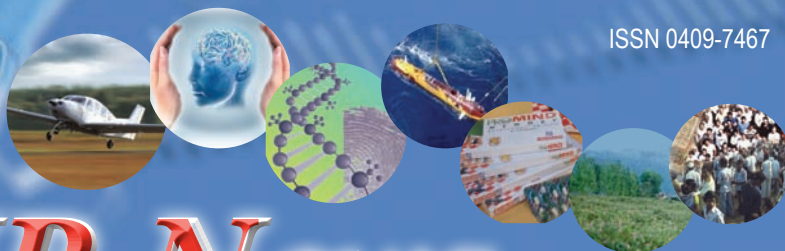




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# CSIR News

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## In This Issue

- 193 In The News**
- CSIR-CFTRI Develops Nutritious Ice Cream
  - CSIR-NPL Develops Technology to Convert Plastic Waste into Tiles

- 195 R&D Highlights**
- Structural Behavior of Reinforced Geopolymer Concrete: CSIR-CBRI
  - Human Liver Cells Fight Stress By Shedding off Regulatory RNAs: CSIR-IICB

**199 MoUs**

**202 Symposia/Seminars**

**209 Workshops/Training Programmes**

**214 Visits**

**216 Announcements**

## In The News

### CSIR-CFTRI Develops Nutritious Ice Cream

A dessert that promises to provide the Recommended Dietary Allowance (RDA) of omega-3 for children in one serving has been developed by the CSIR-Central Food Technological Research Institute (CSIR-CFTRI), Mysuru.

Developed in association with M/s Oleome Biosolutions, Bengaluru and M/s Dairy Classic Ice Creams Pvt. Ltd., 'NutriIce' is an Omega-3 and Vitamin-E enriched frozen nutritional dessert made from Chia seeds, which have the highest content of Omega-3 fat from a vegetarian source.

Dietary supplementation of Omega-3 fats, which are Poly Unsaturated Fatty Acids (PUFA), have been reported to have beneficial health functions including brain development in children and good health in elderly population.

Niti Ayog CEO Mr Amitabh Kanth launched 'NutriIce Creams' on the CFTRI campus in the presence of CFTRI Director Prof. Ram Rajasekharan and Mr Balaraju, Director, Dairy Ice Creams. CFTRI developed the agro



Mr Amitabh Kant, CEO, NITI Aayog, New Delhi releasing "NutriIce Cream" at CFTRI with Prof. Ram Rajasekharan, Director, CSIR-CFTRI, and Mr Balaraju, Director, Dairy Day Ice Cream

technology for Chia and shared the seeds with farmers across the country.

In the research and development work that took about 6-8 months, CSIR-CFTRI scientists worked to combine the widely-shared love for ice-cream with a dash of nutrition. The nutrition was provided by the oil extracted from white Chia seeds. The oil was enriched with PUFA and Omega-3 fats. The effort was to develop the widely-loved ice cream into a nutritious and enjoyable treat.

## CSIR-NPL Develops Technology to Convert Plastic Waste into Tiles

The New Delhi-based CSIR-National Physical Laboratory (NPL) has come up with a unique technology to make tiles from plastic waste. The technology could be a major contributor to the Swachh Bharat Abhiyan launched by the Hon'ble Prime Minister.

Developed as part of the Fast Track Translational Project, the CSIR-NPL team is actively engaged in recycling the plastic waste into tiles and suitably designing the structure where these waste plastic bag tiles can be fixed. They have also developed a suitable chemical



Former Chairman, Dr. Anil Kakodar, Atomic Energy Commission and Dr. Girish Sahni, DG-CSIR visiting CSIR-NPL on 20 May 2016

composition that is to be incorporated in the waste plastic matrix before molding into a tile. As a further step, CSIR-NPL has introduced the concept of “Smart Toilets” made of waste plastic bags. They have put up an entire structure using waste plastic bags and bottles. These tiles can also be used for making different structures applications like separation panels, interlock tiles and in showcase frame designing. In order to

make the toilet fully operational, a portable solar panel has been fixed on its roof to generate electricity to light the toilet.

