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In This Issue

25 In The News

- Dr. M.O. Garg is the new DG-CSIR
- CSIR-India and Bangladesh Council of Scientific and Industrial Research organize Joint Workshop on Chemical Metrology

27 R&D Highlights

- CSIR-CEERI working on Fabrication and Characterisation of GaN/InGaN-based Blue and White LEDs
- Products Developed at CSIR-CEERI under Hybrid Microcircuits Activity
- CSIR-CBRI develops Bio-Concrete as Self Healing Material

34 Conference

- CSIR-IICB Hosts 4th Asian Conference on Environmental Mutagens

36 Symposia/Workshops

- Awareness Seminar-cum-Stakeholder Consultation for Bargachia Metal Spares Cluster by CSIR-CGCRI
- CSIR-IICB Organizes Symposium CeSiN-2014

41 Technology Demonstration

43 Honours & Awards

47 CSIR—Serving The Nation

- CSIR-AMPRI

48 Appointments

In The News

Dr. M.O. Garg is the new Director-General, CSIR



DR. M.O. Garg has been appointed the Director-General of the Council of Scientific and Industrial Research (CSIR). Dr. Garg, who is currently Director of the Dehradun-based CSIR-Indian Institute of Petroleum (IIP), assumed the charge of the post of DG-CSIR on 3 February 2015.

An expert in petroleum refining and petrochemicals, Dr. M.O. Garg has contributed immensely to the country's

refining and petrochemical industry over the past 37 years. A Gold Medalist in BTech from IIT Nagpur, MTech from IIT Kanpur, and PhD from the University of Melbourne, Dr. Garg started his career in the Research & Development Division of Engineers India Ltd. in 1976. In 1994, he joined Process System Services Division of KTI-Technip India Ltd. and moved on to the Indian Institute of Petroleum in 1998.

Dr Garg is credited with the development and commercialization of several technologies. His recent success was in spearheading commercialisation of technology for simultaneous production of US grade gasoline and high purity benzene from FCC gasoline, for which CSIR-IIP received the “CSIR Technology Award” in 2014.

In 2009, Dr. Garg was elected Fellow of the Indian National Academy of

Engineering. He has received several other awards including the Uttaranchal Ratan-2004 award and the OceanTEX 2012 Award for Excellence in Research & Development in the Downstream Oil Sector.

Dr. Garg specializes in the area of liquid-liquid extraction, simulation and modelling, process integration, advance control, and process conceptualization. He has published over 245 papers and has 33 patents to his credit.

CSIR-India and Bangladesh Council of Scientific and Industrial Research organize Joint Workshop on Chemical Metrology

A two-day joint workshop on Chemical Metrology, under the CSIR, India-BCSIR, Bangladesh S&T cooperation programme, was organized at the CSIR-National Physical Laboratory (NPL), New Delhi during 15-16 January 2015. Dr. Amitava Sengupta, Acting Director, NPL inaugurated the workshop.

The Bangladesh Council of Scientific and Industrial Research (BCSIR) delegation comprised Dr. Md. Tofazzal Hossain, Member (S&T), BCSIR, Mr. Reaz Mohammad Mazumdar, Scientist, BCSIR and Md. Moniruzzaman, Scientific Officer,

BCSIR. Over 30 scientists participated in this bilateral workshop. The aim of the workshop was to identify joint projects for implementation, develop mechanisms for scientific exchanges and provide opportunities for training BCSIR researchers at CSIR institutes in the area of Chemical Metrology.

The BCSIR delegates found the workshop very informative and interactive and felt that it was necessary for the Designated Reference Institute for Chemical Measurements (DRICM), BCSIR, Bangladesh to have close cooperation with CSIR-NPL, New Delhi. CSIR assured the BCSIR delegation of providing all necessary support for developing their infrastructure in the area of Chemical Metrology by offering long-term training to young scientists for capacity building, organizing joint workshops, and sending CSIR experts to Bangladesh to deliver lecture series.

A visit to the Metrology facilities of CSIR-NPL, New Delhi was arranged for the BCSIR delegation on 16 January 2015.

On this occasion, a Working Programme of S&T cooperation for the period 2014-2017 was also signed between the Council of Scientific & Industrial Research (CSIR), India and the Bangladesh Council of Scientific & Industrial Research (BCSIR), Bangladesh. The areas identified for cooperation include Materials Science,



The Working Programme was signed by Dr. Amitava Bandopadhyay, Head, International S&T Affairs Directorate, CSIR (on the right) and Dr. Md. Tofazzal Hossain, Member (S&T), BCSIR (on the left)

Chemical Metrology, Pharmaceutical Science & Technology with emphasis on Active Pharmaceutical Ingredients, Medicinal Plants and their derivatives & Polymer Science & Technology. CSIR-BCSIR are planning to

organise a series of joint workshops in the mutually identified areas of cooperation in the next two years in order to engage in fruitful collaboration between the two sides.



Participants of the CSIR-BCSIR Joint Workshop on Chemical Metrology

R&D Highlights

CSIR-CEERI working on Fabrication and Characterisation of GaN/InGaN-based Blue and White LEDs

Scientists of the CSIR-Central Electronics Engineering Research Institute (CEERI), Pilani have fabricated blue LED devices (latest batch) based on GaN/InGaN material.

White light emission from these blue LED chips was achieved by coating YAG-based phosphor on top of LED chips or inside of the lens cap. Prior to the phosphor



Fig. 1: Packaged LED devices

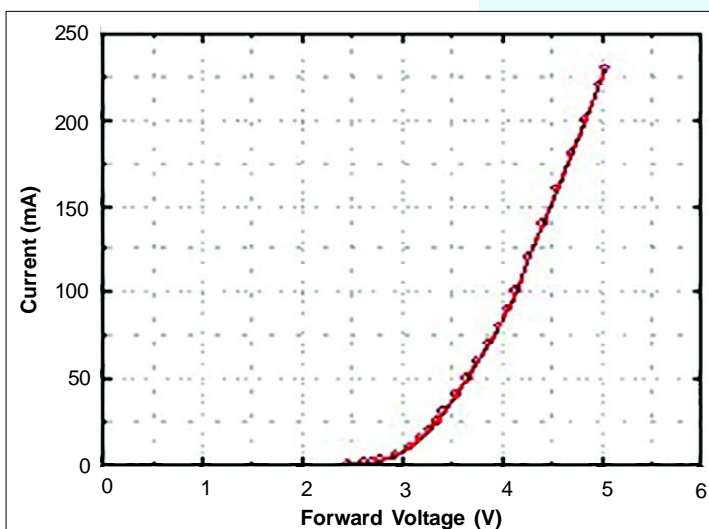


Fig. 2: I-V characteristics of LEDs

coating, the concentration and thickness of the phosphor were optimised in order to achieve the optimal intensity of white light emission with the best possible quality of whiteness.

Following phosphor-coating and packaging, the devices were tested for electrical and optical characterisation. I-V characteristics of a typical LED device are plotted in Fig. 2. Optical characterisation showed that ~230 mA of current was achieved for an applied forward voltage of 5 V. LED luminous efficiency of 9.5 lm/W at 20 mA and 6.7 lm/W at 100

mA (for warm white) and 7.6 lm/W at 20 mA and 6.4 lm/W at 100 mA (for neutral white) was achieved.

Fig. 1 shows the packaged LED devices (fabricated at CSIR-CEERI) with and without yellow phosphor coating. I-V characteristics of a typical LED device are plotted in Fig. 2. Optical characterisation of the blue and white LEDs along with their spectral characteristics is shown in Figs. 3 and 4, respectively.

