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In The News

Two CSIR Scientists Awarded Infosys Prize 2012



Dr Gro Harlem Brundtland with the jury members of the Infosys Prize 2012

Two scientists from CSIR laboratories have made it to the honours list among the prizewinners of the 2012 Infosys Prize. Dr. Ashish Lele, Scientist in the Chemical Engineering and Process Development division of the CSIR-National Chemical Laboratories (CSIR-NCL), Pune and Dr. Ajayaghosh Ayyappanpillai, Senior Scientist, CSIR-National Institute for Interdisciplinary Science and Technology (CSIR-NIIST), Thiruvananthapuram are among the seven prize winners of the Infosys Prize 2012.

At a function held in New Delhi on 3 January 2013, the Infosys Science Foundation honoured the seven winners for their outstanding achievements and contributions across six disciplines: Engineering and Computer Science, Humanities, Life Sciences, Mathematics, Physical Sciences and Social Sciences. A new category – Humanities – had been added this year to “acknowledge the importance of humanistic pursuits like literature, legal studies and history in enriching and elevating our lives”.

The laureates were felicitated by former Prime Minister of Norway, Dr. Gro Harlem Brundtland. The prize in each category comprises a gold medallion, a citation and INR 50 lakh as prize money.

The ceremony was presided over by Mr. S. Gopalakrishnan, Executive Co-Chairman, Infosys and President of the Board of Trustees, Infosys Science Foundation. The jury chairs of the six categories were also present on the occasion and elucidated the importance of the winners' work to the audience. The jury chairs include – Prof. Amartya Sen, Humanities; Dr. Kaushik Basu, Social Sciences; Prof. Shrinivas Kulkarni, Physical Sciences; Prof. Pradeep K. Khosla, Engineering & Computer Science; Prof. Srinivasa S. R. Varadhan, Mathematics; and Prof. Inder Verma, Life Sciences.

Dr. Ashish Lele from CSIR-NCL has been awarded for his work on smart gels, which is based on the notion of connecting molecular properties to microscopic properties. This has potential impact in areas including soft actuators, smart drug delivery



Dr Ashish Lele being felicitated by Dr Gro Harlem Brundtland

"The most pressing task today is to develop renewable, clean energy sources to replace fossil fuel, and science must lead the way."

Dr. Gro Harlem Brundtland

devices and stitch-less wound healing.

Dr. Ashish's research interests are in the area of rheology of complex fluids such as polymer solutions and melts, microphase separated systems and food products, molecular dynamics of entangled polymers, CFD of viscoelastic, non-Newtonian fluids, development of Rheological tools to study microstructure evolution during flow etc.

Dr. Ajayaghosh Ayyappanpillai from CSIR-NIIST received the honour for his pioneering development of methods for the construction of supramolecular functional materials. These materials can be used for sensing other molecules and also for imaging certain biological molecules that may be responsible for diseases; and can therefore be used for detecting diseases in their early stages. These materials may also be used as a security label for documents and for currency.

Dr. Ajayaghosh has also done landmark work that has advanced supramolecular chemistry, most especially in investigations that have led to the design and synthesis

of molecular assemblies called organogels, a new class of materials with great potential for photonic and electronic applications. He has demonstrated that these self-assembled nanomaterials can be used to control the electronic energy transfer processes, paving the way for the development of superior light harvesting devices. He has synthesized and characterized nanomaterials

that can be employed for energy conversion and in optical sensors to detect tiny amounts of TNT and other very dangerous substances.

Congratulating the winners, Dr. Gro Harlem Brundtland, former Prime Minister of Norway and former Director-General of the World Health Organisation in her address said that the most pressing task today was to develop renewable, clean energy sources to replace fossil fuel and that science must lead the way. She said that the countries that first make the transition will be the leaders of the next generation and that emerging economies like India and China, who have a particular stake in the transition to a future based on clean energy, must lead the way.

Dr Brundtland also espoused the cause of cost-effective "frugal science" that is adapted to and addresses the context of developing countries. Citing the example of Western medicine that is increasingly becoming costly, she said the need was to work towards affordable health care, which requires the development of science that is conscious of cost from the beginning. "Foundations such as Gates, Wellcome and others are already developing frugal medicine, and much of the health-care spending in developing countries is on technology that is, of necessity, frugal," she said.

Dr Brundtland, who was the Chairman of the famous Brundtland Commission whose mission was to unite countries to pursue sustainable development together, said that other developing country problems such as the management of mega-cities, effective delivery of education, and provision of water and energy also must include cost considerations right from the outset.



Dr Ajayaghosh Ayyappanpillai receiving the Infosys Prize 2012

In The News

CSIR-CLRI Trained Cobbler Leads Comfortable Life

A report published in the Metroplus edition of the *The Hindu*, Chennai dated 22 October 2012 bears a glowing testimony to the immense societal contribution of CSIR-Central Leather Research Institute (CLRI) for the under-privileged section of the society.

The report talks about Shri Theresanathan who obtained cobbler training as well as tool kits for footwear making from CSIR-CLRI and started earning his livelihood by opening a footwear repairing shop around 25 years back in the posh Besant Nagar area of South Chennai. Although he did not get much opportunity to have good formal education, yet the training imbued him with an uncanny ability to assess the type of repair a footwear requires and the materials required for the repair. Theresanathan's excellent service has earned him the loyalty of several customers.

Today, he is an experienced cobbler earning good money to support his family. His four sons are well educated. His youngest son, who has been pursuing final year Engineering, aspires to become an IAS officer. But Theresanathan has no plans to quit the profession even after his sons are well settled.

The newspaper report is an excellent indicator of the societal contribution of CSIR-CLRI.



R&D Highlights

Post-Earthquake Reconnaissance Survey – Sikkim Earthquake

An earthquake occurred in eastern Nepal near the Nepal-Sikkim border on 18 September 2011 at 18:11 IST, causing significant damage of the built environment in Sikkim alone, especially roads and buildings.

CSIR-Central Building Research Institute (CBRI) scientists participated in the Post-Earthquake Reconnaissance Team (PERT) of the National Disaster Management Authority (NDMA) to (a) study Structures damaged by the earthquake, (b) Collect perishable data related to the built environment in the affected area, (c) Identify vulnerable construction typologies and their performance, (d) Identify the main reasons for damage to masonry, RC frame, traditional construction and other construction, and (e) Evaluate the performance of structural, non-structural and functional elements in major critical and lifeline buildings and facilities, such as hospitals, where feasible.

The built environment in hill areas that was affected by the earthquake includes mainly four types of building construction practices followed in the affected region, namely RC frame type with infill walls, R/R masonry with

stone or wooden post and beam, Shing-Khim (wooden) type construction and Ekra houses. These construction practices are distributed according to the economic development of the area and availability of raw materials.

Traditional houses (Ekra houses) are single- or two-storeyed, built with a wood frame from sloping ground to roof level, light corrugated galvanised iron (CGI) sheet roofing supported on the wood frame, mud walls from plinth to sill level, and cross-woven Ekra or bamboo spilt matting plastered with mud or fine sand with lime as rest of the walling. There are numerous variations to this housing typology over time (Figure 1).

The urban areas are seen to have RC frame construction along hill slopes up to 6-9 storeys, with RC floor slab roof (Figure 2).

Chungthang and Lachung in North Sikkim are two major towns that have suffered the maximum damage caused by landslides and poor construction of buildings combined with intense shaking. The maximum intensity of shaking was observed to be VIII. In Lachung, rockslides and mudslides caused extensive

Theresanathan's success as a cobbler can be attributed to the training and tool kits for footwear he received from CSIR-CLRI.



Figure 1: Variations of housing in hill slopes of Darjeeling/Kalimpong and Sikkim States

damage, as shown in Figure 3.

Intensity of shaking was between VI-VII (MMI) in and around the state capital, Gangtok (e.g. Singtam, Dikchu, Mangan, etc). In general, the damage to the buildings was in accordance with the assigned intensity of shaking, except a few, such as the Secretariat building, two multi-storey buildings in Balwakhani, and another five-storey building in Lumshey



Figure 2: Typical urban landscape along hill slopes of towns, like Gangtok, Darjeeling, Kalimpong and Kurseong



Figure 3: Damage due to mudslide at Lachung



Figure 4: Typical failure of RC buildings in Chungthang

Bastey, all of which suffered either complete collapse or partial collapse due to faulty construction practices and poor workmanship.

Many RC buildings in Gangtok and most of them in Chungthang suffered damages; the most common being shear and/or flexure failure at column end region, failure of beam-column joints, in-plane failure of weak infills and out-of-plane failure of slender walls. The observation shows that basic requirement for good seismic performance of RC buildings viz. planning, design, configuration, load path, reinforcement detailing etc., were not followed.

Many unique and inherently poor construction features such as weak and very slender partition walls in brick/block masonry or in lightly reinforced/plain concrete, extended floor plans in upper stories supported on cantilevered beams and slabs, construction on sloped ground, unstable slopes, weak retaining walls, poor construction material etc., significantly added to the seismic vulnerability

of structures (Figure 4).

Examples of unique hybrid construction were also noticed in the region (Fig. 5).