CSIR-NPL’s endeavour of making tiles from plastic waste and putting up “Smart Toilets” made of waste plastic bags could go a long way in addressing two key issues that face the country – management of waste plastic and availability of toilets.



### **R&D Highlights**

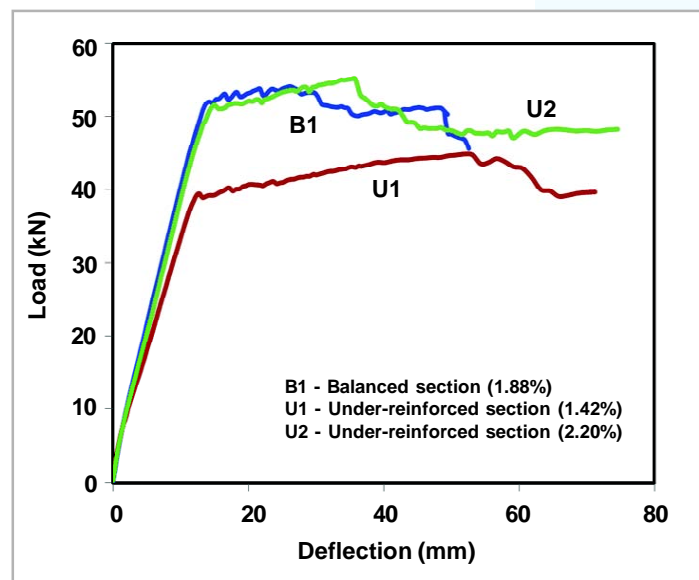
## **Structural Behavior of Reinforced Geopolymer Concrete: CSIR-CBRI**

The mix proportioning of geopolymer concrete with a compressive strength of 40 MPa was carried out using fly ash based composite binder. The ideal gradation curve was used to proportion different sizes of aggregates. Water-geopolymer solid ratio in the mix was kept at 0.21. The aggregate-paste ratio was optimised at a level of 0.36.

The developed mix was characterised for its strength characteristics such as compressive strength, flexure strength and elastic modulus, ITZ, age hardening and drying shrinkage. This mix was used for casting of reinforced concrete beams of size 100 x 150 x 1800 mm. All the beams were doubly reinforced. The beams were designed as per IS 456 guidelines. Reinforcement percentage in the beams was 1.42%, 1.88 % and 2.20 % respectively. The balance reinforced beam and under reinforced beams were chosen for this study. All the beams were designed to fail in flexure mode.

The cast reinforced concrete beams were tested under flexure. The beam was simply supported and loaded under two points kept 550 mm apart on a span of 1650 mm. All the measurements, including deflections, strain values, and

crack propagation, were recorded at regular load intervals until the beam failed. The failure modes and crack patterns of the beams were also recorded. The ultimate load carrying capacity of beams ranged between 44 and 54 kN (Fig. 1).



**Fig. 1. Load-deflection curves of reinforced geopolymer concrete**

The beam having higher percentage of reinforcement had more load carrying capacity. The theoretical deflections were matched with the experimental results at

the service load. The average flexural capacity ratio of experimental value to the calculated value was  $\sim 1.5$  showing that the calculated values were more conservative than the experimentally obtained values.

Limit state theory has been used to construct stress block (Fig. 2) and strain diagram. The neutral axis shifted towards extreme compression fibre on application of load thereby reducing the total compression zone and increased more bending resistance. It was also observed that with increase in the tension reinforcement, the curvature ductility

index of the beam decreased from 6 for 1.41% reinforcement to 3.5 for 1.88% reinforcement. Above 1.88% reinforcement, the ductility of beam increased due to the increase of compression reinforcement. The initial crack in the beams occurred between 9 and 13 kN loads. The crack width size at failure was found to be in the range of 1-2 mm. When compared with the OPC concrete, the crack width size was less although crack patterns are somewhat similar as per the reported literature. The existing guidelines for reinforced OPC concrete can be used to design reinforced