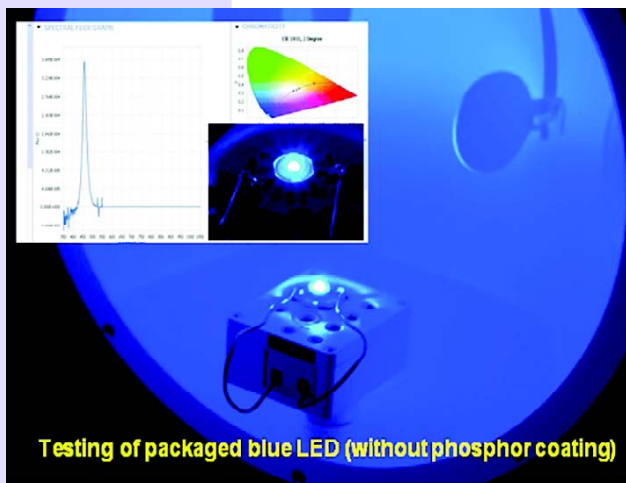


Fig. 3: Optical characterisation of Blue LED

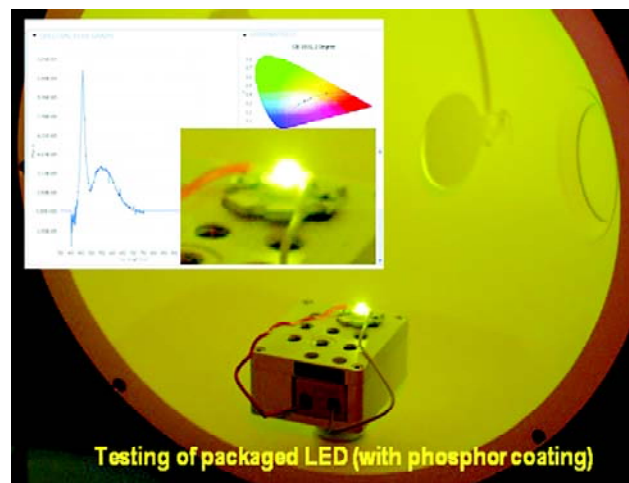


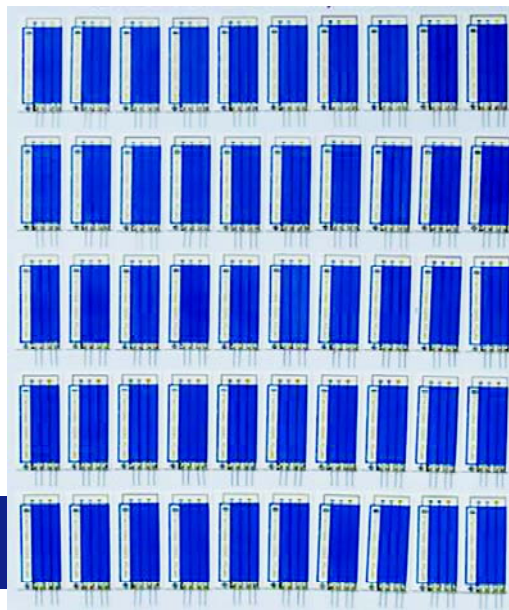
Fig. 4: Optical characterisation of White LED

Products Developed at CSIR-CEERI under Hybrid Microcircuits Activity

Under the Hybrid Microcircuits programme at CSIR-Central Electronics Engineering Research Institute (CEERI), Pilani, the following products have rolled out so far:

Electrode Structure for Milk Analyser: 100 sensor electrodes were developed in two batches for milk analyser system as per the requirements of REIL, Jaipur. They have three working electrodes of Au, Au-Pt and Pd-Ag and one reference electrode of Pt on the substrate. They were handed over to REIL, Jaipur (Fig. 1).

Fig. 1: First batch of 50 sensor electrodes delivered to REIL, Jaipur



LTCC VIA-Butterfly Microhotplates for DRDO-SSPL, Delhi: LTCC Via-Butterfly microhotplates with stable lead interconnections were developed for DRDO-SSPL, Delhi. These microhotplates have an IDT electrode on the front side and the microheater on the back side. The microhotplates can be operated using a DC source and can provide operating temperatures up to 300 °C. These hotplates can be used to develop microsensors for strategic, biomedical and industrial applications. Twenty five microhotplates were supplied to DRDO-SSPL (Fig. 2).

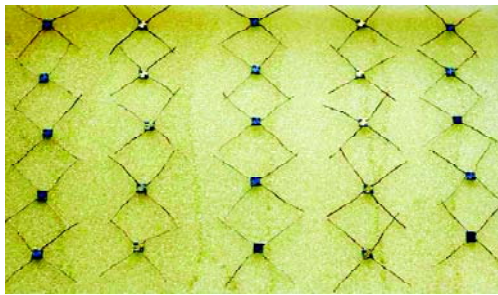


Fig. 2: LTCC Via-Butterfly microhotplates delivered to DRDO-SSPL, Delhi

Pressure Sensor Packaging on LTCC Substrates: The MEMS pressure sensor was mounted on an LTCC substrate. The sensor was packaged using in-house developed packaging attachment (i.e. Nickel plated Kovar cap fixed with stainless steel pipe) attached to the LTCC substrate (Fig. 3). The packaging sustained a pressure of up to 25 bar (permissible limit in laboratory



Fig. 3: Pressure sensor packaging on LTCC

conditions) and no damage or deformation to the sealing was observed.

Pressure Sensor Packaging on TO Headers: Pressure sensors were die-mounted and wire-bonded on TO headers. Caps with pipe assembly were attached to the headers (as shown in Fig. 4) and reliability of header-to-cap attachment was experimentally checked. The sensors were tested up to 9 bar pressure as per the requirement.



Fig. 4: Pressure sensor packaging on TO- headers

Coating Technique for Pressure Sensor Packaging: A technique for coating pressure sensors with a thin protective polymer film was developed. The coated sensing area of the chip was exposed to the environment. The remaining part of the sensor chip was covered using Dam-and-Fill technique. Characterisation of the sensor was performed. This technique could be a low-cost substitute for the conventional oil-filling technique in several applications. These sensors can be used in water and other fluidic environments (Fig. 5).

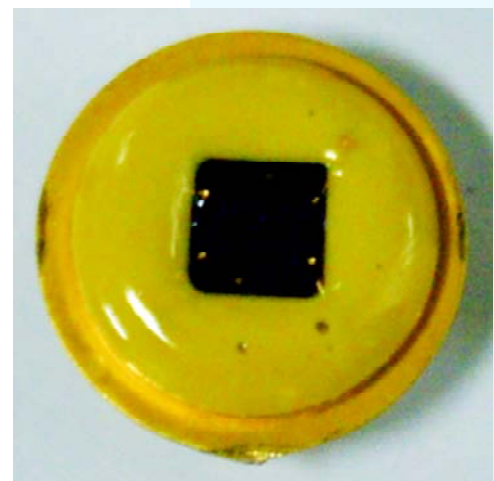


Fig. 5: Packaged pressure sensor



Packaging of 1-Axis Accelerometer using LTCC Technology: A base for accelerometer packaging was developed using LTCC technology. It has Au patterned conductor tracks. A circular dielectric layer has been provided to avoid shorting between conductor tracks and the metallic cap, used for encapsulation. Pd-Ag printing was done on pads for proper lead connections using reflow soldering. Both 8-pin and 10-pin packages were developed (Fig. 6 and Fig. 7).

Figure 8 shows the LTCC-based packages with cavity for accelerometer packaging (four packages are with 8 I/O pins and two packages are with 10 I/O pins). A cavity is

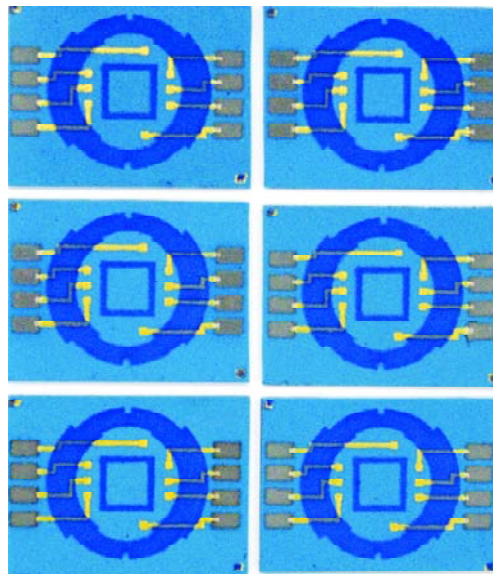


Fig. 6: LTCC package for accelerometer with 8 I/O pins (without cavity)

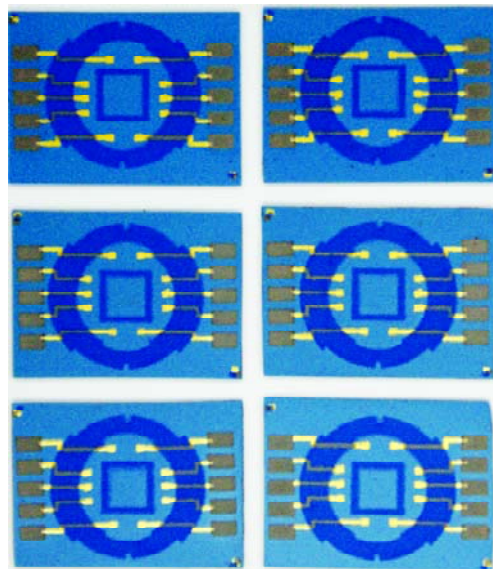


Fig. 7: LTCC package for accelerometer with 10 I/O pins (without cavity)

created in LTCC at the central part where accelerometer chip is to be bonded. The remaining fabrication steps are similar to the I-Axis Accelerometer packaging. Figure 9 shows die-bonded and wire-bonded devices on LTCC package base. Fig. 10 shows packaged 1-axis accelerometer sealed with two different techniques using perspex cap and Ni plated Kovar cap.