The traditional houses like Ekra and Shing-Khim performed significantly better compared to RC-frame/masonry buildings and suffered only minor damages at ground story level. Various monasteries all over Sikkim suffered extensive damage wherein mainly random rubble (R/R) masonry laid in mud/lime mortar was used as construction

material. Major civil-engineering projects in the area include hydel power plants, steel and RC bridges, wherein no significant damage was observed.

The event prominently highlights the presence of vulnerable building stock in Sikkim and adjoining states. The following lessons were learnt that could be useful in reduction of seismic damage:

- Use of good construction practice and quality of material.
- Development of typified designs keeping local architecture and use of locally available material reinstated and integrated with modern construction practices.



Figure 5: Typical hybrid infill RC construction in Lachung

- Proven technology that satisfies all fronts like confined masonry should be promoted.
- Compliance for seismic codes in design.
- Retrofitting strategies should be outlined specially for lifeline and heritage structures.
- Need to strength entheactivities of State Disaster Management Authority (SDMA) with a strong group guiding activities on development of technical and administrative personnel.
- Lack of earthquake engineering education

of stakeholders (like architects, engineers, building owners, quality inspectors, contractors and city building officials) is reflected in poor level of general awareness on earthquake safety.

- Masons, carpenters and bar benders need to be trained to undertake earthquake resistant construction in high seismic regions; certified artisans should be given preference over their untrained counterparts to promote quality construction.

R&D Highlights

Surface Modification of 316L Stainless Steel with Magnetron Sputtered TiN/VN Nanoscale Multi-layers for Biological Implant Applications

Surface engineering of biomedical implants is a salient research area in which surface treatment methods are used to ensure that unwanted immune responses do not occur.

In recent years, researchers have studied the application of protective coatings to orthopedic implants in order to lengthen the implant life span by applying a thin film or multi-layers. The coating should be hard, non-corrosive, wear resistant, biocompatible and highly adherent to the substrate on which they are deposited. Titanium Nitride (TiN) is one of the most studied ceramic coatings, as it possesses many of these properties. In addition, it reduces bacterial colonization and also reduces the release of metal ions to the biological fluid. TiN/NbN and TiN/VN multilayer coatings have shown enhanced hardness when compared to single layers of TiN, NbN, and VN.

Our team at CSIR-CECRI investigated the material properties of TiN/VN multi-layered coatings on medical grade 316L stainless steel substrate. Specifically, the role of multi-layered coatings in improving the corrosion resistance in simulated bodily fluid, hemocompatibility, and bacterial attachment on coated stainless steel substrate was evaluated.

TiN/VN multi-layered coatings were prepared by Reactive dc Magnetron Sputtering using 99.9% pure Titanium and Vanadium target. A single rotational substrate holder was used to obtain the layered structure. The total thickness of the coating was 1.7 μm . The total number of layers was 150 with a bilayer thickness of

Characteristic tested	Methods used
Structural Analysis	X-ray diffractometer (XRD) Field Emission Scanning Electron
Microscope (FE-SEM)	Atomic Force Microscope (AFM) Transmission Electron Microscopy (TEM)
Chemical Analysis	X-ray Photoelectron Spectroscopy (XPS)
Biological Analysis	In vitro Platelet Adhesion Test Bacterial Adhesion Study Corrosion Behavior Potentiodynamic polarization test Electrochemical Impedance Spectroscopy (EIS)
Nano-hardness	Nanoindentation

about 90 \AA . Various characterizations of the coatings were done using the following methods:

Findings

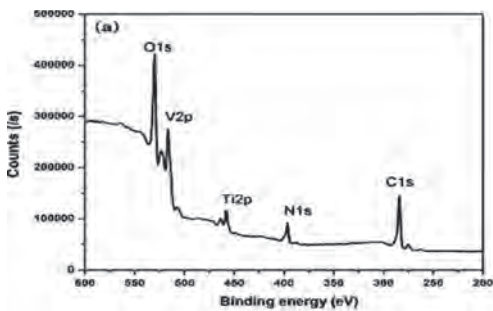
X-ray diffraction analysis reveals polycrystalline cubic structure with (111) preferential growth for the nanoscale TiN/VN multi-layered coatings. The crystallite size reduction to the nanometer range results in considerable improvement in their resistance to localized corrosion. The presence of different phases like TiN, TiO₂, VN, V₂O₃, and V₂O₅ was identified by XPS analysis. The multi-layer coatings exhibit the characteristic Ti 2p, V 2p, N 1s, O 1s, and C 1s peaks at the corresponding binding energies 454.5, 516.1, 397.0, 530.6, and 284.1 eV, respectively.

These coatings were characterized using Laser Raman spectroscopy to elucidate the behavior of the optic and acoustic phonon modes of the crystalline lattices. Raman

Our team at CSIR-CECRI investigated the role of multi-layered coatings in improving the corrosion resistance in simulated bodily fluid, hemocompatibility, and bacterial attachment on coated stainless steel substrate.

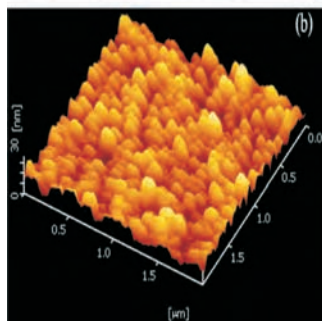
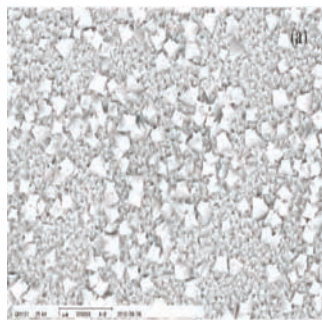


spectra exhibited the characteristic peaks in the acoustic range of 160–320 cm^{-1} and in the optic range between 480 and 695 cm^{-1} . Columnar structure of the coatings was observed from TEM analysis. TiN/VN multi-layer coatings exhibited better hemocompatibility than TiN, VN single layers, and bare AISI 316L SS substrates. The attachment of bacteria on TiN/VN multi-layer coatings was found to be very minimum and without colonization. The number of adherent platelets on the surface of the TiN/VN multi-layer, VN, TiN single layer coatings exhibit fewer aggregation and pseudopodium than on substrates.



XPS survey spectrum obtained for the TiN/VN multi-layers

The wear resistance of TiN/VN multi-layer coatings is better than the single layer and bare substrate. A significant improvement in corrosion resistance in human body environment could be achieved by TiN/VN multi-layer coatings on 316L stainless steel substrates.



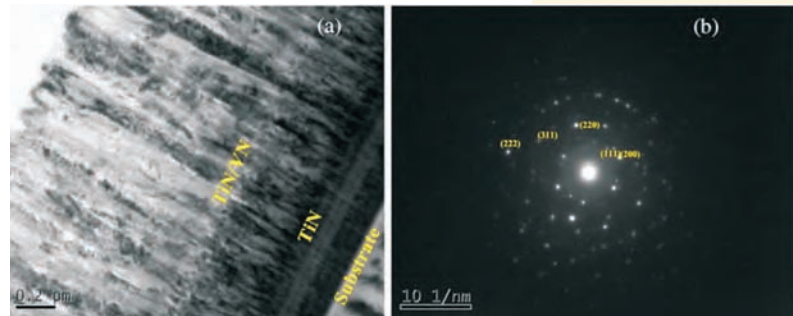
Surface morphology of the multi-layers

The TiN/VN multi-layer coated samples show better protective efficiency than the single layer and uncoated samples. The wear resistance of the multi-layer coatings increases obviously as a result of their high hardness.

Tafel plots in simulated

bodily fluid showed lower corrosion rate for the TiN/VN nanoscale multi-layer coatings compared to single layer coated as well as bare 316L SS substrates. Scanning electron microscopic images of the coatings show that the particles are agglomerated and the average grain size is about 20–30 nm.

There is no evidence of significant microstructural changes either in the coating or in the substrate. Excellent bonding between

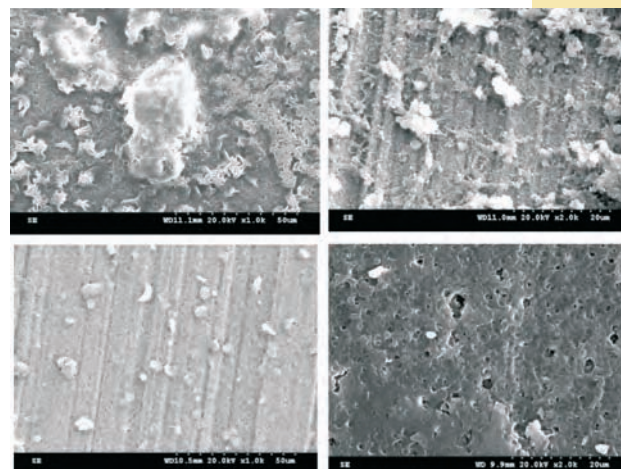


Cross-section TEM image and SAED pattern for the multi-layers

the coating and the substrate is evident from the observed columnar structure of the coating.

The number of adherent platelets on the surface of the TiN/VN multi-layer, VN, TiN single layer coatings exhibit fewer aggregation only and lesser pseudopodium compared to AISI 316LSS substrates. Our experiments demonstrate that the scalar and active levels of adhered platelets on coated samples are lower than those on stainless steel substrate. These results confirm that denaturing and aggregation of the platelets are observed to be impeded, and platelet adhesion is also reduced on the coated surface.