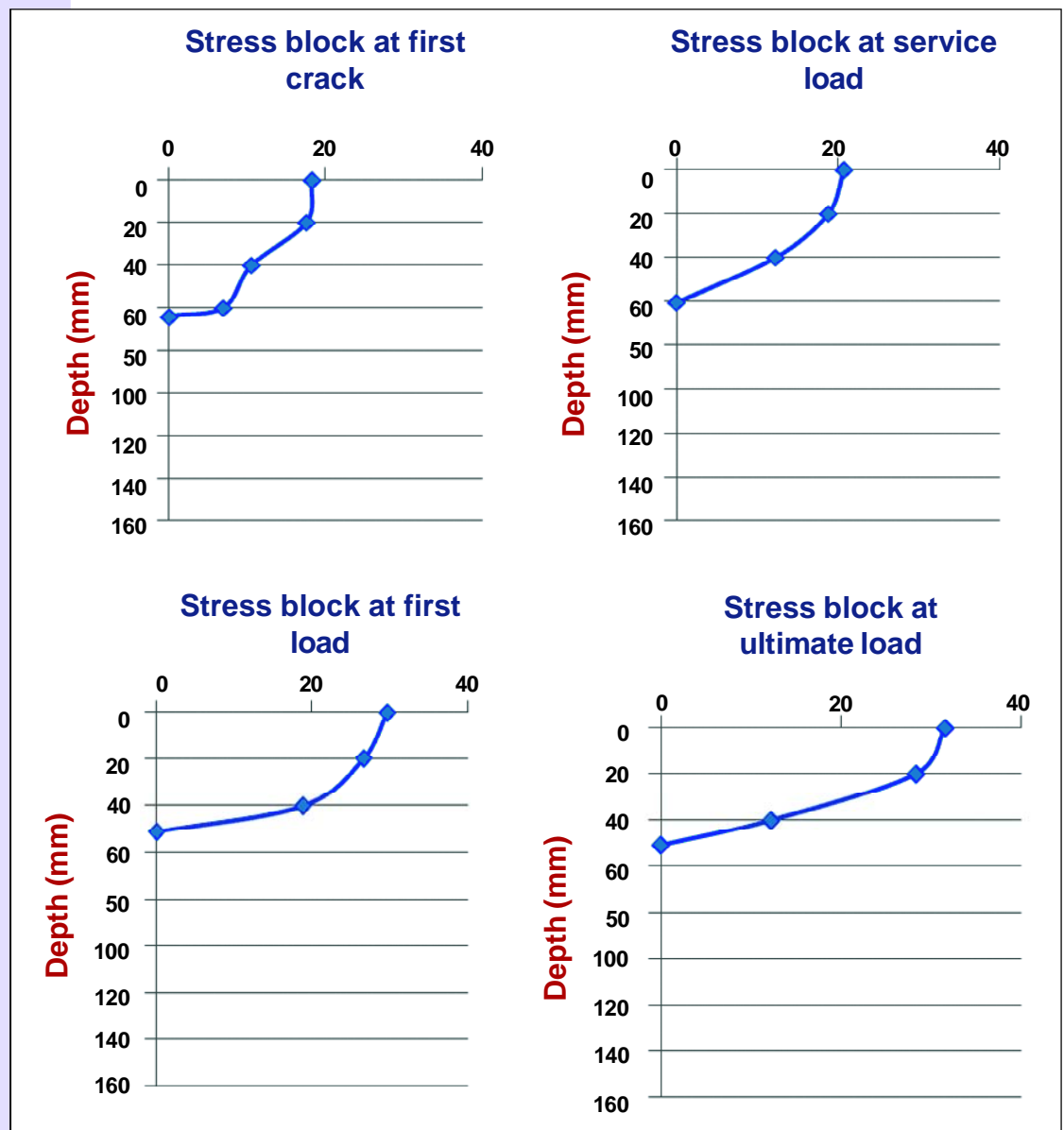


Fig. 2. Stress block of reinforced geopolymer concrete

**Table 1: Impact test results of geopolymer concrete for 7 and 28 days as per ACI 544.2R-89**



Compressive (MPa)	Age	Number of blows		Impact energy (J) Strength	
		First crack	Ultimate crack	First crack	Ultimate crack
29	7 days	69	74	1407.8	1512.9
	COV	20	19	20	19
	28 days	93	96	1886.1	1947.1
	COV	15	16	15	16
35	7 days	131	134	2656.1	2730.8
	COV	10	10	10	10
	28 days	142	147	2890.2	2995.4
	COV	15	14	15	14
42	7 days	168	171	3412.6	3473.6
	COV	11	10	11	10
	28 days	220	227	4471.0	4613.5
	COV	10	10	10	10

geopolymer concrete flexural members.

Repeated impact drop weight test as per ACI 544.2R-89 was conducted to compare the relative impact resistance of various geopolymer concrete mixes prior to their use in the reinforced beams/slabs (Table 1). Results of number of blows necessary to cause the prescribed level of distress in the specimens can be useful to ascertain their impact resistance behaviour. It was found that the impact strength of plain concrete increased with an increase of compressive strength. The impact energy of concrete varied from 1900 J to 4500 J. The energy absorbed at 28 days specimens was 32% more than the 7 days cured specimens (42 MPa). Knowing the variability of result in the test, scattering of data in terms of coefficient of variance was 10-20%. To obtain more precise data, subsequent experiment was performed with the Instrumented Drop Weight Type System on reinforced geopolymer concrete beams.

The impact response of reinforced geopolymer concrete beams (100 x 150 x