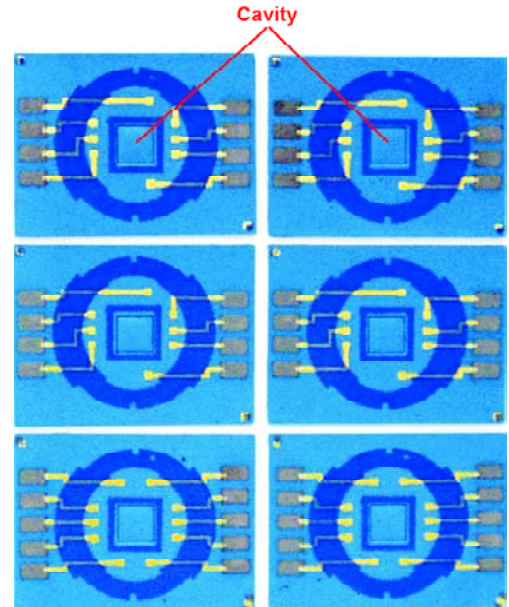


Fig. 8: LTCC based package with cavity (with 8 and 10 I/O pads) for accelerometer packaging

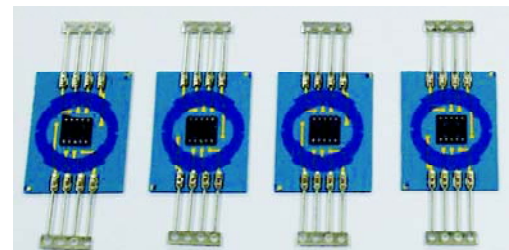


Fig. 9: Die-bonded and wire-bonded accelerometer devices on LTCC pac

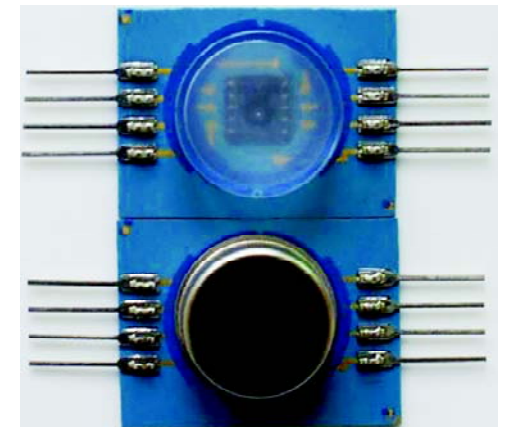


Fig. 10: Packaged 1-axis Accelerometer using LTCC technology with two different sealing techniques

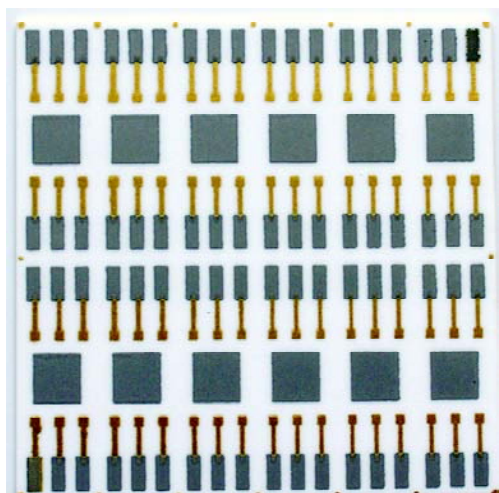


Fig. 11: Base for headers used for packaging

Custom Required Headers for Packaging:

The base substrate used was alumina with Au pads for wire bonding. Pd-Ag pads were provided for die bonding and lead attachment. A low-cost ceramic base as a substitute for TO headers was developed (Fig. 11), which can be used for packaging of pressure sensors, accelerometers, microhotplates and other MEMS devices. Fig. 12 shows the ceramic header base with leads attached and microhotplate die bonded (a) and wire bonded (b).

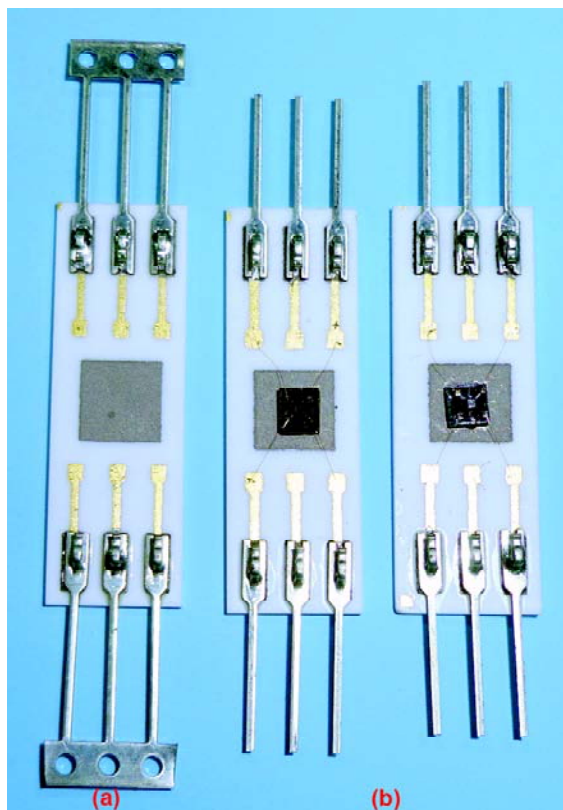


Fig. 12: Base with leads attached (a) microhotplate die bonded and wire bonded (b)

CSIR-CBRI develops Bio-Concrete as Self Healing Material

Scientists at the CSIR-Central Building Research Institute (CBRI) have come up with a Bio-Concrete as Self Healing Material.

For this, two new calcifying bacteria were identified and maintained in laboratory for further experimentation (Fig. 1a and 1b). Next, bacterial pellets were prepared by growing the bacteria in liquid culture media. The OD of bacteria culture



Fig. 1a: MTCC 10086 - Bacterial Culture

Fig. 1b: MTCC 10221 - Bacterial Culture



Fig. 2: Refrigerated Centrifuge

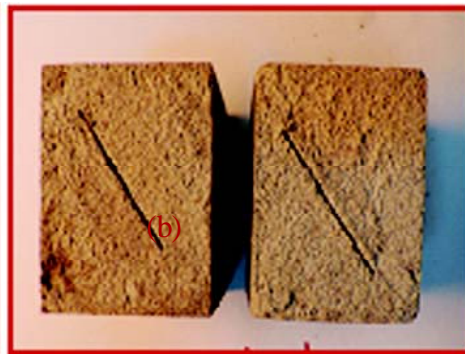
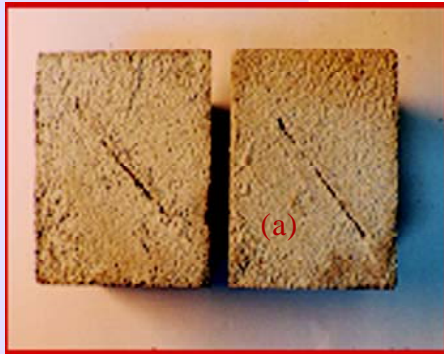


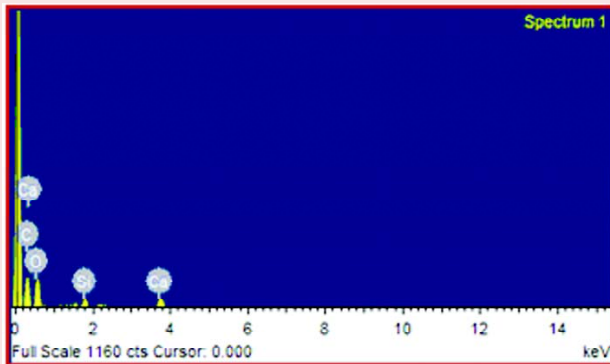
Fig. 3a: 50 mm mortar cubes (control)

Fig. 3b: 50 mm bacterial mortar cubes

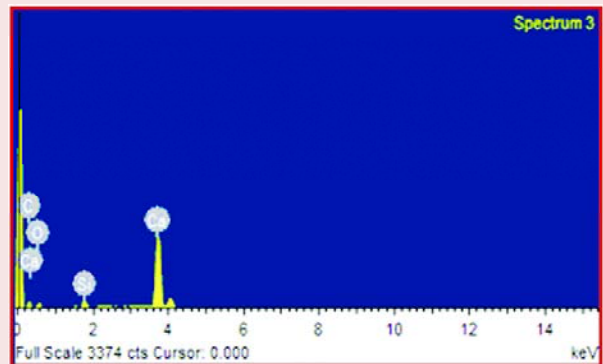
were determined using UV-spectrophotometer followed by centrifugation on refrigerated centrifuge to get their concentrated bacterial pellets, which was used for casting of bacterial mortar (Fig. 2).

