED BY DUAL OFF-CENTER NANOENGINES

**Liangxing Hu**
Nanyang Technological University, Singapore

A novel nanojet with dual off-center nano-engines consisting of gold (Au), nickel (Ni) and platinum (Pt) is designed. Au and Ni are shaped as a concentric disk with 12 μm in diameter. The thicknesses of Au- and Ni-disks are 0.2 and 0.1 μm, respectively. Two identically off-center Pt nozzle nanoengines form cylindrical chambers and are symmetrically distributed on the base of the Au-Ni disk. The diameter, bottom-thickness, wall-height and wall-thickness of the nozzle nanoengines are 3, 0.3, 1.5 and 0.3 μm, respectively. A propulsion mechanism for the Au-Ni-Pt nanojet. Without the presence of hydrogen peroxide ($H_2O_2$), the nanojet suspended in deionized (DI) water is stationary. After the addition of $H_2O_2$ into DI water, oxygen ($O_2$) bubbles are generated at the Pt-surface (the nanojet and $O_2$ bubbles have a joint velocity of v1). The generated $O_2$ bubbles grow bigger. At this state, the nanojet and $O_2$ bubbles have a same velocity of v2. When $O_2$ bubbles reach a certain diameter, they detach from the surface of the nanojet. The nanojet has a velocity of v3, while $O_2$ bubbles have a different velocity of v0. According to the momentum conservation law and the momentum theorem, a driving force *F'drive* is generated, resulting from momentum change induced by the detachment of $O_2$ bubbles, to thrust the nanojet propelling forward. The nanojet is equipped with two identically and symmetrically distributed off-center nanoengines, resulting in the total driving force *F'drive* is well aligned with the drag force Fdrag. Hence, the Au-Ni-Pt nanojet propels forward linearly. At steady state, the nanojet will continuously propel forward at a speed of v.

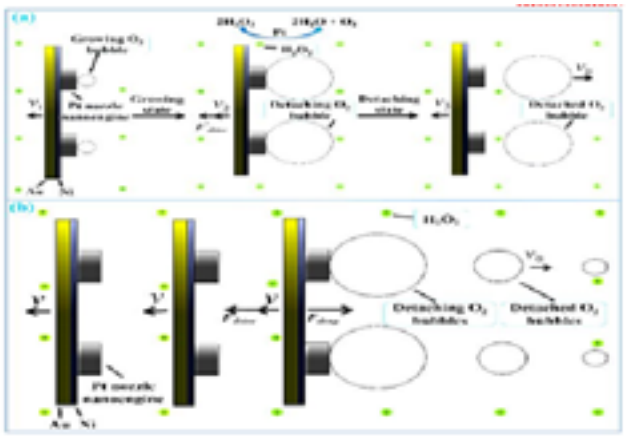

Figure.2: Schematic diagram depicting the propulsion mechanism for the Au-Ni-Pt nanojet in $H_2O_2$ solution. (a) Illustration of Au-Ni-Pt nanojet's propulsion originated from momentum change, resulting from the detachment of $O_2$ bubbles from $H_2O_2$ decomposition catalyzed by Pt; (b) Demonstration of the linear propulsion of the Au-Ni-Pt nanojet steered by dual off-center nanoengines in $H_2O2$ solution

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# ORIGINAL PROCESS OF BIOACTIVE GLASS NANOPARTICLES ELABORATION: APPLICATIONS IN BONE BIOMATERIALS RECONSTRUCTION