1800 mm) was studied under falling weight impact test at various heights and repeated blows. A hammer (75 mm hemispherical tip) with a mass of 100 kg was dropped (0.65, 1.0 and 1.25 m) onto the simply supported beams with a span of 1600 mm. The parameters studied are: time history of dynamic response, impact force, reaction force, midspan deflection, crack patterns and impact response and static flexural capacity correlation.

The results indicated that the impact force on the beams ranged between 161 kN and 220 kN for a drop height of 0.65 m to 1.25 m. The initial response peak increased with an increase of drop height. The reaction force of beams ranged between 96 kN to 125 kN. The negative reactions observed were more in higher drop height than the lower ones due to lifting of beam end as a result of rebound of applied impact load. The deflection obtained on the beams was in the range of 16 to 29 mm. As the number of blows increased, the impact load and reaction force decreased and midspan deflection increased. The beam having

higher reinforcement exhibited higher impact and reaction forces than the beam

containing low percentage of reinforcement. The midspan deflection reduced with the increase of reinforcement percentage in the beam. The amount of longitudinal reinforcement significantly affected the failure mode of beams under impact loading.

A correlation between the impact response and static flexural capacity of reinforced geopolymer concrete was also attempted. It was observed that the maximum impact force and reaction force increased with an increase of static flexural load carrying capacity. Increasing input impact energy increased static flexural load carrying capacity of the beams. It was also noted that the midspan deflection during impact decreased with the increase of static flexural load carrying capacity. A comparison on the impact behavior of reinforced geopolymer concrete and OPC concrete was made with respect to impact force, reaction force and deflection (Fig. 3).