In the next step, bacteria-embedded mortar cubes (50 mm) with standard size crack were caste using bacterial pellet (Fig 3a and 3b).

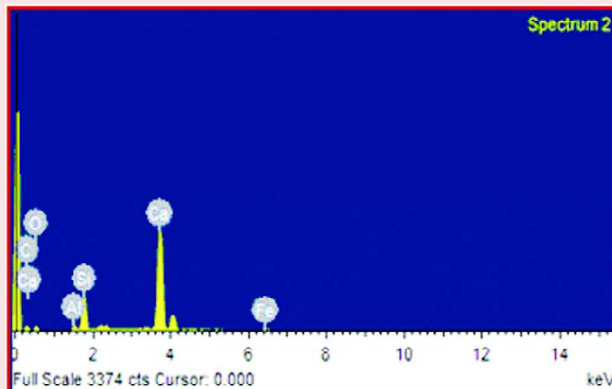
The mortar samples were examined by scanning electron microscope with various magni-



Untreated: Ca - 8.99 %



Bacteria treated: Ca - 44.04%



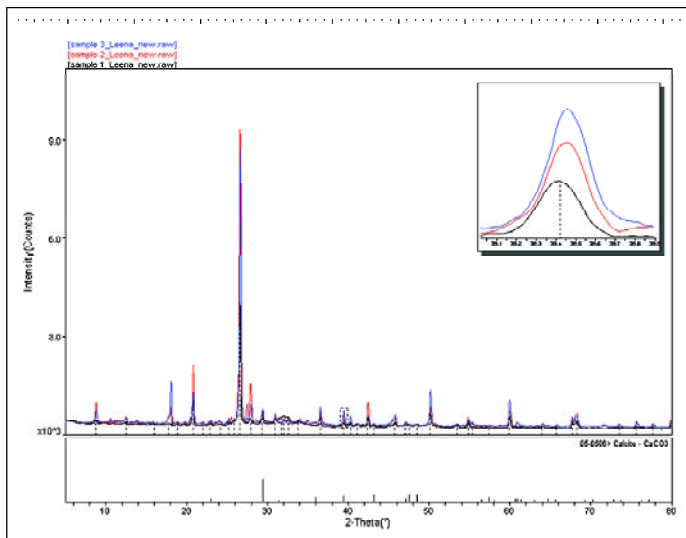
Bacteria with CL treated: Ca-68.88%

EDAX spectra of untreated, Bacteria treated and Bacteria with calcium lactate treated mortar

fications. The rod-shaped bacteria and crystal of calcite are clearly visible in bacteria-treated mortar.

The samples were examined by EDAX, which showed enhancement of calcium ion concentration from 8.99% (untreated) to 44.04% (with bacteria) and 68.88% (with bacteria and calcium lactate).

Next, XRD analysis was done to reveal the form of mineral composition formed. The bacterial mortar showed that the majority of carbonate deposits were present as calcite while no calcite peaks were visible in untreated samples.



XRD spectra of control, bacteria and bacteria with calcium lactate embedded mortar

Leena Chaurasia & Rajesh K. Verma at CSIR-CBRI



Equipments procured and installed



Construction of Bio-concrete Laboratory is under progress

Conferences**CSIR-IICB Hosts 4th Asian Conference on Environmental Mutagens**Inaugural Session of the 4th ACEM

Dr. A.K. Giri, President AAEMS addressing the audience

The 4th Asian Conference on Environmental Mutagens (ACEM) was held at the CSIR-Indian Institute of Chemical Biology (CSIR-IICB), Kolkata, during 10-12 December 2014, in collaboration with All India Congress of Cytology and Genetics (AICCG). Seventy international delegates from China, Korea, Japan, Austria, Germany, USA, Iran, Kazakhstan, Australia, Canada and Belgium along with 150 Indian delegates and students participated in

this three-day international conference.

The meet was inaugurated by Prof. Takehiko Nohmi, president of the International Association of Environmental Mutagens and Genomics Societies (IAEMGS) along with Dr. Ashok K. Giri, president of the Asian Association of Environmental Mutagen Societies (AAEMS).

Dr. Giri in his inaugural address gave a brief introduction about the activities and significance of various environmental mutagen societies in Asia as well as the rest of the world. He mentioned that from developing nations to the developed, all face some of the most intense environmental problems that culminate into a global despair. He outlined the present scenario of the effects of environmental mutagens like radiation, hazardous chemicals and heavy metals and highlighted the main objectives of the meeting. He stated that Asia harbors some of the fastest developing countries in the planet earned it the dubious reputation of being the most polluted one.

Dr. Giri then focused on another major long standing concern of the prevalence of wide-spread arsenic toxicity in South East Asia where 160 million individuals are chronically exposed to this group-I carcinogen through contaminated ground-water primarily in Bangladesh, India, Taiwan and China with fresh reports coming out from other countries and newer areas about this toxicant. He reminded that in the year 2001 there were only 21 countries where arsenic contamination was the problem through drinking water and other sources but in the



Address by: Dr. T. Nohmi (top left), Dr. J. Cao (top right),
Dr. Y. Aoki (bottom left) and Dr. MH Cho (bottom right)

year 2014 about 70 countries have been included in the list. The problem is now a global issue. Dr. Giri informed that his research group reported a link between rice containing high levels of arsenic and chromosomal damage in humans. Based on this report, very recently, the US FDA has started a project to find out the minimum threshold dose of arsenic in rice.

The other issues he addressed were fluoride toxicity through contaminated groundwater. He also emphasized that the main objective of the meet was to discuss about the present scenario of various hazardous chemicals and environmental pollutants in various geographic locations, their impacts on direct human health and scientific measure to combat such environmental threats. Dr. Giri finally requested all scientists across the globe to come forward and play a leading role in

understanding the mechanisms of such environmental toxin exposure caused maladies and to devise ways to detect them early and to find palliative measures.

Dr. Takehiko Nohmi talked about the roles of translation DNA synthesis in the threshold for genotoxic chemicals. Dr. Yasunobu Aoki, President of Japanese Environmental Society, proposed transgenic animal models as a tool for risk assessment of environmental mutagens. Dr. Myung-Haing CHO, President of Korean Environmental Mutagen Societies, Dr. Jia Cao, Vice President of Chinese Environmental Mutagen Society along with other scientist presented their research findings and proposed necessary measures.

Scientists from other CSIR institutes and different Indian universities also presented their work and actively participated in the discussions. Thirty one students from around

the world were supported with travel award to participate in the conference. More than seventy national and international students, post-docs, academicians and professors presented their research work in the first and second day poster sessions.

The final session ended with feedback from various participants and discussion on action plan to meet the targets. In the

valedictory session the joint organizing secretary, Dr. Arun Bandyopadhyay from CSIR-IICB, in his vote of thanks, expressed appreciation for the presence of a distinguished gathering on the occasion and thanked the delegates individually and collectively and conveyed gratitude to all the sponsors.

Symposia/Seminars

Awareness Seminar-cum-Stakeholder Consultation for Bargachia Metal Spares Cluster by CSIR-CGCRI

A team of scientists from the CSIR-Central Glass & Ceramics Research Institute (CGCRI), Kolkata visited the Bargachia Metal Spares Cluster in Howrah, West Bengal on 30 December 2014. The team comprised Shri Kamal Dasgupta, Acting Director, CSIR-CGCRI, Dr. Debashis Bandopadhyay, Coordinator, Dr. Sukanya Datta, Shri Debashish Sarkar, Shri Indranil Biswas, Shri Sanjib Dey, Smt. Suchismita Nandan, Shri Debtanu Pal and Shri Shubhankar Ghosh. Dr. Soumya Sensharma from CSIR-CMERI, Durgapur also joined the team.