Bacterial adherence to the implant surface is considered to be an important event in the



Morphology of platelet adherent on (a) Steel substrate, (b) TiN, (c) VN and (d) TiN/VN multi-layers

pathogenesis of bacterial infections and implant failures. This adherence is associated with the development of inflammation of the peri-implant soft tissues, crestal bone loss, and peri-implant pathology. Such type of specific adherence is mediated by extracellular polysaccharides and lectin-like substances [Schilling KM, Bowen WH. *Infect Immun.* 1992; 60:284–94].

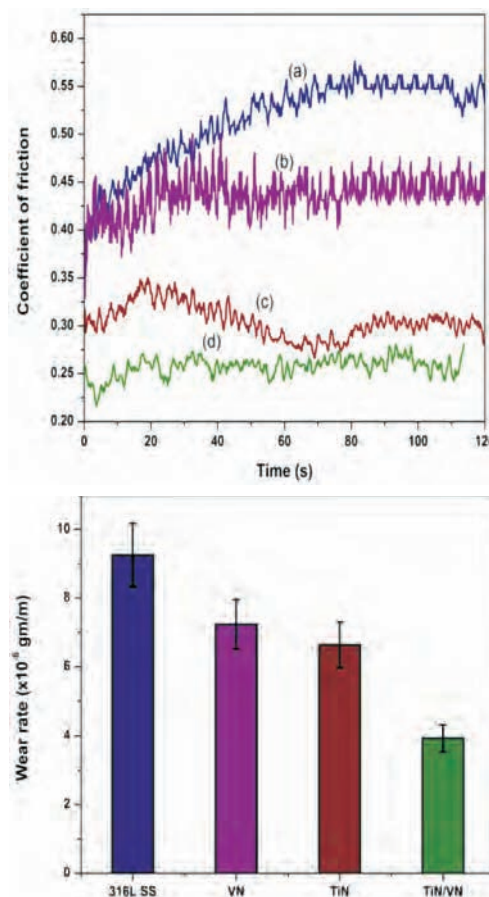
The results of the present study show that the implants coated with TiN/VN multi-layers presented a minor quantity of the surface covered by bacteria. The quantity of attached bacteria was higher on uncoated substrates with higher roughness than on coated substrates. As bacteria get accumulated on the uncoated 316L stainless steel surface, they exhibited typical phenotypic properties of biofilm formation.

Visual observation showed that TiN and VN single layer coatings had lesser bacterial cells compared to the substrate. Of all the coatings, the attachment of bacteria on TiN/VN multi-layer coatings was found to be very minimum and without colonization because the multi-layer coating surface had very smooth surface. Further, the film composition would have been responsible for the large variation in bacterial adhesion, as it would have mediated the bacterial adhesion through charge transfer interactions.

Nanohardness of TiN, VN single-layer and TiN/VN multi-layers was determined on the coated steel substrate by using a nanoindenter. The nanohardness and young's modulus of the TiN/VN multi-layer coating

was 30.04 and 186.99 GPa respectively.

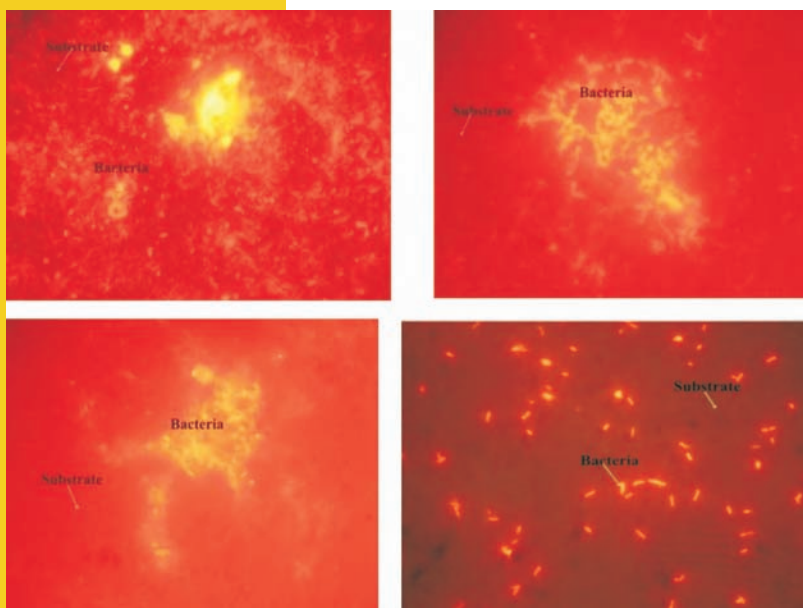
The friction coefficient of 316LS, TiN, VN single-layer and TiN/VN multi-layer stacks, which were prepared by reactive dc magnetron sputtering method, was evaluated



(a) Variation of friction coefficient with sliding time and (b) Wear rate of steel ring after sliding against Steel Substrate, VN, TiN and TiN/VN

against steel ball as a counter material. The lower friction coefficient observed in Fig. a for the TiN/VN on 316L SS indicates that this stack has better wear resistance. Fig. b shows the comparative diagram of wear rates of TiN/VN multi-layer coatings with TiN, VN single layer and bare substrate. Experimental data clearly indicates that TiN/VN multi-layer coating has superior wear resistance compared to single layer and bare substrate. Generally the wear resistance of a material has been directly related to its hardness, i.e., higher the hardness, higher the wear resistance.

The success of implants in the human body depends on their biosafety, biocompatibility and biofunctionality in the environment where implants are placed in. With the aim of studying the protection abilities and stabilities on localized corrosion of coating,



Bacterial adhesion image on (a) 316 L SS, (b) TiN film, (c) VN film and (d) TiN/VN multi-layers



potentiodynamic polarization measurements were carried out in simulated body fluid conditions. There is an appreciable increase in corrosion resistance for the TiN/VN multi-layer coated substrate compared to TiN, VN and bare substrate. It clearly shows that passive film is formed on the TiN/VN multi-layer coated substrate and demonstrates good corrosion resistance of the multi-layer coated specimens as evident from the observed wide passive potential range and the associated low current density.

Conclusions

The structural, mechanical, corrosion properties and biocompatibility of TiN/VN multi-layered nanocomposite coatings, prepared by reactive dc magnetron sputtering in an Ar-N₂ gas mixture, were analysed. Multi-layer coatings

had better hemocompatibility than single layer and bare 316LSS substrates. The multi-layer coated 316L surfaces showed a significant reduction of bacterial adherence, and this fact could probably be important in the decrease of the inflammation of the peri-implant soft tissues. A significant improvement in corrosion resistance in human body environment can be achieved, by TiN/VN multi-layer coatings.

It is concluded that the human body implant TiN/VN multi-layer coated 316L SS has shown better biocompatibility due to its improved corrosion resistance in body fluid. Further, to improve osseointegration between the implant surface and tissue, a toplayer of hydroxyapatite is coated and evaluation of biocompatibility is under progress.

*B. Subramanian and team
at CSIR-CECRI*

R&D Highlights

Utilization of Solar Energy in Buildings and for Improvement of Built Environment in Cold Climatic Regions

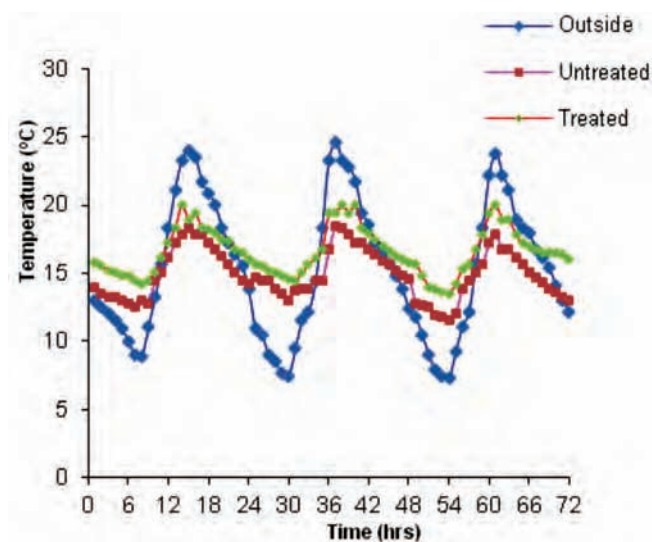
Scientists at the CSIR-Central Building Research Institute (CBRI) have undertaken studies with the objective to develop methodology for utilization of solar energy for improved environment in and around residential buildings in cold climatic regions.

We have developed a new solar window system for cold climatic regions. The sun altitude during winter season is lower towards south direction due to which maximum solar radiation

falls on the south wall surface of the building. Keeping this in mind, a solar window system in a room to study its thermal performance



South facing treated window in room



Performance of Solar Window System in winter

Experimental studies have been carried out to determine the thermal performance of new aluminum solar window. To study the effect of the solar radiation, windows of same sizes are constructed in two identical rooms. Room air temperature 3-3.50 C higher can be achieved through a properly designed solar window in the treated room.