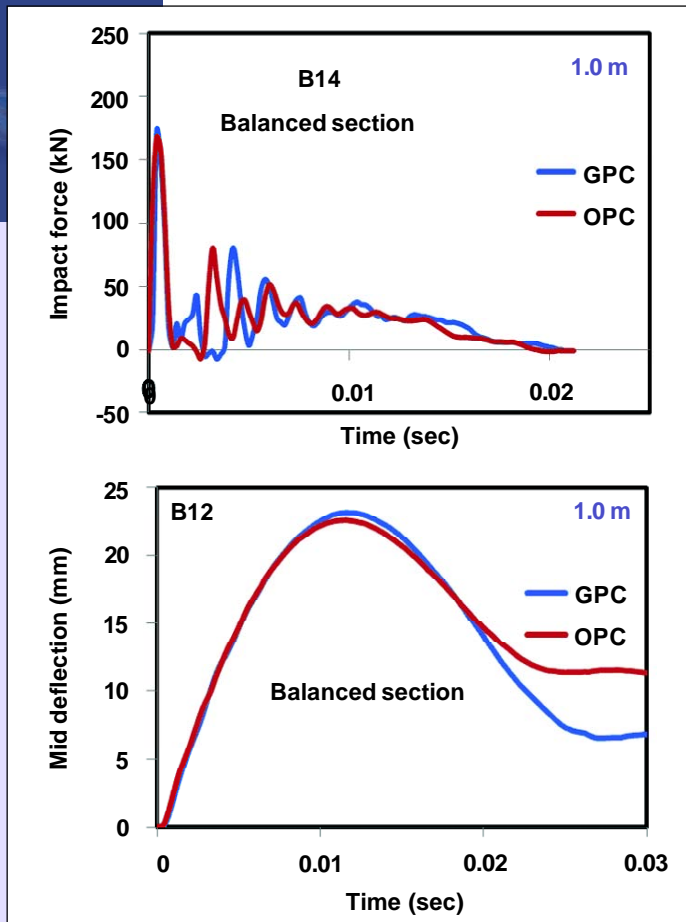


Fig. 3. Comparative evaluation of impact response on reinforced GPC and OPC concrete

B. Singh, Md Reyazur Rahman, Rakesh Paswan, Ishwarya G., Humaira Ather in CSIR-CBRI

## Human Liver Cells Fight Stress by Shedding off Regulatory RNAs: CSIR-IICB

In mammalian cells gene expression is usually under tight regulation where tiny regulatory RNAs, known as microRNAs, play a major role in controlling the expression of proteins.

When the cells are under stress they undergo a robust change in gene expression to combat stress by putting on several genes that are otherwise repressed by microRNAs. Scientists from CSIR-IICB have now identified the

mechanism of stress induced regulation of these tiny regulatory RNAs.

In hepatic cells, metabolic stress due to deprivation of nutrients ensures export of microRNAs out of the cells as a strategy to combat stress related emergency. This is a new mechanism of gene expression regulation that the CSIR-IICB scientists have now resolved and reported in a research article published in the journal *EMBO Reports*

published by European Molecular Biology Organization (EMBO) press <http://embor.embopress.org/content/early/2016/07/11/embr.201541930>.

They have now identified new molecular targets that could possibly get altered either by drugs or small molecules to restrict the loss of microRNAs.

Export of microRNAs also occurs in human cancer cells. Therefore, this work promises to provide new tools to

fight against diseases like cancer where anomalous expression of microRNAs are often the cause of uncontrolled cell proliferation which is the hallmark of cancer.

#### Reference

Mukherjee, K., Ghoshal, B., Ghosh, S., Chakrabarti, Y., Swetha, S., Das, S. and Bhattacharyya, S.N. Reversible HuR-microRNA binding controls extracellular export of miR-122 & augments stress response. *EMBO Rep* (2016) e201541930



#### MoUs

## Modular High Rate Bio-Digester for Safe Disposal of Garbage

Accumulation of garbage is a major issue in all cities and towns. Treatment of garbage at source of its generation is the best option to reduce pollution load of a city. Taking this into consideration CSIR-Indian Institute of Chemical Technology (CSIR-IICT) has developed a high rate anaerobic bio-digester for safe disposal of garbage as well as a variety of other solid wastes.

The project for developing this technology was funded by the Ministry of New and Renewable Energy, Department

of Science and Technology and CSIR.

The underlying principle is based on High Rate Biomethanation Technology by which organic solid waste is converted to methane by bacterial fermentation. The technology is entirely different from the conventional gobar gas plant. The high rate bio-digester is designed based on the scientific doctrine of environmental biotechnology coupled with advanced engineering principles to accomplish superior process efficiency and operational convenience.