The visit was organized as part of a capacity building programme for MSME Clusters under the aegis of the Council of Scientific and Industrial Research, Government of India and supported by the Ministry of Micro, Small and Medium Enterprises, Government of India. The programme was appropriately aligned to other on-going programmes such as PRISM (Promoting Innovations in Individuals, Start-ups and MSMEs) under the Department of Scientific and Industrial Research (DSIR), New Delhi, which also funds institutions to help develop appropriate and new technology solutions for MSME clusters.

India is expected to rank amongst the world's top growth economies and also the top manufacturing destinations by 2020. Thus, it is imperative that the manufacturing industry gets a boost at all levels.

The Bargachia Metal Spares Cluster manufactures both ferrous and non-ferrous metal parts. The items for which this cluster is celebrated includes, locks and lock accessories, nuts and bolts, screws, washers, electrical sockets, metal parts for the leather Industry, rifle parts, spare parts for medical apparatus, holders and connectors to name a few items. Some metal parts for railways and the aviation industry are also manu-factured here.



Acting Director Shri Kamal Dasgupta delivering his speech

However, in the face of fierce competition, the traditional manufacturing units are in need of technological up-gradation and so the visit was designed to incorporate Technical Sessions, Stakeholder Interactions and also visits to actual manufacturing sites so as to assess the felt-needs and ground realities.

Shri Dasgupta greeted the assembled entrepreneurs and explained how in the face of growing global competition in a free market economy, adoption of new and efficient technologies is the only way to prosperity. He said that CSIR has many high-end technologies as also many appropriate technologies for the MSME sector. He gave the motivational example of CSIR-CGCRI's success story in Gujarat's Tile Industry. A small pottery cluster in Naroda comprising of about 400 units today has taken modern scientific support for vitrified tiles from CSIR. It currently reports a turnover of around Rupees four thousand crores annually and has successfully taken on the Chinese Tiles Industry in India.

In this context, Shri Dasgupta elaborated on the setting up of the Technology Facilitation Centre (TFC) at CSIR-CGCRI following the signing of an MoU between of the Government of West Bengal and CSIR with the vision of creating a sustainable ecosystem of micro, small and medium enterprises to drive economic prosperity of the State. TFC will facilitate access to technology, government will extend support and impetus will be given for skill development, he said. He urged the entrepreneurs to take help from CSIR to bridge the technology gap.

The first talk of the Technical Session entitled "Overview of CSIR Technologies" was delivered by Shri Indranil Biswas. Shri Biswas outlined the organizational structure of CSIR and elaborated about the different subject areas of research where CSIR laboratories were active. He also focussed on certain chosen mechanical devices, technologies and engineering areas. He

explained that CSIR was ready to provide currently existing technologies, or customize solutions to suit local needs. It was also possible to support collaborative research to find answers to issues that await redress. CSIR was willing to help entrepreneurs fructify their dreams with limited financial support and assistance for skill-development.



Interacting with entrepreneurs

His presentation paved the way for answering the questions about the process of acquiring technology from CSIR. This was addressed by Shri Debasis Sarkar in his presentation entitled "Acquiring Technology from CSIR". Shri Sarkar said that technology may be acquired from traditional knowledge, imported or acquired. There were pros and cons to ways in which an entrepreneur could have access to technology. For example, technology received as a legacy of traditional use may prove to be out-moded or inefficient. Imported technology, on the other hand, often comes with many constraints. Proper support may not be available to service the machines or the entrepreneur may lack the necessary skill(s) to operate/use it.

However, acquiring technology from an institution such as CSIR is not only easy but also effective, said Shri Sarkar. The cost of technology transfer is usually nominal for registered MSMEs and under certain conditions, may even be given free of cost. Of course, royalty payment would need to be paid from time to time. The best way to take advantage would be to pay a visit to the



nearest CSIR laboratory or to write to the MSME Technology Facilitation Centre set up at CSIR-CGCRI, Kolkata. Availability of technology is checked and communicated within a short time, thus facilitating access to the technology. CSIR also gives certification that is much valued.

Dr. Soumya Sensharma of CSIR-CMERI, Durgapur spoke about the benefits of a cluster. He appreciated the fact that those employed by the metal spares cluster did much of their tasks manually and were skilled at the task. However, access to and use of technology can be used to appropriately tweak existing machinery, and improve production, he said. He said that the scheme not only extended support to entrepreneurs and build confidence but that it also actively encouraged the spirit of innovation. He urged the entrepreneurs to uplift their conditions. Special needs will be answered with customized solutions, he reiterated.

Dr. Sensharma spoke about table-top or micro factories and elaborated on the appropriate machinery that could be used by the metal spares cluster and which is currently available with CSIR-CMERI. For example, those for milling, cutting and surfacing. He invited the entrepreneurs to visit CSIR-CMERI at a mutually convenient date and time to familiarize them with all that CSIR-CMERI can offer.

Shri Ashok Sinharoy, GM, DIC, Howrah also spoke on the occasion. He began by thanking CSIR for reaching out and establishing a bridge. For the miracle to be repeated in Baragachia we must embrace technology, he said. "Make in India" is the new slogan and technology has a huge role to play. He said that he was hopeful that a Common Facility Centre would soon come up in Bargachia, and perhaps also a Toolroom, once lingering legal bottlenecks were overcome. The dream was also to develop proper skill development certification, he said. His message to the

entrepreneurs was that while soon it will be mandatory for all Public Sector Units (PSUs) to purchase 20 per cent of their requirements from Micro, Small and Medium Enterprises, the quality of products has to be up to the mark too.

This was followed by the interactive technical session characterized by spirited exchange of ideas. The entrepreneurs presented certain specific problems and outlined pressing challenges. These were answered by the CSIR scientists. The entrepreneurs were advised to adopt best techniques and to improve their skills and products so that they could conquer the market on merit.

After an on-site visit to the many factories in the cluster area, the team reconvened for another meeting with the leading entrepreneurs in the area. It was decided that a selected team of entrepreneurs with representatives of every manufacturing sector in the cluster would visit CSIR-CMERI and also CSIR-NML as guests of CSIR.

At CSIR-NML they would focus mainly on metal testing facilities and furnaces. It was agreed that a move had to be made towards some degree of automation from the fully manual mode so that manpower-demand could be decreased while improving product quality. The cluster would have to aim to incorporate as much automation as is possible under existing conditions and then slowly upgrade.

The entrepreneurs were requested to identify specific training needs (particularly in the areas of statutory compliances, waste disposal, fire hazard mitigation and household units etc., which assume importance with respect to the Make in India project), which would be then addressed. The entrepreneurs were informed that they could approach the TFC at any time with their needs and that they could use the facilities at CSIR-CGCRI, with prior intimation, for chemical analysis of their materials.

CSIR-IICB Organizes Symposium CeSiN-2014



Diya in CeSiN 2014 programme: Prof. Michael Koval, Prof. Kasturi Datta, Dr. Snehasikta Swarnakar and Prof. Chitra Mandal (left to right)

The 2nd international symposium on “Advanced Studies on Cell Signaling Network” (CeSiN-2014) was organized at the CSIR-Indian Institute of Chemical Biology, Kolkata during 13-15 December 2014. About 170 of the brightest minds in the field of cell signaling from India as well as overseas gathered on this occasion to discuss the global advancement in Cell Signaling and the future of cell biology research.

The Scientific Program at CeSiN-2014 featured cutting-edge knowledge developments in the arena of Cell Biology, through research work presentation by keynote, plenary lectures, invited talks, oral

and poster presentations. Prof. Chitra Mandal, Director, CSIR-IICB, was the chairperson of the symposium.

The inaugural session of the conference was graced by Prof. Kasturi Datta, distinguished professor from Jawaharlal Nehru University, New Delhi, as the Guest-in-Chief and Prof. Michael Koval from Emory University, USA as the Guest-of-Honour.

The theme of the conference was to highlight the current state of knowledge about the role of cell signaling in the pathogenesis of major chronic diseases, and to discuss the comprehensive networking strategies applicable to prevention of a broad



The inauguration programme of CeSiN 2014

spectrum of chronic and immune diseases in human and other biological systems. An impressive range of local and international stalwarts in the respective fields talked about many important topics like Gene Regulation in Cell Signaling, Molecular Signaling in Human Diseases, Structural Basis of Biological Signaling, Understanding of Signaling in Experimental Models, etc.