**Oudadesse H, Najem S, B Lefeuvre, Lucas-Gitot A and P Pellen**
University of Rennes 1, France

Recently, nanotechnology offers a new strategy to develop novel bioactive materials. Nanoscience are attractive in relation to regenerative medicine and tissue engineering approaches. Nanoparticles with size of 100 to 120 nm enhanced the interactions between cells and biomaterial surfaces. The higher specific surface area of nanoscale bioactive glasses allows faster release of ions and accelerates the deposition process of hydroxyapatite. Ternary bioactive glass nanoparticles (BGN) composed by $SiO_2$ – CaO – $P_2O_5$ were prepared by a novel method based on a quick alkali-mediated sol-gel method, in which the size of the bioactive glasses could be controlled. Particles size distribution of BGN has been determined by using dynamic light scattering (DLS). Obtained results show the size between 20 and 40 nm with an average of 36 nm. These sizes have been increased to 120 nm for biomedical applications according to the experimental method. Physicochemical characterization has been conducted by using several complementary techniques. The bioactive character of these BGN biomaterials was confirmed by using *in vitro* assays. Nanoparticles have been immersed in simulated body fluid (SBF) for different periods. The formation of hydroxyapatite layer was rapidly observed on the surface of BGN. Based on these results, this bioactive glass nanoparticle with excellent bioactivity would be a promising biomaterial for bone tissues engineering. After preparation and characterization, these BGN will be coated on metallic prosthesis using the electrophoresis method and associated with therapeutic molecules.

Note:

# ADVANCED NANO MATERIALS FOR RENEWABLE ENERGIES

**Purushottam Joshi**
INL- International Iberian Nanotechnology Laboratory, Portugal

The energy conversion from most of the present-day process is 15% to 30%. And remaining energy is lost. Traditional energy regenerators for renewables are bulky and needs higher capital investment. By incorporating advanced nano materials into the energy process efficiency of energy conversion can be increased by another 15%. Figure of merit provides rough estimate of efficiency of energy conversion. Devices manufactured using conventional materials have figure of merit of 0.7 to 0.9. Recently theoretically and practically it has shown that by incorporating nano materials in renewable devices, figure of merit can enhance by two to three folds. In this talk we will show various strategies for producing nano materials and show that how figure of merit is increased using such nano materials.

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# TECHNOLOGY AND BUSINESS OPPORTUNITY OF BIODEGRADABLE PLASTICS IN CHINA

**Usman Khan Niazi**
Kcomber Inc, China

As of 2015, there were mainly six types of biodegradable plastics being produced in China, namely polylactic acid (PLA), polybutylene succinate (PBS), polyhydroxyalkanoates (PHA), starch-based materials, polypropylene carbonate (PPC) and polycaprolactone (PCL). Currently in China, these biodegradable plastics are mainly applied in packing materials, agricultural film, and 3D printing. The increasing demand from these fields has become a main force driving the development of the Chinese biomaterial industry. For example, in 2015, due to the prohibition of disposable plastic bags in Jilin Province, there was a greater demand for biodegradable packing materials, and in response, many Chinese producers had increased their capacity of PLA. At present, the major factor that hinders the development of biodegradable plastics in China is the high price, the average of which is 2-5 times as much as general-purpose plastics. For example, although starched-based material is the cheapest amongst the six biodegradable plastics, it's more expensive than polyethylene (PE), a kind of general-purpose plastic.

# SMART EMERGING TECHNOLOGY TO DEVELOPMENT CURTAINS AND UPHOLSTERY FOR THEATERS AND HOSPITALITY

**Elsayed Ahmed Elnashar**
Kafrelsheikh University, Egypt

Smart emerging technology of self-cleaning concept has achieved surprising interest because of their components and extensive variety of conceivable applications in different fields such as curtains and upholstery for theaters and hospitality. A superhydrophobic surface with roll off angle less than 10º is called self-cleaning. Because the rolling water droplet takes away all the dust and dirt particles with it and leaves the surface very clean. These self–cleaning surfaces have numerous applications in diverse fields like textiles as curtains and upholstery for theaters and hospitality, and applications requiring anti-fouling and a reduction of drag in fluid flow. In micro/nanochannels. The methods towards integration of more than one functional property into one fabric were carried out by functionalizing cotton fabric with silver particles which was subsequently modified with octyltriethoxysilane to make it hydrophobic. Various attempts have been made to develop biologically self-cleaning textiles by using some of above mentioned techniques for bacterial growth prevention.