#### Salient Features

- Capacity ranges from 20 kg per day and above
- Prefabricated model designed for apartments, housing colonies and canteens
- Technology can be scaled-up for large scale application for variety of solid waste
- Treatment efficiency 80-90% in terms of solids reduction
- Digester is fully automatic and no manual operations are involved
- Waste can be directly dropped into digester without any pre-processing or grinding
- No water consumption
- No slurry discharge & surroundings remain clean and tidy
- Negligible power consumption (less than 0.10 unit/day)
- Completely sealed and free from odour, rodents and insects related problems
- Completely safe, environment friendly & field tested
- Biogas obtained having higher methane content compared to conventional system
- Affordable cost, aesthetic looks and very less space requirement

The technology is field tested and currently digesters are installed at several housing colonies and apartments in Kochi. M/s Enbiopac in Kochi was the first license holder to commercialise this technology. Now M/s Lars Enviro Pvt Ltd. in Nagpur, a leading environmental engineering company having large scale



installations of waste treatment plants has signed an agreement with CSIR-IICT to commercialise this technology globally.

The agreement was signed between Dr. Srivari Chandrasekhar, Director, CSIR-IICT, Hyderabad and Dr. Ramesh Daryapurkar, CEO of M/s Lars Enviro Pvt Ltd, Nagpur on 28<sup>th</sup> July 2016 at CSIR-IICT, Hyderabad.

## CSIR-IICT Signs Two-year Agreement with LAADH Biotech Pvt. Ltd. (LBPL)



Dr. Srivari Chandrasekhar, Director, CSIR-IICT signed a two-year agreement with LAADH Biotech Pvt. Ltd. (LBPL), a startup company established by two women entrepreneurs aimed at developing import substitutes for enzymes and molecular biology reagents in the area of diagnosis and human health. LBPL is incubated at CSIR-

IICT to carry out their R&D activities.

One of the founding Directors of LBPL, Dr. (Mrs.) Roopa Jones Ganji was present and exchanged the agreement with Dr. Chandrasekhar in the presence of Lakshmi Gayatri Nimmagadda (Director, LBPL) and several senior scientists of CSIR-IICT.

## CSIR-CCMB & NIMS Ink Deal for Research



The CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad signed a Memorandum of Understanding (MoU) with the Nizam's Institute of Medical Sciences (NIMS) to evolve collaborative research projects of clinical relevance that should reduce the disease-burden of the masses.

Speaking on the occasion, Dr. Rakesh Mishra, Director, CSIR-CCMB said that the role of basic science with already existing expertise in the frontier areas of modern biology with state-of-the-art facilities will be an advantage to team up with clinicians of NIMS to develop strategies in identifying, preventing and ultimately curing the rare diseases, cardiomyopathies, obesity, diabetes, sickle cell anaemia, and malaria. He said that new training programmes would be conducted with faculty from both the institutes to train young people to make them industry-ready in the areas of cell biology, forensics and bioinformatics.

Dr. K. Manohar, Director, Nizam's Institute of Medical Sciences (NIMS)

said that the institute received a grant to develop a state-of-the-art facility for patient care with clean room facilities for stem cell culture, bone marrow and stem cell transplantation with 16 ICU beds and a dedicated lab for bone marrow transplantation.

For the next five years, both CSIR-CCMB and NIMS will work together to develop deliverables for patient health care.



Dr. Rakesh Mishra, Director, CCMB and  
Dr. K. Manohar, Director, NIMS

## CCMB-SCIC Ink MoU on Sickle Cell Disease Research

Hyderabad-based, Centre for Cellular and Molecular Biology (CCMB) signed a long-term Memorandum of Understanding (MoU) with the Sickle Cell Institute Chhattisgarh (SCIC), Raipur, an autonomous institute of the Government of Chhattisgarh.

Sickle cell anemia is a serious disorder of hemoglobin metabolism and is widely prevalent in the states of Chhattisgarh, Maharashtra, Gujarat, and Orissa and sparingly in other places. Sickle cell anemia is an inherited form of anemia

— a condition in which there are few healthy red blood cells to carry adequate oxygen throughout the body of an individual. The disease occurs globally due to a single mutation in the beta globin gene and follows an autosomal recessive pattern of inheritance meaning that parents are usually the carriers of defective beta globin gene and the disease occurs when both copies of the defective gene are inherited together in the children.