R&D Facilities

CSIR-NEERI's Solar Energy based Electrolytic Defluoridation and Iron Removal Plants Inaugurated at Chhindwara, Madhya Pradesh



Solar power based EDF plant at Adiwasi Kanya Shiksha Parisar, Chhindwara

CSIR-NEERI was also successful in installing an iron removal plant (IRP) at the Guraiya village in Chhindwara district. This plant was installed as a hand pump attachable unit. The concentration of iron was found to be around 3 mg/L in the water of this hand pump.

Based on the technology developed by CSIR-National Environmental Engineering Research Institute (NEERI), a solar energy based electrolytic defluoridation plant (EDF) was installed at Adiwasi Kanya Shiksha Parisar in Chhindwara district of Madhya Pradesh. This work was undertaken in association with Public Health Engineering Department (PHED), Govt. of Madhya Pradesh and UNICEF, Bhopal.

A defluoridation plant of this kind had become essential as the fluoride concentration in the groundwater had risen to 1.9-3.0 mg/L, which was above the permissible limit stipulated by BIS (IS 10500:1991). The EDF plant installed consists of two electrolytic treatment reactors having capacity of 1000 liters each and producing 2000 liters of treated water in a batch of 3 hours. Solar panels with battery have been installed to provide electricity for operation of the EDF plant in the absence of power supply.

The plant is capable of producing around 6000 liters per day fluoride-free water, which meets the daily requirement of students and staff of Adiwasi

Kanya Shiksha Parisar for drinking and cooking purpose.

CSIR-NEERI was also successful in installing an iron removal plant (IRP) at the Guraiya village in Chhindwara district. This plant was installed as a hand pump attachable unit. The concentration of iron was found to be around 3 mg/L in the water of this hand pump. But after testing with CSIR-NEERI developed IRP, iron concentration in the treated water was found less than 1 mg/L, which is below permissible limit of BIS (IS 10500:1991). The population of the Guraiya village is around 750. This IRP has been designed suitably to supply iron-free drinking water to 250 persons.

The iron-removal technology is based on aeration, oxidation, precipitation, sedimentation and filtration. IRP can treat 1000 liters of iron-contaminated water in one hour. It is based on continuous operation contact bed aeration system. Precipitation of soluble iron by oxidation with air followed by sedimentation and filtration is a relatively simple process used for removal of iron from ground water. Sedimentation is a physical water treatment process used to settle out suspended solids in water under the influence of gravity. The design of IRP was modified and backwash arrangements have been improved in the plant.

During the 58th CSIR-NEERI Research Council (RC) Meeting, Prof. Kasturi Datta, Chairperson, CSIR-NEERI RC and other RC Members visited the EDF and IRP installation



Prof. Kasturi Datta, CSIR-NEERI RC Chairperson inaugurating the iron removal plant

sites. Prof. Kasturi Datta inaugurated the EDF and IR plants. Mr. B.C. Pandey, Assistant Commissioner, Tribal Welfare Department, Chhindwara; Mr. M.C. Choudhary, Collector, Chhindwara district; Mr. Sanjay Singh, Consultant, UNICEF, Bhopal; Mr. R.G. Suryawanshi, Superintendent Engineer, PHED, Chhindwara; Mr. H.N. Vaidya, Executive Engineer, PHED, Chhindwara; Mr. T.K. Sonone, Assistant Engineer, PHED, Chhindwara; Mr. B.D. Harode, Sub Engineer, PHED, Chhindwara, Mr. K.C. Jain, Sub Engineer, PHED, Chhindwara, and Dr. Hemant Purohit, Chief Scientist and Member Secretary, CSIR-NEERI RC were also present on this occasion.

In his opening remarks during the inaugural

programme Dr. Pawan Labhassetwar, Principal Scientist & Head, WTM Division, CSIR-NEERI talked about fluorosis in Madhya Pradesh, in particular Chhindwara, and electrolytic defluoridation technology. Mr. Pandey expressed gratitude for selecting the school for installing the first EDF plant in Chhindwara district.

Dr. Satish R Wate, Director, CSIR-NEERI praised the efforts put in by the school authorities and PHED to get the EDF plant installed.

Prof. Datta emphasized on the need to install such plants in other fluoride-affected areas of the country. Mr. Singh informed that sixteen such EDF plants would be commissioned in seven districts of Madhya Pradesh.



R&D Facilities

CSIR-NEIST Substation Extension Technology Centre Inaugurated

The Technology Extension Centre Building of the CSIR-NEIST Substation, Imphal was inaugurated by Shri Gurbachan Jagat, Governor of Manipur on 17 November 2012 in the presence of Shri P.P. Shrivastav, Member NEC, Shillong, Shri L. Nandakumar Singh, MLA, Dr P.G. Rao, Director, CSIR-NEIST, Members of the 45th Research Council of CSIR-NEIST (Prof G.D. Sharma, Dr Bharat B. Dhar, Prof P.K. Biswas, Prof K. Krishnaiah, Prof Samir Bhattacharya), Dr R.C. Boruah, Outstanding Scientist, and officials from CSIR-NEIST and other delegates from Manipur.

The programme was also attended by Dr (Mrs) Incoronata Galasso, Project Coordinator from CNR-Institute of Agricultural Biology & Biotechnology (CNR-IBBA), Milan, Italy, Prof S. Roy and Shri Samarjit Kar both from Science & Culture, Kolkata.

On the occasion, a booklet entitled *CSIR-NEIST in the State of Manipur* was released by the Chief Guest, Shri Gurbachan Jagat, Governor of Manipur. The Chief Guest also visited the exhibition stall of novel products based on ethnic designs (a joint collaboration of CSIR-NEIST & CSIR-CLRI, Chennai). In his inaugural speech, the Chief Guest emphasized on development of bioresource based products and formulations and appealed to the CSIR-NEIST to play a lead role for the development of Manipur. He further expressed his appreciation for NEIST Substation, Imphal for its various activities in the state, especially for School Educational Programs under the banner of DNA Clubs.



(Top): Shri Gurbachan Jagat, Governor of Manipur inaugurating the Extension Technology Centre at CSIR-NEIST Substation, Imphal in the presence of Shri P.P. Shrivastav (extreme right), Member NEC, Shillong, Dr P.G. Rao (second from right), Director, CSIR-NEIST and others. (Bottom) Shri Gurbachan Jagat visiting the exhibition stall.

Conferences

CSIR-NGRI Hosts Indo-Norwegian Conference on Carbon Dioxide Injection for Enhanced Oil Recovery and Geological Sequestration



Dignitaries on dais from L to R: Prof. P.K. Banik, DG, Pandit Deendayal Petroleum University; Mr. R.S. Sharma, Head, Institute of Reservoir Studies, ONGC, Ahmedabad; Prof. Mrinal K. Sen, Director CSIR-NGRI; Ms. Marianne Jensen, Science and Technology Counselor of Norway in the Royal Norwegian Embassy in New Delhi; Prof. V.P. Dimri, Distinguished Scientist, CSIR-NGRI; Dr. E. Desa, Director CSIR-800, and Dr Idar Akervoll, project coordinator SINTEF

Dr. Idar Akervoll, senior researcher from SINTEF, Norway and coordinator highlighted salient points about the ongoing project and also emphasized on CCS to reduce global warming.

The first Indo-Norwegian conference on Carbon Dioxide Injection for Enhanced Oil Recovery (EOR) and Geological Sequestration was held at CSIR-National Geophysical Research Institute (NGRI), Hyderabad during 26-28 November 2012, in collaboration with SINTEF Petroleum Research, Trondheim, Norway.

Inaugurating the conference on behalf of the Ambassador of Norway to India, Ms. Marianne Jensen, Science and Technology Counselor of Norway in the Royal Norwegian Embassy in New Delhi expressed keen interest to continue the ongoing project between India and Norway on EOR and carbon dioxide capture and storage (CCS).

Prof. Mrinal K. Sen, Director CSIR-NGRI, delivered the inaugural talk on the cutting edge technology of carbon dioxide monitoring and reservoir characterization and also expressed his intention to make CSIR-NGRI a leader in this field. Prof. V. P. Dimri, coordinator of the conference, emphasized the grave need to save the country from environmental pollution. Dr. E. Desa, distinguished guest of honour, spoke about the CSIR 800, a programme to channel CSIR's efforts to address the needs of 800 million people through its scientific interventions.

Dr. Idar Akervoll, senior researcher

from SINTEF, Norway and coordinator highlighted salient points about the ongoing project and also emphasized on CCS to reduce global warming. Mr. R.S. Sharma, Head, Institute of Reservoir Studies, ONGC, Ahmedabad, expressed the need for collaboration between industry and research institutes to meet the high-energy demands of the country. Prof. P.K. Banik, DG, Pandit Deendayal Petroleum University spoke on human resource development and its effective utilization to make the country self-reliant.

Thirty scientific papers were presented in various scientific sessions, including on the special themes EOR and CCS, Potential of Basalts for Carbon Dioxide Sequestration and its Geochemical Aspects, Unconventional Energy Resources and other topics like seismic inversion, climate, micro-seismicity etc.