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# SOME IMPORTANT CONCEPTS FOR LEAF PROTEIN EXTRACTION AND TWO-DIMENSIONAL ELECTROPHORESIS TECHNIQUE

**Daryush Talei**
Shahed University, Iran

Proteomic analysis of plants relies on high yields of pure protein. In plants, protein extraction and purification to perform two-dimensional electrophoresis technique present a great challenge due to accumulation of a large amount of interfering substances including polysaccharides, polyphenols and secondary metabolites. Therefore, it is necessary to modify and use an effective protein extraction protocols for two-dimensional electrophoresis technique. To achieve high yields of pure protein and successful two-dimensional electrophoresis some important factors during protein extraction process, protein precipitation methods, iso-electric focusing program such as; rehydration types (passive or active), isoelectric point (PI), IPG strips (size and pH), power conditions and resolution in IEF, equilibration buffer, SDS-PAGE process such as; choosing a gel size format, gels percentage and power conditions, detection of protein in gels, image achievement and analysis, and identification and characterization of 2-D protein spots should be considered.

# SYNTHESIS, PROPERTIES AND APPLICATIONS OF NOBLE METAL NANOPARTICLE-BIOMOLECULE INTEGRATION

**Xianfang Zhu**
Xiamen University, China

Noble metal nanoparticles, such as gold or silver nanoparticles and nanorods exhibit unique photonic and electronic properties. Functionalization of noble metal nanoparticles with biomolecules (e.g., protein and DNA) has numerous applications in catalysis, delivery, therapy, imaging, sensing, constructing nanostructure and controlling structure of biomolecules. In this paper, we review recent research about noble metal nanoparticle-biomolecule integration from the following three aspects: synthesis of noble metal nanoparticle-biomolecule integration, including electrostatic adsorption, direct chemisorption of thiol derivation, covalent binding through bifunctional linkers and specific affinity interaction; photonic properties and bioactivation of the nobel metal nanoparticle-biomolecule conjugation; applications in biosensor, imaging, diagnosis and therapy in medicine, and assembly of nanoparticle. The special attention has been paid on the conjugation of noble metal nanoparticle and biomolecule as well as the most recent related applications.

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# IDENTIFICATION OF REFERENCE GENES FOR REAL-TIME PCR GENE EXPRESSION STUDIES IN DEVELOPING SEEDLING OF *CYAMOPSIS TETRAGONOLOBA* UNDER NITROGEN STRESS

**Poonam S Jaiswal, Navneet Kaur** and **Gursharn Singh Randhawa**
Indian Institute of Technology Roorkee, India

Guar (*Cyamopsis tetragonoloba*) is an important industrial crop because of many industrial applications of galactomannan gum present in its seeds. It, being a legume crop, can fulfil its nitrogen requirement through biological nitrogen fixation. However, this crop usually encounters nitrogen deficiency during the initial stages of crop growth when nitrogen fixing nodules have not been fully developed. The knowledge about genes of guar involved in various processes can help in developing improved varieties of this crop. qRT-PCR is a preferred technique for accurate quantification of gene expression data. This technique requires use of appropriate reference genes from the crop to be studied. Such genes have not been yet identified in guar. In the present study, expression stabilities of 10 candidate reference genes, viz., *CYP, ACT 11, EF-1α, TUA, TUB, ACT 7, UBQ 10, UBC 2, GAPDH* and *18S rRNA* were evaluated in shoot and root tissues of guar (RGC-1066 variety) under nitrogen stress. Four different algorithms, geNorm, NormFinder, BestKeeper and ΔCt approach were used to assess the expression stabilities of reference genes and the results obtained were integrated into comprehensive stability rankings. The study indicated that *CYP, TUA and UBC 2* genes were the most stable reference genes in guar under nitrogen stress whereas *EF-1α* gene was the most unstable reference gene. The *CYP, TUA* and *UBC 2* genes were the most suitable reference genes for accurate normalization of the gene expression data under nitrogen stress. Our findings are expected to provide a boost to gene expression studies in guar under nitrogen stress. Such studies are likely to improve our understanding of molecular mechanisms of nitrogen uptake in guar seedling and facilitate research initiatives to determine genes expressing under nitrogen stress in this industrially important crop.