Under the MoU, both institutes will strive to reduce the burden of Sickle Cell

Anemia, primarily in the state of Chhattisgarh by identifying eligible carrier couples who are at risk of giving birth to an affected child and follow them with genetic testing, prenatal diagnosis and genetic counselling. Both

the institutes would also conduct cutting-edge research to identify molecular markers to understand the molecular basis of these differences and thus help identify newer management strategies and eventually a therapy for the disease.

### Seminars/Symposia

## Technology & Trend Seminar by CSIR-CLRI



The CSIR-Central Leather Research Institute (CSIR-CLRI), Chennai organised a Technology & Trend Seminar recently.

Shri Md Sadiq from CSIR-CLRI welcomed the gathering and detailed the agenda of the seminar. He also listed out the presentations by various speakers:

- Tokyo International Fair: Mr Sachin Jadhav, Reed Exhibitions
- Design in India - An initiation for Futuristic Leather Lifestyle Accessories: Shri K. Karthikeyan
- Estimation of Raw Hides & Skins: Dr. K. Giriyappa & Shri Nithyananda Vasagam
- Future Footwear Industry: Dr. B.N. Das
- XXXIV IULTCS Congress 2017: Dr. K.J. Sreeram

- MODEUROP Leather & Colour Trends for Autumn Winter 17/18 season: Team India Fashion Studio

Shri Sachin Jadhav commenced his presentation with a video on “Fashion World Tokyo” which is slated for 7-9 November 2016. He said that this is Japan’s largest trade show and is a valuable opportunity for establishing contacts and conducting business in the Japanese market. Detailing the profile of the fair, he said that it covers display of leather shoes, bags, jewellery, accessories and OEM. For the 2016 edition, 850 exhibitors from around the world had already confirmed their participation and suggested that it would be a good opportunity for CLE members to participate and gain access to wholesalers and retailers not only from Japan but from the world over. He proceeded to give some tips to attract Japanese visitors to the stalls and pointed out that Indian exhibitors in the earlier editions of the fair were very satisfied with the response from the fair.

Shri M. Rafeeqe Ahmed, Chairman, CLE informed the members present that the Council for Leather Exports had obtained the approval of the Ministry of Commerce for the appointment of a consultant for both the Japanese as well the US markets. Sharing his experience on doing business in the Japanese market, he pointed out that even though the price



was attractive, the Japanese buyers had exacting quality demands and opined that it required patience and at least three years of sustained efforts to realise good orders from the Japanese.

Shri K. Karthikeyan, CSIR-CLRI gave a brief overview of the design work being carried out at the Centre for Leather Accessories and highlighted the 100 plus designs for the leather goods industry that had been catalogued. He also informed the audience of the design of innovative products through market research. In this connection, he gave the example of how a medical representative bag led to the design of backpacks and on further research led to the final product called rainpack, which integrated the backpack with a rain coat. He also spoke of ergonomically designed biker jackets and highlighted the futuristic sustainable products, which integrated textiles with leather. He flagged the potential for the use of speciality leathers for upholstery and touched upon the design of interesting products using exotic leathers like chicken feet leather. In conclusion, he described the success story of CLRI design involvement in generation a range of products for online selling of men's lifestyle accessories for a company called Flairman.

Shri K. Giriappa, CSIR-CLRI in his presentation underlined that this study was to gauge the availability of Raw Materials in India and would be very helpful for Business Planning for the industry. He informed that based on the National Surveys conducted in 1987 and later in 2002, the data had been extrapolated and using a Mathematical Model and Advanced Statistical Techniques, the trend of Raw Material availability had been worked out.

Shri N. Vasagam, CSIR-CLRI then described the software developed by CSIR-CLRI called "LIVSOFT" which

predicted the livestock population. He also presented data on the production of hides and skins in India and described the 'Mathematical Model' used in the software. The workflow and the algorithm followed were also highlighted by Shri Vasagam. Screen shots of the software were illustrated and the 'model validation' was also provided. In conclusion, Shri Vasagam informed that the accuracy levels of the software were above 90% and assured good 'Return on Investment' if the software was used.