On the first day, Prof. Sankar Ghosh from the University of Columbia, USA, a renowned scientist in the field of Immunology and Microbiology, delivered the keynote address. He explained the multi-way intersection of inflammation and immunity in the light of TNF α , which leads to tumor development.



Poster presentation by research scholars

Dr. Anirban Bandyopadhyay from Tsukuba, Japan presented a novel hypothesis where a triangular relationship exists between chemical, mechanical and electromagnetic interactions.

Prof. Michael Koval from the Emory School of Medicine, USA, delivered his plenary lecture on cytokine balance and lung barrier function in breathing. His current research focuses on the role of signaling imbalance of TGF β and cytokines on alcohol-induced lung injury.

Dr. Tapas K. Hazra from the University of Texas, USA, explained his latest findings

on DNA strand break repair deficiency and human neurodegenerative disease spinocerebellar ataxia type 3.

Dr. Smita Mohanty from Auburn University, USA, talked about the role of pheromone-binding protein on olfactory signal transduction. Dr. Samuel Molina from Emory University, USA delivered his lecture on stimulatory effect of insulin for glucose uptake in primary human bronchial epithelial cells. Dr. Subhra K. Biswas from the Singapore Immunology Network, Singapore, presented his recent investigation on monocyte-macrophage response and plasticity in human disease.

Dr. Asish Chaudhuri, UTSouthwestern Medical Center, USA, delivered his talk on understanding of the protein homeostasis as a determinant of longevity. Dr. Snehasikta Swarnakar of CSIR-IICB discussed on the association of promoter polymorphism of Matrix metalloproteinase-7 and Gastric cancer risk in Eastern Indian population. She added, "Nicotine exhibits additive role in gastric cancer risk by increasing MMP-7 transcription via phosphorylation of CREB transcription factor." Dr. Niranjan Chakraborty from NIPGR, New Delhi emphasized on the changes in nuclear proteome in stress adaptation, development and growth of plants. Dr. Santasabuj Das from NICED, Kolkata elucidated the immunological mechanism of protective function of butyrate in *Salmonella* enterocolitis. Dr. Gaurisankar Sa from Bose Institute, Kolkata and Dr. Mrinal K. Ghosh from CSIR-IICB elucidated the importance of p53 and p68 in oncogenesis.

Altogether, around 80 abstracts were accepted for presentation of which 12 oral presentations were by research scholars.

The valedictory session was chaired by Dr. Rukhsana Chowdhury from CSIR-IICB and Dr. Barbara Sclingmann from Emory University, USA. Awards for best poster and best oral presentations were given to research scholars in this session.

The organizing secretary, Dr. Swarnakar, CSIR-IICB, expressed her heartfelt appreciation to all the speakers, contributors, sponsors, and volunteers. The programme ended with the national anthem of India.

Technology Demonstration

CSIR-CBRI Technology Demonstration-cum-Classroom



The Institute has developed several technologies used in the construction of buildings in the past. This calls for wider dissemination of these technologies and its performance evaluation when exposed to different geo-climatic environment. Towards this end, most of the CSIR-CBRI developed technologies were implemented in the construction of additional rooms over the existing single storeyed class rooms of the Bal-Vidya Mandir (school building) at CBRI Colony, Roorkee. The objective was to provide practical and visual information about the technologies that support sustainable human settlements and evaluate its serviceability performance.

A comprehensive range of building technologies and products were implemented in the construction, including systems that could be regarded as conventional, as well as some alternative approaches. The exhibits are grouped into three distinct categories viz. Brickwork, Materials & Technology, and Roofing Systems.

Brickwork: The brickwork for walls was carried out using Machine Made Clay Bricks, Fly-ash Bricks, C-Bricks, Stone Blocks, Concrete Blocks, all developed by CSIR-CBRI and locally available Burnt Solid Clay Brick units. The purpose of the exhibits is to display some of the technology components that would normally be concealed within plastered surface (Refer Photo 2h).

Materials & Technology: The developed Materials & Technologies deployed in the construction and their salient features are:

Confined Masonry: The seismic performance of this technology was tested on a full-scale model at CSIR-CBRI in the Indian context. The technology exhibited superior seismic performance in terms of strength, stiffness, ductility and energy dissipation capacity. The technique is cost-effective, as it makes use of locally available material and construction skills.



Photo 1: View of single-storeyed building adopted as a platform for demonstration of CSIR-CBRI technologies

All the load-bearing walls of the Demonstration Building were constructed using this technique (Refer Photo 2a).

Door Frames with Wood Without Tree: The door/window frames were manufactured using rice husk plastic wood, a material developed by CSIR-CBRI. The material has wood-like surface appearance, having features similar to natural wood and meeting requirements of the National Building Code (NBC 2005, Section 3, Timber). The product is termite-resistant and carpenter-friendly.

The door frames provided in the Demonstration Building were manufactured using rice husk plastic wood (Refer Photo 2b).

Gypsum Plaster: This environmental friendly product developed from waste of Hydrofluoric acid plant was used for external and internal plaster over masonry work. The salient features include – low water absorption, high compressive strength, fire resistant and good acoustic properties. Also this material can be used for making wall

panels, tiles, etc. (Refer Photo 2c).

Some part of the walls of the Demonstration Building was plastered using Gypsum Plaster.

Heat Reflective & Water-Proofing Treatment for Roofs: The technique provides a good water-proofing layer on the roofs. In addition, the features offered are – excellent durability, reflects about 80% solar radiation and is cost-effective (Refer Photo 2e).

Liquid Extinguishant Fire Extinguisher: The product provides affordable first-aid fire safety equipment. It is suitable to combat Class A-combustible material fires, such as paper, wood, cloth, etc.; Class B-flammable liquid fires, such as petrol, diesel, kerosene; Class K-Kitchen and electrical fires. The product has fire suppression time between 8 to 10 sec. on 100 cm² area for Class A and B fires and 25 to 30 sec. on 1000 cm² area. It works on the principles of oxygen depletion, flame chain reaction inhibition and flame-zone cooling

by lowering flame temperature. The product is low priced, bottled in different sizes and can be placed in-house by a common person (Refer Photo 2g).

Eco-Friendly Antifungal additives for Paint: The additives comprised essential oils from Eucalyptus and Peppermint plants. The product is eco-friendly and does not pose health hazard to occupants. 1% volume fraction of additives is recommended to be mixed with commercially available paints. The salient features are – effective in control of fungal growth in walls, can be applied in interior and exterior surface of the building, and is cost effective. The additives have a shelf life of four years (Refer Photo 2d).

The product was used in exterior painting of the Demonstration Building.

Roofing System

Precast RC Waffle Units: The units can be cast and assembled manually or by using machines for a larger housing project. These roofing units are preferred in construction