# III-V/ SI INTEGRATION FOR NEXT GENERATION HIGH SPEED LOW POWER ELECTRONICS

**Edward Y Chang**
National Chiao Tung University, Taiwan

The integration of III-V on Si substrate provides the platform for future high-speed electronic devices due to the high mobility of III-V materials. Among the III-V compound semiconductors, InxGa1-xAs and AlxGa1-xSb are the most promising materials for high speed, low power consumption electronics such as MOSFET, FinFET and TFET due to their low electron effective mass. Simulation and epitaxial growth of InxGa1-xAs and AlxGa1-xSb materials on Si substrate for high speed, low power electronics will be presented in the presentation. The frequency dispersion of accumulation capacitance (Δcacc) and interfacial trap density (Dit) are 3.06 %/dec and 3.2x1012cm-2eV-1 for In0.53Ga0.47As MOSCAPs on Si substrate. A reasonable Dit level with high FL movement efficiency indicates low acceptor-like traps and good carrier transport properties for MOSFET applications.

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# BIO-NANOTECHNOLOGY INDIAN CONTEXT

**Chinta Sanjay**
GITAM University, India

Nanotechnology has been heralded as a revolutionary technology by many scholars worldwide. Being an enabling technology, it has the potential to open new vistas in the field of R&D in various multiple disciplines and have wide domain of sectoral applications, ranging from healthcare/medicines, electronics, textiles, agriculture, construction, water treatment, and food processing to cosmetics. Much of these applications are very much pertinent for a developing country like India. In this context, the government has been playing a pioneering role in fostering and promoting nanotechnology R&D in India since early 2000s. India is among the top 12 biotech destinations in the world and ranks third in the Asia Pacific. The development of nanotechnology in India has been mainly conceived and continued the premise that this new and emerging technology has huge potential to help the country address societal challenges such as provision of drinking water, healthcare, etc., and simultaneously achieve economic gains through growth in the nanotech-based industrial sector. Biotechnology and nanotechnology are among five key technologies that have the maximum potential to stimulate growth in Indian manufacturing and also serve national security priorities. Bio-nanotechnology is the key functional technology of the 21st century. It is a fusion of biology and nanotechnology based on the principles and chemical pathways of living organisms and refers to the functional applications of biomolecules in nanotechnology. It encompasses the study, creation, and illumination of the connections between structural molecular biology, nutrition and nanotechnology, since the development of techniques of nanotechnology might be guided by studying the structure and function of the natural nano-molecules found in living cells. Biology offers a window into the most sophisticated collection of functional nanostructures that exists.

# STATE-OF-THE-BIO BASED PLASTICS INDUSTRY: OVERVIEW 2018

**Yash P Khanna**
Innoplast Solutions Inc., USA

While most major corporations around the world have escalated their efforts in recent years on improving the environmental impact and sustainability via several routes, some break-through concepts have only lately emerged. For example, converting land and forest wastes into chemicals; the latter besides numerous uses serve as building-blocks for plastics and reducing-capturing-converting the harmful greenhouse gases ($CO_2$ and $CH_4$) into chemicals. These revolutionary concepts are expected to take environment/sustainability efforts to new heights. This presentation will begin with a review of the historic emergence of the bio-based plastics industry starting with an era of waste management via biodegradation followed by a period of very high petroleum prices and proliferation of technology pipeline to develop traditional and new durable polymers, and now again through times of lower petroleum pricing/shale gas revolution. Despite turbulent events, reasons for steady-growth of this industry forecasted to be 34Blbs/year by 2020, will be highlighted. Emphasis of the presentation will be on how the field of polymers and chemicals is being rejuvenated via non-fossil raw-materials that are: biobased-sustainable or air-land-ocean pollutants; thereby leading to preservation of petroleum resources, reduction of air-land-ocean pollution, and utilization of free/undesirable raw materials.