Eight foreign delegates from Norway, USA and New Zealand, twenty-seven Indian delegates from different renowned organizations, universities like ISM, Dhanbad, Delhi University, PDP, GERMI etc and industries like ONGC, Reliance, CAIRN etc, and 27 delegates from CSIR-NGRI shared their knowledge. Eleven students from various institutes, universities of India participated in the poster session.

Technical papers on the possible EOR model in the Ankleshwar, Gujarat field and one on a potential Carbon Dioxide saturation model in the Sleipner field, North Sea, were presented by the members of the project. Meetings were also held to discuss upcoming projects from IRS, ONGC, Ahmedabad, CSIR-800, GERMI etc during the conference.

The three-day program concluded with a geological field trip to the Nagarjuna Sagar cutting across different geological cross sections.

Workshops

CSIR-NEERI Conducts Workshop on Community of Practice within Natural Water Systems and Treatment Technologies

CSIR-National Environmental Engineering Research Institute (NEERI) and Indian Water Works Association (IWWA) jointly organized a workshop on Community of Practice within Natural Water Systems and Treatment Technologies (NaWaTech) on 3 September 2012 at Indian Water Works Association's Office, Nagpur.

The workshop was organized on the commencement of the Indo-European collaborative research project NaWaTech. This project addresses the water shortages in urbanized India by developing and deploying a string of multi-barrier, cost effective, low-maintenance, low-energy natural treatment systems. These units, which will be set up at selected sites in Maharashtra, aim to treat, recycle and reuse heavily polluted water, while integrating various water conservation techniques like rain water

and storm water harvesting in its ambit.

Dr. Pawan Kumar Labhsetwar, Principal Scientist and Head, Water Technology and Management Division, CSIR-NEERI, during the workshop, said that along with promoting the budding European Union-India research relationships, this project will also aim at ensuring replication of suitable technologies in the designs of the upcoming townships in the state.

Er. Subhash Andey, Scientist, CSIR-NEERI informed that to ensure maximum benefit of this project for the public, CSIR-NEERI and IWWA organized this workshop to disseminate information about the roles and functions of the Community of Practice.

The members from European Union consortium also attended the workshop, besides a large number of Indian delegates



This project addresses the water shortages in urbanized India by developing and deploying a string of multi-barrier, cost effective, low-maintenance, low-energy natural treatment systems.

Training Programmes

CSIR-NIO Conducts SAARC Training Programme-2012



Dr. S.W.A. Naqvi, Director, CSIR-NIO addressing the participants and faculty during the inaugural function

CSIR-National Institute of Oceanography (NIO), Goa organized a training programme on Multidisciplinary Oceanographic Observations for Coastal Zone Management during 24 September-8 October 2012 for the member countries of the South Asian Association for Regional Cooperation (SAARC) under the aegis of the SAARC Coastal Zone Management Centre (SCZMC), Maldives.

The SCZMC is a focal institution of the SAARC that promotes regional cooperation in planning, management and sustainable development of the coastal zones, including research, training and promotion of awareness in the region. As a programme activity for the

year 2012, the SCZMC supported the workshop at CSIR-NIO, Goa on knowledge sharing and capacity building in the area of coastal zone management.

The two-week long training course aimed at familiarizing administrators, policy-makers and researchers with latest practices followed to acquire oceanographic data for coastal zone management. The programme consisted of a series of interactive presentations, field work and laboratory studies. Nine participants from four countries – Afghanistan, Bangladesh, Maldives, and Sri Lanka participated in the programme.



Participants of the training program along with Director, CSIR-NIO; Deputy Director, SAARC Coastal Zone Management Centre, Maldives; Convener of training program and the faculty of NIO

Training Programmes

Goa's First ever INSPIRE Programme Held at CSIR-NIO



Shri Manohar Parrikar, Honorable Chief Minister of Goa, delivering the inaugural address at the INSPIRE programme. Seated on the dais from left to right: Dr. S.W.A. Naqvi, Director CSIR-NIO, Prof. J.N. Goswami, Director PRL Ahmedabad and Dr. Judith Gonsalves, Senior Scientist CSIR-NIO

The CSIR-National Institute of Oceanography (NIO) organized Goa's first ever Innovation in Science Pursuit for Inspired Research (INSPIRE) programme during 19-23 November. The programme was intended for Goa's top performers in the tenth standard examinations who are presently pursuing science stream in eleventh standard. The programme was sponsored by the Department of Science and Technology, Govt of India, New Delhi.

The internship camp was inaugurated by Shri Manohar Parrikar, the Honorable Chief Minister of Goa. In his welcome address, Dr. S.W.A. Naqvi, Director, CSIR-NIO informed that the INSPIRE initiative seeks to address the lack of awareness, uncertainty and insecurity about careers in science. He expressed confidence that

this initiative would go a long way in inspiring the youth of Goa to pursue careers in science so that the state produced many more Anil Kakodkars and Ragunath Mashelkars.

Shri Parrikar in his motivating inaugural address said, "If I was given an opportunity again in my life to select a course probably I would select a PhD in physics." His address focused on the need to change the trend of pursuing professional courses by bright students. This change in attitude is essential for national building. He emphasized the importance of basic science and the need for the nation to create a pool of talent in the pure sciences.

The keynote address titled 'Exploring the Unknown: The Solar System and Beyond' was delivered by the eminent space scientist Prof. J.N. Goswami, Director of Physical Research Laboratory, Ahmedabad. He spoke in a student-friendly manner on different aspects of planetary science including hot topics like water on Mars, detection of new planets and the Chandrayaan mission.

Students from 22 higher secondary schools of Goa enthusiastically participated in this hectic five-day camp. Twelve renowned scientists of different science disciplines from various institutions mentored the interns with inspiring and motivating talks and interactions. The camp integrated lectures and practical sessions, which included hands-on training on the magic of chemistry. The interns were also exposed to the state-of-art facilities available at the three premiere institutes of Goa, namely



INSPIRE programme participants with Dr. S.W.A. Naqvi, Director NIO, Dr. Judith Gonsalves Coordinator and mentors

Indian Council for Agricultural Research (Old Goa), National Centre for Antarctic and Ocean Research (Vasco-da-Gama) and National Institute of Oceanography (Dona Paula). Besides, a field visit was also organized at ICAR.

The creativity of the interns was triggered

by a logo art competition. During this programme a quiz competition was also organized. The camp concluded on 23 November 2012 with the Director of CSIR-NIO delivering the valedictory address and distributing prizes and certificates to the students.



Training Programmes

CSIR-CLRI Showcases MODEUROP Spring Summer 2014 Trends

MODEUROP Showcase: Spring Summer 2014 season was held on the 18th of October 2012 at the CSIR-Central Leather Research Institute (CLRI). MODEUROP is an international institution founded by the prominent institutions of the global leather and footwear industry that forecasts fashion and trends in leathers, colours and materials for the international market, three seasons ahead.

Prof. Dr A.B. Mandal, Director, CSIR-CLRI unveiled the First View: MODEUROP Colours for the Spring Summer 2014 season. The SHOWCASE was attended by the members of the leather industry and chemical companies who keenly interacted and discussed the Colour Tendencies for the Spring Summer 2014 season that were presented in three colour groups: Reality, Art and World.

First from LINEAPELLE: Trends for Autumn Winter 13/14 season was released to the Members of the Industry by Shri R. Ramesh Kumar, IAS, Executive Director, CLE, who graced the function as the special guest. Shri K.R. Vijayan, President, Indian Shoe Federation was also the special guest at the occasion.



Glimpses of MODEUROP Spring Summer 2014 Trends

Training Programmes

Closing Function of the Training Programme on Silkworm Biology and Molecular Biology Techniques at CSIR-NEIST

The closing function of the training programme on Silkworm Biology and Molecular Biology Techniques organized by the Biotechnology Department for a delegate from Queen Sirikit Department of Sericulture, Thailand for one month (October 25 to 25 November 2012) was held at the M.S. Iyengar Hall on 23 November 2012.

Dr. P.G. Rao, Director CSIR NEIST, Mrs. Pattarakorn Thuntarak, Agricultural Research Officer, The Queen Sirikit Department of Sericulture, Thailand, Dr. R.C. Boruah,

Outstanding Scientist, research students of the Biotechnology Division and other scientists attended the meeting.

In his welcome address, Dr. B.G. Unni, Chief Scientist and Area Coordinator (Biological Sciences/Biotechnology) and Coordinator of the training programme, elucidated the chronology of events that led to the signing of the MoU between ARDA, Thailand and CSIR-NEIST for mutual collaboration to organize programmes to promote various scientific activities. Dr. Unni briefed in detail about the course content

of the training programme such as regular classes, course work, demonstration, practical classes, and experiments related to molecular separation of molecules by different techniques, genome mapping, gene specific amplification, molecular marker studies, and bioinformatics. Practical demonstrations and tasks were given on sericulture related issues. Field visits and interaction at the field with sericulture scientists were also organised.

Ms Pattarakorn Thuntarak thanked CSIR-NEIST and scientists of the Biotechnology Department for providing excellent opportunities to learn various techniques in the area of biochemistry and molecular biology.

Dr. P.G. Rao, Director, CSIR-NEIST in his brief speech thanked the scientists for arranging such an important training programme for a delegate from Thailand under the MoU between CSIR-NEIST & ARDA, Thailand.