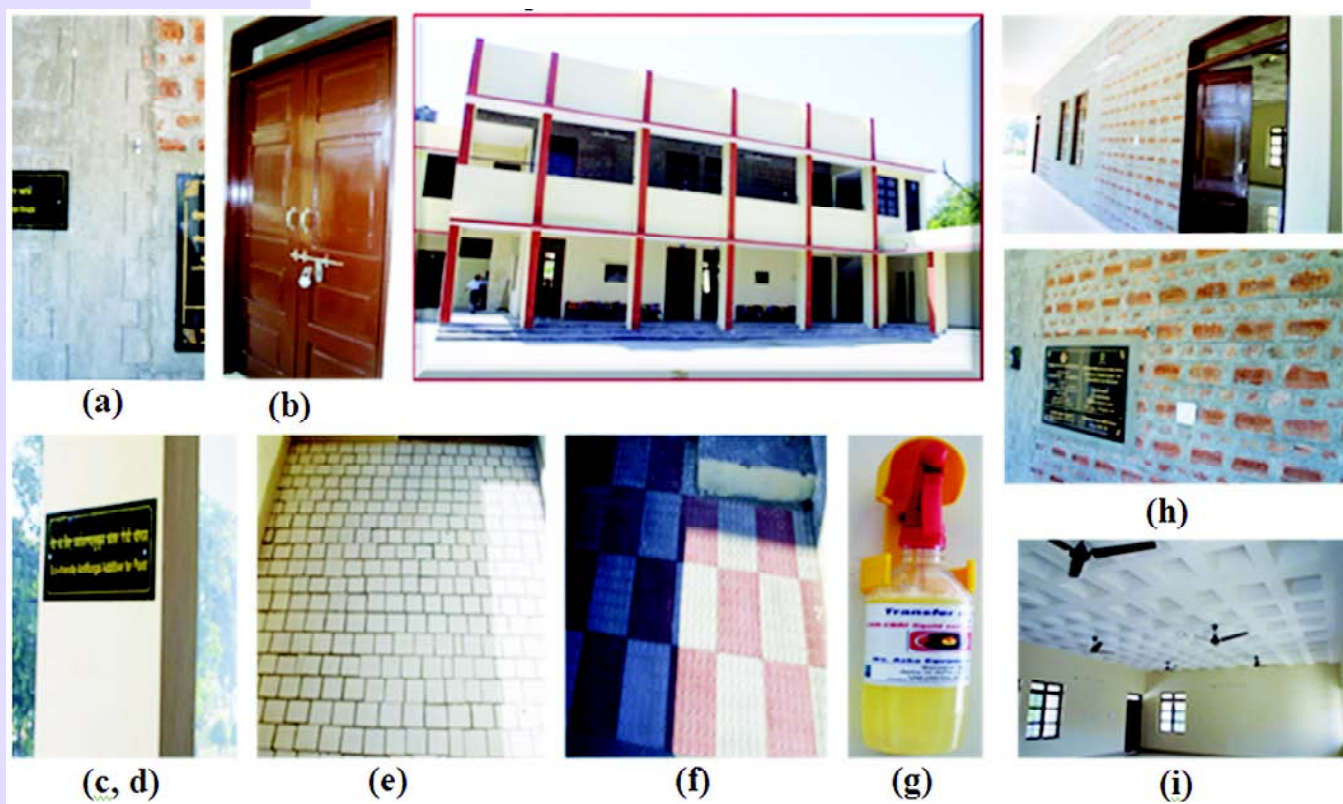


Photo 2: Technology Demonstration-cum-Class-room building exhibiting CSIR-CBRI developed technologies - (a) Confined masonry (b) Door frames with wood without tree (c) Gypsum plaster (d) Eco-friendly antifungal additives for paint (e) Heat reflective and water proofing treatment for roofs (f) Vermiculite tiles (g) Liquid extinguishant fire extinguisher (h) Machine made clay bricks, Fly-ash bricks, C-bricks, Stone blocks, Concrete blocks (i) Pre-cast RC waffle units



Photo 3: Chairman, Research Council, CSIR-CBRI, Prof. Prem Krishna inaugurating the Technology Demonstration-cum-Classroom Building

of two-way slabs of large spans (above 9.0 m) and provide lower carbon foot-print and embodied energy with substantial saving in construction cost and time. Moreover, the roofing units offer an aesthetically pleasing ceiling (Refer Photo 2i)...

Exfoliated Vermiculite Tiles: The product can be used for thermal insulation, partitioning, false ceilings, panelled door, and shutters. The product is environment friendly, cost effective, pleasant in aesthetic appearance, and fulfils the requirements of

IS:3346 (Refer Photo 2f).

The constructed facility has become a one-stop site for full-scale demonstration of first-hand information on existing and some new CBRI technologies. At the same time the technologies are monitored for performance evaluation. This helps our scientists to improve performance, solve problems, comply with regulations, meet specifications, realise projects, develop novel products/processes, and improve the existing ones.

Honours & Awards

CSIR-NEIST Scientist receives Young Achiever Award

Dr. B.S. Bhau, Principal Scientist, has been conferred the 'Young Achiever Award' for his significant contribution in the field of Agricultural Microbiology.

The award was given during the National Workshop on "Advances in PGPR Research" held during 7-8 October 2014 at the Banaras Hindu University, Varanasi. Dr Bhau was felicitated with a certificate, a memento and a shawl. The award is hosted by the Asian PGPR Society to encourage young Indian scientists working in the areas of PGPR and Agricultural Microbiology.

Dr. B.S. Bhau is currently based in the

Medicinal Aromatic and Economic Plants Division at CSIR-NEIST. He did his Postgraduation and Doctorate in Botany from Jammu University, Jammu. He worked as post-doctorate fellow in Botany Department, Delhi University, Delhi; School of Life Sciences, Jawaharlal Nehru University (JNU), Delhi, National Institute of Biological Science, Beijing & The Energy & Resources Institute (TERI), Delhi. Dr Bhau also worked in the School of Life Sciences, Dundee University,



Dundee, Scotland, UK for one year as BOYSCAST Fellow.

Dr Bhau is actively engaged in many national and International R&D projects awarded by the Department of Biotechnology

and Department of Science & Technology, Government of India. His research interest includes biotechnology, plant microbe soil interaction, plant genomics and development of nano-particles using different biological material.

CSIR-NEIST Scientist receives Mineral Engineering Science Award 2014



Dr. Binoy Kr Saikia, Scientist, CSIR-North East Institute of Science & Technology, Jorhat has been conferred the Engineer AC Datta Mineral Engineering Science Association (MESA) of India Award-2014 for his contribution to Mineral Engineering Science.

The award was given on the occasion of Engineer's Day celebration on 15 September 2014 held at Udaipur by the Institution of Engineers, Udaipur chapter. Dr Saikia was felicitated with a certificate and a cash award of Rs. 5000/-. The award is hosted by the Mineral Engineering Science Association (MESA) of India, Visakhapatnam to encourage young Indian scientists working in the areas of mineral sciences in India and abroad.

Dr. Saikia obtained his MSc and PhD

degree in Chemistry in 2001 and 2008 from Gauhati University and CSIR-NEIST respectively. He has been working on different aspects of "Coal Science & Technology" since his doctoral studies. His research interests are "advanced characterization and utilization of high sulfur Northeast Indian coals, green coal beneficiation, nano-mineralogy, elemental chemistry of coal, rare earth elements in coal and coal products".

He has published 35 research papers in reputed journals (SCI) along with three book chapters (ISBN). Dr. Saikia had attended and presented many research papers in national as well as international conferences. He is an editorial board member of *International Journal of Coal Science & Technology* published by Springer.

CSIR-IICB Scientist Honoured with TWAS Fellowship



Dr. Hemanta K. Majumder, Emeritus Scientist, Raja Ramanna Fellow (DAE) of the CSIR-Indian Institute of Chemical Biology has been elected Fellow of The World Academy of Sciences (TWAS) in 2014, for the advancement of science in developing countries. His election to this prestigious Academy is a clear recognition of his outstanding contribution to science and its promotion in the developing world.

Dr. Majumder has made outstanding contributions in Leishmania research. He is the elected Fellow of Indian National Science Academy (FNA), Indian Academy of Sciences (FASc), National Academy of

Sciences (FNASc) and West Bengal Academy of Sciences and Technology (FAScT). He served CSIR-IICB for three decades and superannuated in the year 2012. He was heading the Infectious Diseases and Immunology Division of CSIR-IICB for more than a decade.

For his significant contribution in science, the Chief Minister of West Bengal offered him the position of Working Chairman of West Bengal State Council of Science and Technology, where he has rendered his honorary service from 2004 to 2011. Dr. Majumder is also J.C. Bose National Fellow (2010) and received several awards

viz. P. C. Sengupta Memorial Oration Medal by Calcutta School of Tropical Medicine (2004), J.C. Ghosh Memorial Award by Science Association of Bengal (2007), B.K. Bachhawat Memorial Award by National Academy of Sciences, India (2007), Desh Ratna Dr. Rajendra Prasad Memorial Oration

Award by Rajendra Memorial Research Institute, ICMR, Patna (2008), Dr. Nitya Anand Endowment Lecture Award (2012) of Indian National Science Academy and Sir Ronald Ross Memorial Lecture Award from IPGMER, Kolkata (2013).



CSIR-CDRI Scientist Elected Fellow of the Indian Academy of Sciences

Dr. Anuradha Dube, Chief Scientist, Division of Parasitology, CSIR-Central Drug Research Institute, Lucknow has been elected as the Fellow of the Indian Academy of Sciences.

Visceral Leishmaniasis (VL) or Kala-azar is a debilitating infectious disease which becomes lethal if untreated. The digenetic parasite is characterized by diversity and complexity based on geographical placement. In India, approximately, 100,000 new cases of VL occur annually and nearly 90% cases come from Bihar. Chemotherapy, fraught with cost and side effects, remains the key element in the treatment of VL as there are no vaccines to prevent VL infection. Unresponsiveness of 37-64% of newly diagnosed cases to the standard drugs is a new challenge to the current line of treatment. The depressed immune system due to infection is not always able to control the disease or augment the effects of the drugs.