Note:

allied academies Joint Event on
Global Congress on
BIOTECHNOLOGY
&
Annual Congress on
EMERGING MATERIALS AND NANOTECHNOLOGY
September 06-07, 2018 | Bangkok, Thailand
Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-011

# BIOPLASTICS FROM BIOMASS; THE FUTURE CRUDE OIL

**Yash P Khanna**
Innoplast Solutions Inc., USA

While most major corporations around the world have escalated their efforts in recent years on improving the Environmental Impact and Sustainability via several routes, some breakthrough concepts enabled via biotechnology, have only lately emerged. For example, converting land and forest wastes, i.e., non-fossil raw-materials that are bio-sourced/ sustainable into chemicals; the latter besides numerous uses serve as building-blocks for traditional as well as new polymers. These initiatives leading to preservation of petroleum resources, reduction of air-land-ocean pollution, and utilization of free/undesirable raw materials are taking the environmental and sustainability efforts to all-time new heights. In this workshop, historic emergence of the bio-based plastics industry will be discussed starting with an era of waste management via biodegradation followed by a period of very high petroleum prices and proliferation of technology pipeline to develop traditional and new durable plastics, and now again through times of lower petroleum pricing/shale gas revolution. Despite turbulent events, reasons for steady-growth of this industry forecasted to be 34Blbs/year by 2020, will be highlighted. An overview will be presented on the state-of-the-bioplastics industry today covering the breadth of polymers such as polyolefins, polyamides, polyesters, polycarbonates and more. Join us to witness how the field of polymers and plastics is being re-invented by converting bio-sourced raw-materials from agricultural-waste into high-quality products that otherwise have been traditionally derived from fossil fuels; an adventure we have not seen in the chemical industry since the 1960's.

# GREEN SYNTHESIS OF GREEN TEA CONJUGATED NANOPARTICLES FOR DRUG DELIVERY

**Lei Nie, Fang Zhang, Meng Sun, Jilai Cui** and **Hongyu Yuan**
Xinyang Normal University, China

In recent years, functional nanoparticles, have attracted attention due to their unique surface-ratio effects, small size and quantum size effects, and drug loading properties, etc. The phytochemicals present in tea have dual functions as effective reducing agents and can be used as stabilizers to provide strong coatings. The single step facile approach for using tea to synthesize metal nanoparticles in our lab. The drug-loading efficiency (such as doxorubicin hydrochloride, DOX) of metal nanoparticles were investigated, and the drug release profiles could be regulated by chemicals functionalized on the surface of nanoparticles. The toxicity of prepared nanoparticles on cells were evaluated. The results showed that the cells (HaCat, 293T, Hela) had a good viability while culturing with nanoparticles for three days. The metal nanoparticles prepared by using green tea have a good drug-loading efficiency, and the cells could be killed at day three, shows that such drug-conjugated nanoparticles releasing system could be used in tumor cells applications.

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# PURIFICATION OF CARBON NANOTUBES

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Nanotubes have never ceased to make object of research around the world. The scientific community has high hopes on these nanomaterials seen their exceptional properties and their various applications. The as-prepared CNTs contain impurities such as metal catalysts, amorphous carbon, and multi-shelled carbon particles. These impurities must be removed to realize the intrinsic properties of the CNTs. Purification is an essential issue to be addressed. Here we present an overview of the purification of carbon nanotubes, based on two methods of purification, filtration and acid treatments.

# PROPERTIES OF LITHIUM BATTERY UNDER DIFFERENT PROPORTIONS OF TERNARY CATHODE MATERIALS NICKEL, COBALT AND ALUMINUM

**Wu Zhonghui**
Kcomber Inc., China

LiNi1−x−yCoxMnyO2(NCM), a cathode material of nickelic ternary lithium battery, has become a promising component for Li-ion power battery by its high specific capacity and low cost. Proportion of nickel, cobalt and manganese (NCM) can change the property of nickelic NCM materials. This year, common nickelic ternary battery types are NCM523 and NCM622, while NCM811 type which has great potential is still under prior research and development of most battery companies Cathode material structure & NCM function in ternary Li-ion battery, relation between nickel proportion and ternary Li-ion battery property, application of NCM nickelic ternary lithium battery, application of NCM811 battery, China vs. Abroad are the main contents of the speech.

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