Dr. Rao mentioned that collaborative projects, the exchange of visits of scientists between the two countries and other activities such as training programmes to be undertaken between CSIR-NEIST and other institutes from Thailand, will not be for short-term basis but will give long-term benefits for both the countries. Dr. Rao also proposed to establish a reach-out centre at ARDA campus Thailand in the near future for coordination and dissemination of scientific activities between the two institutions.

The closing function of the training programme concluded with a Vote of Thanks delivered by Dr. Unni to Director, CSIR-NEIST for extending all the infrastructure facilities and also taking a leading role for the successful implementation of the MoU between CSIR-NEIST and ARDA, Bangkok. Dr. Unni also thanked ARDA, Thailand for sponsoring the programme.

Diamond Jubilee Celebrations

CSIR-NBRI celebrates its Diamond Jubilee and Annual Day



Prof. S. K. Brahmachari, DG, CSIR inaugurating the newly developed Ethno-botanical Gallery at NBRI Exposition

CSIR-National Botanical Research Institute (NBRI) celebrated its Diamond Jubilee inaugural and Annual Day functions in the Central Lawn of the Botanic Garden on 25 October 2012. Bharat Ratna Dr. A.P.J. Abdul Kalam, Former President of India was the Chief Guest of the Diamond Jubilee inaugural function, while Shri B.L. Joshi, Governor of Uttar Pradesh, graced the occasion as the Guest of Honour.

Prof. S.K. Brahmachari, DG-CSIR, delivered the inaugural address and Dr. C.S.

Nautiyal, Director, CSIR-NBRI, welcomed the guests. Many renowned scientists and eminent personalities were present on the occasion. Later, Dr. Abdul Kalam interacted with more than 200 students and replied to the queries of the young students about nature, environment, science and life. He also planted a sapling of Rudraksh, a rare plant species, in the Botanic Garden. On this occasion, a publication titled, *A Success Story of 60 Years*, depicting the transformational journey of CSIR-NBRI, was released by Dr. Kalam. Prof. Brahmachari inaugurated the newly developed Ethno-botanical Gallery in the Exposition of the Institute.

Dr. Nautiyal, in his welcome address, highlighted the transformational structure of the sixty-year journey, started under the visionary leadership of Prof. K.N. Kaul, the founder director of the institute. Dr. Nautiyal emphasized the efforts being undertaken at the institute in the direction of root biology, soil metagenomics, plant-microbe interaction, plant conservation, identification and characterization, including rare and threatened species.

Speaking on this occasion, Prof. Sopory, VC, JNU and Chairman of the Research Council of CSIR-NBRI, congratulated CSIR-NBRI for the overall progress it had achieved in several



Release of the commemorative book on NBRI 'A Success Story of 60 years'



areas of traditional and modern plant science research over the last sixty years. Prof. Sopory touched upon the key milestones and transitional changes brought in botanical research at the institute under the dynamic leadership of the past and present directors. This is an occasion of happiness, celebration and also introspection among the scientists and technical staff of CSIR-NBRI, he concluded.

Prof. Brahmachari, in his inaugural address, informed that every single laboratory of CSIR is unique in its contribution in the field of Science and Technology. He highlighted the role CSIR-NBRI played in developing the Tactile Garden at Rashtrapati Bhavan, and the institute's contribution in the area of Gladiolus, Chrysanthemum, Bougainvillea, leading to its recent recognition as a DUS testing centre by PPV and FRA. Prof. Brahmachari added that CSIR, in its 70th year, has released several monographs on various scientific achievements of CSIR. He appreciated the selection of CSIR-NBRI's patent on Bio-inoculants as one of the top impact making patents in the seventy years history of CSIR. Two research papers of NBRI (by Vivek Pandey et al and CS Nautiyal et al.), having high citation, find a place in the history of CSIR high academic science. He also apprised about the CSIR award for S&T Innovations given to CSIR-NBRI and Directorate of Agriculture, Govt. of UP by Prime Minister Dr. Manmohan Singh on 26 September 2012. This is a result of translational research done by the institute. Prof. Brahmachari commended the work being undertaken by CSIR-NBRI in general and in the area of rural technologies in specific.

Shri B.L. Joshi, Governor, UP, appreciated the efforts of CSIR-NBRI in the area of plant science research which led to the National Award given by Prime Minister Dr. Manmohan Singh to the institute jointly with the Directorate of

Agriculture, Govt. of UP. He applauded the efforts of the institute in the area of dehydration of flower technology and dissemination of its rural programme along with other green technologies. He emphasized the need for making these technologies available to the rural masses.

Dr. A.P.J. Abdul Kalam, in his special address, recalled the contribution of CSIR-NBRI in creating a Touch and Smell Garden at Rashtrapati Bhavan. Appreciating the efforts of CSIR-NBRI in the last sixty years for its role in conservation, sustainable utilization of genetic resources and integrating biodiversity, biotechnology and bioinformatics, Dr. Kalam suggested that the institute undertake preparation of a national atlas indicating the most suitable plants and herbs based on Indian agro-climatic conditions. He opined that such a document would enable farmers to engage in the right type of plantation in their area and also enable conservation of rare species.

Dr. Kalam also suggested a number of areas and priority issues to be looked upon by the Institute for future research. One of the major challenges he emphasized was documentation of the biodiversity of Sundarban area of West Bengal. The rich biodiversity of the forests acts as a large sink for harvesting



Release of Annual Report (2011-12) of NBRI at the Annual Day Function



A view of the audience at the Diamond Jubilee Inaugural Function

Diamond Jubilee Celebrations



Bharatratna Dr APJ Abdul Kalam interacting with young students

Dr. Kalam stressed the need for developing useful plant genotypes beneficial for stress condition through genomics and genetic engineering. He further recommended developing new plants with desired traits without affecting the environment,

tonnes of carbon dioxide whose release in the atmosphere has posed a serious threat to climate change. Dr. Kalam also gave the example of reclamation of Usar land through plantation of *Jatropha* (biofuel plant) in Allahabad district. Dr. Kalam stressed the need for developing useful plant genotypes beneficial for stress condition through genomics and genetic engineering. He further recommended developing new plants with desired traits without affecting the environment, focus on increasing cotton production, and find out the ways for plantation of suitable varieties of fruits and vegetables in Jammu & Kashmir and North East India.

In the afternoon, Dr. A.K. Mattoo, Research Plant Physiologist/Biochemist, USDA Sustainable Agricultural Systems Laboratory, Beltsville, Maryland, USA, delivered the Diamond Jubilee Keynote lecture titled 'Agricultural Biology in the 3rd Millennium: Nutritional food security & specialty crops through biotechnology and sustainable agriculture'. Dr. A.K. Mattoo elucidated that the recent biological revolution in the form of genetic engineering and biotechnology brings several promises such as enhancing crop production within a shorter time frame; reducing reliance on pesticides, fungicides and fertilizers; prolonging the shelf life of produce and reducing over half the losses registered during post-harvest, and providing necessary tool kit to translate natural products chemistry into alternative medicine. He further said that biotechnology is part of eco-friendly sustainable agricultural production, and necessary for nutritional food security and human health benefits. It is now realized that bioactive nutrients contribute to the antioxidative capacity of vegetables, fruits, nuts and various herbs, and show potential in preventing cancers

and other human diseases. The biotechnology approach for nutritional enhancement, longer post-harvest life, higher processing quality, lower production costs and cleaner environment provide a new paradigm in crop production for the 21st Century, he concluded.

In the evening, the Institute celebrated its Annual Day. Prof. S.K. Sopory presided over the function. On this occasion, Prof. Sopory released the Annual Report of CSIR-NBRI for the year 2011-12 and Dr. C.S. Nautiyal, Director, CSIR-NBRI presented the highlights of the Annual Report. He informed that this year the Institute had published a total of 167 research papers in leading national and international journals. Out of these, 94 were in SCI journals with an impact factor of 2.532 per scientist and total IF of 212.68. Nine patents were filed, while four patents filed earlier were granted this year. Dr. Nautiyal said that this year was significant for CSIR-NBRI as it witnessed successful culmination of the 11th Five-Year-Plan projects and initiation of insightful discussions for framing new, innovative and outcome oriented plant science research programmes for the 12th Five-Year-Plan period. Purification of two novel plant proteins (NBRI-12 and NBRI-14) which cause 100% mortality of whiteflies, and the first report of a new strain of *Trichoderma koningiopsis* from India were among the salient contributions of the Institute in the field of plant molecular biology and microbiology. The Institute also organized a number of training programmes under its rural development projects.

Later, two publications titled *Restoration of degraded land to functioning forest ecosystem* by Drs. Bajrang Singh and V.L. Goel and *Dainik jeevan mein upyogee paudhe* by Drs. K. Kulshreshtha, Sanjeev Ojha, J.K. Johri and S.K. Tewari, were released by Prof. S.K. Sopory and Dr. A.K. Mattoo, respectively.

Prof. S.K. Sopory, in his presidential address, remarked that 60 years of CSIR-NBRI journey comprised the tenure of ten Directors and each had taken over the baton from the predecessor and carried forward research in the institute. He appreciated the contributions of the past directors and expressed his confidence that the CSIR-NBRI would progress through a transformational journey from basic research to molecular biology, plant physiology, pharmacognosy, transgenic crops, and plant-microbe interaction.