Therefore, Dr. Dube and her group took the challenge to look for an effective and safe drug molecule from natural resources and search for vaccine molecules in leishmanial parasites with long lasting effects – the two-pronged strategies that need to be followed to win the battle against VL. Her notable research contributions have been in the areas of immunobiology of the Leishmania parasite, development of new screening models, drug discovery and mechanism of drug resistance. She applied functional proteomics for identifying some parasite molecules possessing Th1 stimulatory property as potential immunoprophylactic agents against VL. She

demonstrated successful immunization with killed Leishmania parasites in hamsters and non-human primates and also showed a long lasting immunity against VL using live suicidal mutants of Leishmania in hamsters. Successful immunization with the DNA-encoding N-terminal domain of proteophosphoglycan (glycoprotein), suggests it to be a promising antileishmanial DNA vaccine candidate.

A stable Green Fluorescent Protein (GFP) *Leishmania* transfectant cell line was generated by her for rapid screening of antileishmanials, which is also being used in some international labs. She developed and established the only non-human primate (*Presbytis entellus*) model for VL for preclinical evaluation of potential drug/vaccine. To unravel the drug-resistant mechanism she first developed the drug (Sodium Antimony Gluconate) resistant *in vitro* and *in vivo* models using antimony-resistant clinical isolates. These isolates overexpressed novel proteins and their significance has been explored. She has contributed to the discovery of two new potential and safe oral antileishmanial lead compounds from natural resources. Using new drug delivery systems the effectivity of Amphotericin B – a toxic but most effective antileishmanial drug at reduced dose schedules was demonstrated.

She is a well funded and recognized prolific researcher having published almost 150 papers and also mentored 16 PhD students. Her research findings have significant potential implications in improving human health and alleviation of human suffering.



CSIR-NCL Scientist elected as a Fellow of the Indian Academy of Sciences

Dr. B.L.V. Prasad from the CSIR-National Chemical Laboratory (CSIR-NCL), Pune has been elected as a Fellow of the Indian Academy of Sciences, Bangalore.

Dr. B.L.V. Prasad received his Masters degree and PhD in Chemistry from the University of Hyderabad. After two post-doctoral stints, one at Tokyo Institute of Technology and the second at Kansas State University under a NASA sponsored project, he joined CSIR-NCL in 2003. His research interests include the synthesis of materials in particular nanoparticles and nanoscale materials. He has supervised nine doctoral theses. He has nearly 100 publications in peer-reviewed international journals and has filed five international patents (two US patents granted) and several Indian patents.

Dr. Prasad's group has focused on the preparation of solution processing techniques of 2-dimensional materials,



molecular self-assemblies, identification of novel nanoparticle synthetic routes, preparation of bio-molecule-nanoparticle conjugates and their applications in drug-delivery systems, bio-implants and diagnostics.

Dr. Prasad has also received the Young Career Award from the DST Nanomission, Bronze Medal by the Chemical Research Society of India, RAMAN Research Fellowship, Materials Research Society of India Medal, and Scientist of the Year award by the NCL Research Foundation.

CSIR-IICB Scientist Awarded FNASc



Dr. Sib Sankar Roy, Principal Scientist, CSIR-Indian Institute of Chemical Biology has been elected Fellow of the National Academy of Science India (FNASc) for the advancement of science in 2014.

His outstanding contribution in research in Biochemistry and Molecular Biology has led him to be elected to this prestigious Academy. Dr. Roy has made exceptional contributions in research on ovarian cancer and in obesity-associated insulin resistance. His research work on understanding the signalling cascade for proliferation and

invasion in ovarian cancer has been published in highly reputed journals.

Dr Roy was also elected Fellow of the West Bengal Academy of Sciences and Technology (FAScT) in 2011. He has been serving the CSIR-Indian Institute of Chemical Biology for the last fifteen years. He was elected President in the New Biology Section of Indian Science Congress, 2014-15 for his significant contributions in science. He has received the CSIR Raman Research Fellowship Award (2008).



Beginning from this issue, CSIR News will profile all the CSIR laboratories throwing light on the significant areas they work in and their achievements.

CSIR-Advanced Materials and Processes Research Institute (AMPRI)

The CSIR-Advanced Materials and Processes Research Institute (AMPRI), Bhopal was instituted in May 1981 as a “Regional Research Laboratory” (RRL) and got its present name in March 2007.

The Institute has devoted itself to developing innovative, cutting edge, internationally competitive, energy-efficient and environment friendly technologies and products in the area of advanced and improved materials for mining and farm implements; lightweight materials such as aluminium and magnesium alloys; metallic and polymer-based composites, foams, and functional materials; nano-materials, and new materials based on industrial wastes such as flyash and red mud.

Some significant developments include improved and efficient brake-drums for

automobiles, polymeric foam for automobile noise attenuation and shock absorption, engineering components such as FRP gear case for locomotives and hybrid packing rings for railway bogies.

CSIR-AMPRI has also been working on upgrading the quality of poor quality ores and minerals, utilization of waste materials and recovery of valuable minerals from the wastes. The Institute has also carried out computer simulation of manufacturing processes, material modeling, material informatics, software development, etc.

In the strategic sector, the Institute has developed a novel process for making advanced shielding materials by using ceramic as well as ceramic polymer composites in the form of cement, panel and tiles for the first time in the world. The shielding efficiency



Al-composite brakedrum



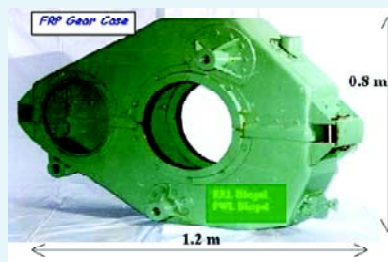
Al-foam filled bracket for noise and vibration attenuation



Water resources management



Wood substitutes



Non-toxic shielding materials

of the materials has been evaluated by Radiation Standards and Safety System Division of BARC, and Atomic Energy Regulatory Board (AERB), Mumbai.

Through its activities on water resource modeling, surface-treated agricultural implements, bell metal artefacts, handicrafts using sisal fiber, use of flyash for agricultural soil reclamation, alternative and low-cost building materials from waste, flyash bricks, wood substitutes, etc., CSIR-AMPRI has emerged as a promising institute for rural technologies specific to problems related to the state of Madhya Pradesh.

The Institute undertakes assignments on irrigation management and watershed

development. CSIR-AMPRI also undertakes assignments on environmental impact assessment, risk assessment, environmental and safety auditing, and effluent treatment for industries.

For more information contact:

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Appointments

Dr. Anil Sood takes over as Acting Director, CSIR-IHBT



Dr. Anil Sood has taken over as the Acting Director of the Palampur-based CSIR-Institute of Himalayan Bioresources and Technology. Dr. Sood is currently Chief Scientist & Head, Division of Biotechnology, and Business Development and Marketing Unit, CSIR-IHBT.

Dr. Sood's area of specialization is Plant Tissue Culture/Biotechnology/Greenhouse management. As Head of the Division of Biotechnology, he has been engaged in developing the micropropagation protocols in Tea, Bamboo, Rose, Gladiolus, Orchids, Stevia, Ferns, and a number of medicinal plants of higher reaches of the Himalayas. Dr. Sood established large nurseries of bamboos for supply to different corners of the country. He also facilitated establishment of many Tissue Culture labs in private and public sectors. Dr. Sood has been invited to many countries such as Australia, China, Japan, Ethiopia, USA, Belgium, Thailand and South Africa for technology transfer and as a bamboo expert. As Head of the Patent Unit at IHBT, Dr. Sood has helped scientists and

scholars for over 17 years in filing and securing patents both in India and abroad. Over 167 patents have been granted so far.

Dr. Anil Sood has received several awards including the M/s Usha Vij Memorial award under the aegis of the Orchid Society of India (TOSI) and the Indian Fern Society award for outstanding contribution in the field of Petridology.

He is a Fellow of the National Academy of Science (2009); Member, Executive Body of the Society for Development of Vanaspati Van, Himachal Pradesh (Department of Ayurveda); Member, TIET (CORE) at Thapar University, Patiala; Co-ordinator, DBT's Bamboo Micropropagation programme; Member, DST Task Force for Project monitoring; Member, International Association of Plant Tissue Culture & Biotechnology; Member, Plant Tissue Culture Association (India); Member, The Orchid Society of India, and Member, Society for Plantation Crops.

Dr. Sood has published 73 papers in national and international journals and has supervised five PhDs.

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