Lectures

CSIR-CLRI conducts PrIEST Lecture 'Optional Methods for Solid waste Management – Tanneries'

A lecture titled Optional Methods for Solid waste Management - Tanneries was held on 27 November 2012 at the ILPA-Freya auditorium in the Calcutta Leather Complex. This was a part of the Programme for Implementing Emerging and Sustainable Technologies (PrIEST), seventh in the series of programmes currently being organised jointly by CSIR-Central Leather Research Institute (CLRI) and ILTA in association with CLCTA and ILPA.

Although the lecture was targeted at tanning finishing units, it covered disposal routes for all kinds of tannery solid wastes including those produced in leather product units. Dr. S.V. Srinivasan, a scientist in the Environment Technology Division of CSIR-CLRI delivered the lecture. Over forty people from various sections of the industry turned up to attend the lecture.

The programme began with a Welcome Address by the President of the Indian Leather Technologists' Association, Shri Arnab Kumar Jha. Shri Jha informed that multidimensional research was being carried out in western countries for developing products from solid waste for reuse. Since environmental issues are gaining importance, he felt that researches in our country also needed to be extended in this direction.

Shri Jha's address was followed by a speech by Dr. Dipankar Chaudhuri, Scientist-in-Charge of the Regional Centre for Extension and Development of CSIR-CLRI in Kolkata. Dr. Chaudhuri reminded the gathering that environmental laws would be stricter in future and urged the industry to adopt cleaner and newer technologies to keep pace with the development. He made a fervent appeal to the industry to consider the cost of various elements like wastewater treatment, solid waste disposal, etc. also while doing the cost-benefit analysis of cleaner technology implementation. In reporting the progress of the various activities undertaken as a follow up to the PrIEST, Dr. Chaudhuri mentioned that the report on analysis of various solid waste samples that had been drawn from CLC was ready. He announced that the survey conducted by CSIR-CLRI with support from CLCTA for estimating the quantity of various solid wastes generated in CLC was over and



Mr. Arnab Kumar Jha, President, ILTA welcoming the audience at the beginning of the 7th PrIEST lecture



Dr. S.V. Srinivasan delivering the lecture titled Optional Methods for Solid waste Management – Tanneries



Dr. Dipankar Chaudhuri, Scientist-in-Charge, RCED, CSIR-CLRI, Kolkata providing an update on PrIEST related activities



A view of the participants in the 7th PrIEST lecture

expressed hope that processing of the collected waste would be completed soon to enable CLCTA to prepare a proposal for putting up a biorefinery plant in CLC.

Dr. S.V. Srinivasan made a detailed presentation covering all kinds of solid wastes including the CETP sludge generated in CLC. From the viewpoint of management he divided the solid wastes produced in tanneries into hazardous, and non-hazardous. While hazardous waste contains 5000 mg/kg chromium or more on a dry weight basis, solid waste is considered non-hazardous when it contains chromium below this limit. The options for management of hazardous waste like CETP sludge are limited. Its use in agriculture as soil conditioner and in brick making has been examined, but with existing regulations these options cannot be implemented in our country. Dr. Srinivasan felt that disposal in secured landfill would be the most practical approach.

On the utilization of chrome-containing wastes like chrome shavings and finished trimmings, some potential applications in construction for noise control in building and as filler in bituminous mix were suggested. However, preferred approaches would be to process the shaving dust into leather board for fetching higher value or to go for de-chroming



followed by bio-methanation through anaerobic process to convert the waste into energy. Dr. Srinivasan highlighted a number of options for management strategies for chrome-free wastes. He proposed reutilization of recovered salt directly in agricultural farm for growing coconut trees as one such option for consideration.

Dr. Srinivasan also presented various possible approaches for deriving energy and value-added products from chrome-free organic wastes like raw trimmings and limed fleshings. He mentioned available CLRI technologies for turning such waste into wealth. He described a process detailing how gelatin and glue could be made using hide trimmings as a raw material and discussed how waste limed fleshings could

be converted into products like dog chew and animal feed.

Summing up, Dr. Srinivasan emphasized the need for careful segregation of various kinds of wastes generated in tanneries. He asserted that it was the key to success in the management of tannery solid waste no matter whether they were meant for producing fuel, bio-fertilizer or value-added products. Dr. Srinivasan also indicated the direction in which developments would take place in future in this area. He concluded his speech by stating that the practice of cleaner technologies held the key. The cleaner tanning process that reduces the volume of solid waste has no alternative.

MoUs/Agreements

CSIR-NEERI signs MoU with RTM Nagpur University and M/s Alaknanda Technologies

CSIR-National Environmental Engineering Research Institute (NEERI) signed an MoU with RTM Nagpur University, Nagpur on 27 July 2012 to promote academic and research cooperation to foster interdisciplinary research, impart vocational and skill-oriented training and other programmes.

This MoU is expected to benefit students and staff of both organizations, joint research and academic activities leading to academic excellence, new knowledge generation, innovative technology development, professional skill and competence development, capacity building and many such synergies of interdisciplinary research through collaboration and networking of University, CSIR-NEERI, industry, agencies, and academia from national and international domains.

CSIR-NEERI also signed a licensing agreement with M/s Alaknanda Technologies on 13 August 2012. The agreement relates to the usage of the process of phytoid wastewater treatment technology.

CSIR-CLRI Signs LoI with LSRI

A Letter of Intent (LoI) was signed on 14 September 2012 between CSIR-Central Leather Research Institute (CLRI) and Leather and Shoe Research Institute (LSRI), Hanoi to extend their collaboration.

Leather and Shoe Research Institute (LSRI) is the leading research organization in Vietnam that facilitates development of the Vietnam leather sector by providing technological support and generating high quality human resources. CSIR-CLRI, the largest organization in the world engaged in R&D activities relating to leather and allied sector, has already exhibited its keen interest in extending appropriate technical cooperation to LSRI to empower Vietnamese leather and footwear industry. LSRI had already earlier approached CSIR-CLRI seeking technical intervention in promoting the growth of the Vietnam leather sector.

Recently, a two-member delegation from CSIR-CLRI comprising Prof. Dr. A.B. Mandal, Director and Dr. N.K. Chandra Babu, Chief Scientist visited Hanoi to have detailed discussions regarding the possible areas of cooperation between CSIR-CLRI and LSRI. The areas identified for possible assistance and collaboration from CSIR-CLRI in near future include the following:

- Environment-friendly leather tanning technologies
- Effluent treatment technologies
- Testing, analysis and quality control in leather production
- Fashion design and leather products processing
- HRD to cater to the needs of the leather and footwear industries
- IT application in leather and footwear industries.

Appointments

Dr R.C. Boruah, Outstanding Scientist, takes over charge of CSIR-NEIST

The charge of CSIR-NEIST was taken over by Dr R.C. Boruah, Outstanding Scientist who will be the Acting Director w.e.f. 1 January 2013. Dr P.G. Rao handed over of the charge to Dr R.C. Boruah in the presence of CSIR-NEIST staff in a function held in the Dr J.N. Baruah Auditorium.

It is worthwhile to mention here that Dr Boruah initiated independent research in the field of Steroids in 1995. He discovered a novel system called 'beta formyl enamide'. He has to his credit 88 research papers in reputed national and international journals of organic chemistry and filed 14 national and one international patent. Nine students have received PhD under his supervision, some of whom are recipients of the prestigious Alexander von Humboldt Fellowship (AvH) in Germany, Post-Doctoral Fellowships in USA and Japan Society for Promotion of Science (JSPS).

In 2005, Dr Boruah was conferred with the prestigious Fellow of National Academy of Sciences (FNASc) in recognition of his significant contribution in chemistry. He also received the CRSI Bronze Medal (2005) at the national level and Professor H.C. Goswami Memorial Fellowship (2003-06), instituted by the Assam Science Society, Guwahati. He received "Certificate of Appreciation" from the American Chemical Society for his manuscript to ACS journal. He is also Member of several Academic Bodies and Societies like the American Chemical Society, Chemical Research Society of India, Indian Chemical Society, Indian Society of Chemists & Biologists, Indian Science Congress Association, Society of Chemists & Biologists etc. He is also a reviewer for some of the highly reputed international and national journals. He is a PhD thesis examiner for many Indian Universities.

Dr Boruah graduated from the Sibsagar College, Assam with Honours in Chemistry and completed MSc (Chemistry) from Dibrugarh University in 1976 with gold medal. He obtained PhD degree from Dibrugarh University in 1980. Under CSIR-DAAD exchange programme he visited West Germany and worked with Professor Wolfgang Pfeleiderer at the University

of Konstanz during 1982-83. He also worked as a Post-doctoral Associate with Professor Edward B. Skibo at the Department of Chemistry and Biochemistry, Arizona State University, USA

during 1992-94 where he worked on anticancer drug Mitomycins under NSF funded project. In 2010, Dr Boruah visited East China Normal University, Shanghai under CSIR-NSFC programme.

The function began with a brief presentation by the outgoing Director Dr P.G. Rao, who led the institute for a decade (2002-2012). He recapitulated the progress the institute had made over the last decade like formation of national and international research linkages, attainment of ISO 9000 certification, improvement in the External Cash Flow, societal activities undertaken and communicating the same to the public through CDs (namely, 'NEIST Towards Societal Development', 'The Butterfly Story' etc.). Dr Rao also mentioned about various fields where research activities could be undertaken in the future.

Dr Boruah in his brief speech also highlighted some of the significant achievements CSIR-NEIST had made over the last decade under Dr Rao's leadership.



Honours & Awards

CSIR-NIIST Scientist Honoured with IFIBIOP Young Scientist Award-2011



Dr Parameswaran Binod receiving the award

The International Forum on Industrial Bioprocesses has honoured Dr Parameswaran Binod of the CSIR-National Institute for Interdisciplinary Science and Technology (NIIST), with the Young Scientist Award for the year 2011 for his significant contributions in the area of Microbial and Enzyme Technology.

Dr Parameswaran Binod is a Scientist in the Biotechnology Division, CSIR-NIIST, Trivandrum. He obtained his PhD in Biotechnology from Kerala University, Trivandrum. Dr Binod worked as post-doctoral fellow at the Korea Institute for Energy Research, Daejeon, South Korea in 2008. He has also worked at the Technical University of Budapest, Hungary during 2005. He joined CSIR-NIIST in 2009 as a Project Scientist at the Centre for Biofuels. His major areas of research are Biofuels, Biopolymers and Industrial Enzyme Technology. He has published 21 research papers, three review papers and 12 book chapters, apart from several conference communications.

Honours & Awards

Dr. G. Narahari Sastry of CSIR-IICT Awarded Shanti Swarup Bhatnagar Prize for 2011 in Chemical Sciences



Dr. Sastry's research interests are computational chemistry and computer aided drug design. Dr. Sastry has contributed significantly in the fields of non-bonded interactions, buckyball chemistry, hetero-aromaticity, designing structures that defy conventional bonding patterns, pericyclic reactions, biomolecular modeling and computer aided drug design (PDE4, P38kinase, aromatase, membrane proteins, etc). Several of his computational predictions have seen experimental realization. Noteworthy contributions are in the field of understanding the structural and energetic aspects of cation- δ interactions and their relevance in chemistry and biology. His current interests are computational chemistry, computational biology and computer

aided drug design. His work on cation- δ interaction, cooperativity of non-bonded interactions and design of enzyme inhibitors have been recognized as the major contributions of fundamental interest in the citation of SSB award.

He has also been awarded the National Bioscience Award (DBT) 2009, Swarnajayanti Fellowship 2005 (DST), B.M. Birla Young Scientist Award for 2001, B.C. Deb Memorial Award (Indian Science Congress), CRSI Medal 2011, and Alexander von Humboldt fellowship. He was a visiting professor at Institute of Molecular Science, Japan, and Jackson State University, USA. He was also elected as a fellow of National Academy of Sciences (FNASc) and Andhra Pradesh Academy of Sciences (FAPAS). He has successfully guided 12 Ph.D. students, and several M.Tech., M.Pharm., and M.Sc. students. Six more workers spend time as Post-Doctoral colleagues in the group. Currently about 10 students are pursuing their Ph.D. under his guidance. He has organized and participated in many national and international conferences, and delivered about 150 invited/plenary lectures. He has published about 215 papers and received more than 2900 citations, and has an h-index of 28.

Honours & Awards

Indian Geophysical Union Decennial Award 2012 for CSIR-NGRI Director

Prof. Mrinal K. Sen, Director, CSIR-NGRI, has received the prestigious IGU Decennial Award for the year 2012. The award was presented by Dr. V.P. Dimri, President, IGU on 29 October 2012 at the 49th IGU Annual Convention held at Pandit Deendayal Petroleum University, Gandhinagar, Gujarat. Prof. Sen received the award for his outstanding contributions in the field of theoretical and exploration geophysics.



Prof. Sen has supervised over fifty doctoral and post-doctoral students at the University of Texas at Austin. He serves on several national and international committees and is an associate editor of leading journals such as Geophysics, Journal of Seismic Exploration and International Journal of Geophysics. Prof. Sen routinely serves on the SEG and SPG technical committees.



Honours & Awards

CSIR-NEERI Wins Bronze Icon Award

CSIR-NEERI was awarded the Bronze Icon Award in recognition of outstanding work in contributing to the promotion of electronic work culture and cause of green growth. This award was conferred on the 70th CSIR Foundation Day at CSIR, in New Delhi and was given away by former Minister of Science & Technology & Vice-President, CSIR, Shri Vayalar Ravi.

CSIR-NEERI officials receiving the award from former Minister of Science & Technology Shri Vayalar Ravi



Honours & Awards

CSIR-NEIST Scientist Honoured at International Consultative Meeting of Sericulture

Dr. B.G. Unni Chief Scientist and Area Coordinator in Biotechnology/Biological Sciences, CSIR-NEIST, Jorhat was honoured with Distinguished Sericulture Scientist along with Prof. Mrs Keiko Kadono-Okuda, Insect Genome Research Unit, National Institute of Agrobiological Sciences, Japan at the inaugural function of the ICMS-2012 held at MFDC Auditorium, Imphal, Manipur on 5 December 2012. The honour was conferred by Shri G. Gaikhangam, Deputy Chief Minister of Manipur at the meeting.

Delegates from South Korea, Japan, USA, Singapore and various institutions from India attended the meeting from 5-7 December 2012 jointly organized by the Institute of Bioresources and Sustainable Development (IBSD), Imphal and Indian Institute of Technology (IIT-Gauhati) sponsored by the Department of Biotechnology, Govt of India.

Dr. Unni's contribution to both basic and applied silkworm biochemistry for the last three decades or more has immensely benefited

sericulture, especially growth of silkworm, silk fibre production and host plants in terms of quality and quantity.

Dr. Unni has guided 13 students for their PhD degrees. He has published 80 research papers in national and international journals, presented 120 research papers at national and international conferences, has three patents to his name, contributed 19 chapters in books and 45 research papers in proceedings. He has also released one technology for societal benefit. Dr. Unni has also been honoured with the CSIR Technology Award for Life Sciences-2011.



Shri G. Gaikhangam, Deputy Chief Minister of Manipur honouring Dr. B.G. Unni at the meeting

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

HUMAN RESOURCE DEVELOPMENT GROUP

CSIR Complex, Library Avenue, Pusa, New Delhi 110 012

NOMINATIONS INVITED

Shanti Swarup Bhatnagar Prizes for Science and Technology-2013

The Council of Scientific and Industrial Research (CSIR) invites nominations for the Shanti Swarup Bhatnagar (SSB) Prizes in Science and Technology for the year 2013. The SSB Prizes are to be given for research contributions made primarily in India during the past five years. The age of the nominee for the 2013 SSB Prize should not be more than 45 years as on 31.12.2012.

The SSB Prizes are awarded for notable and outstanding research, applied or fundamental, in the following disciplines:

(1) Biological Sciences; (2) Chemical Sciences; (3) Earth, Atmosphere, Ocean and Planetary Sciences; (4) Engineering Sciences; (5) Mathematical Sciences; (6) Medical Sciences; and (7) Physical Sciences. The SSB Prize carries with it a citation, a cash award of Rs. 5,00,000/- (Rupees five lakh) only and a plaque for each scientist selected for the Award.

Nominations addressed to Scientist Incharge-SSB/YSA Unit, Human Resource Development Group, CSIR Complex, Library Avenue, Pusa, New Delhi-110012 should be sent as per the prescribed proforma (Original + 14 copies) along with one set of reprints of significant publications of the last 5 years' period on or before 31st March 2013.

The details of the SSB Prize and the prescribed proforma for nomination may be obtained from the above address or downloaded from the website: www.csirhrdg.res.in

CSIR Young Scientist Award 2013

The Council of Scientific & Industrial Research (CSIR) invites nominations for the CSIR Young Scientist (YS) Awards for the year 2013. The awards are to be given for research contributions made primarily in India. The nominee should be a regular scientific staff of CSIR system holding a post of Junior/Trainee Scientist or above (Previously Scientist 'B' or above in Group IV) and should have joined the CSIR laboratory on or prior to 26th September 2012. The age of the nominee should not be more than 35 years as on 26th September 2012.

The YS Awards are given annually in the following disciplines: (1) Biological Sciences, (2) Chemical Sciences, (3) Earth, Atmosphere, Ocean and Planetary Sciences, (4) Engineering Sciences, and (5) Physical Sciences (including instrumentation). The YS Award comprises a citation, a cash award of Rs 50,000 (Rupees fifty thousand only), and a plaque.

Nominations addressed to Scientist Incharge, SSB YSA Unit, Human Resource Development (HRD) Group, CSIR Complex, Library Avenue, Pusa, New Delhi 110 012 should be sent as per the prescribed proforma (original + nine copies) latest by **31st January 2013**. Digital photograph (preferably in JPEG), softcopy of duly filled proforma (preferably in MS-WORD) and softcopy of significant publications (preferably in PDF) of the nominee on a single CD/DVD are also required.

The details of the YS Award and the prescribed proforma for nomination may be obtained from above address or may also be downloaded from our website: www.csirhrdg.res.in Human Resource Development Group SSB-YSA

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