Dr. B.N. Das, CSIR-CLRI in his presentation underlined the value of 'change' and suggested that this was essential to make modern day manufacturing sustainable. He emphasised that 'Automation' was the buzzword today and cited the examples of 'Customised Footwear' and 'Virtual Prototyping' in this regard. Quoting Bill Gates, Dr. Das stated that, "The first rule of any technology used in a business is that automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency."

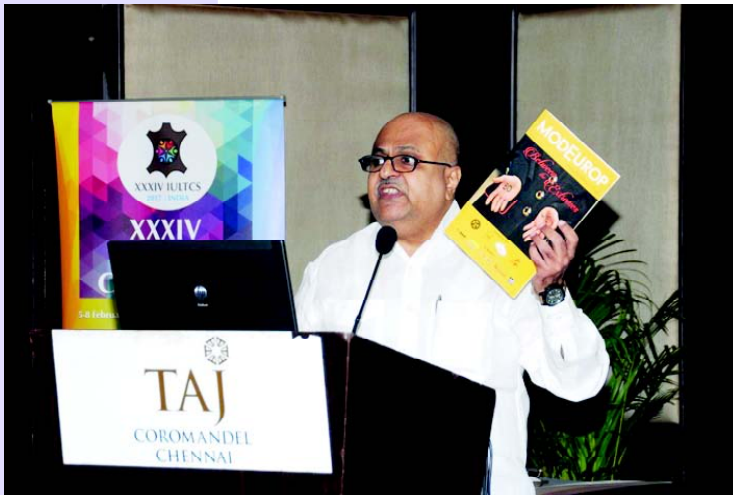
He also quickly touched upon 'Methods for Leather Assortment', automatic stitching pallets for sewing machines and the use of die-less cutting systems in the leather and leather product industry. He proceeded to highlight the use of 'Robotics' in the Shoe Manufacturing process and spoke in detail of the use of 3D Scanners and their use in the manufacture of customised footwear.

He concluded his presentation by flagging the importance of CAD in creating 'Virtual Shoe Samples' and the concept of "0 defects" in shoe manufacturing.

Dr. K.J. Sreeram, CSIR-CLRI invited all the members present to participate in the XXXIV IULTCS Congress

scheduled to be held during 5-8 February 2017 in Chennai. He highlighted the theme of the Congress, which was “Science and Technology for the Sustainability of Leather” and informed that this Congress was held once every two years to discuss the latest trends in aspects of Leather and Leather Products.

Round Table and Colour Club Meeting for the Autumn Winter 2017-18 season in Germany was played which took the audience through the review of the past season, voting for the ‘Top Colours’ for previous season, colour proposal presentations from fashion experts for the A.W. 17/18 season, colour selection, colour christening and the ‘First Look’ of the MODEUROP Colour Card for the A.W. 17/18 season.



Dr. Gautham G., CSIR-CLRI in his presentation on “New Perspectives on CAD for Footwear Design” traced his journey in the realm of CAD for Footwear from the early generation ‘Microdynamics Cad system’ to the more recent ‘Shoemaster CAD System.’ He informed how CSIR-CLRI had helped ‘set-up’ CAD Centres along with ‘Design Studios’ in the Footwear Manufacturing Units and also trained their personnel to handle ‘Design’ and “CAD Pattern Engineering.” Retracing the genesis of bringing out the first CAD Manual on 2D Pattern Engineering, Dr. Gautham stated that with the advent of more sophisticated technologies, it was felt that a new and improved version of the CAD

Team India Fashion Studio presentation by Shri Md Sadiq and Shri K. Dayalan commenced with a detailed overview of the Leather & Colour Trends for Autumn Winter 17/18 season. A video movie capturing the entire sequence of events at the MODEUROP



WARM MODEUROP AW 17/18



COOL MODEUROP AW 17/18



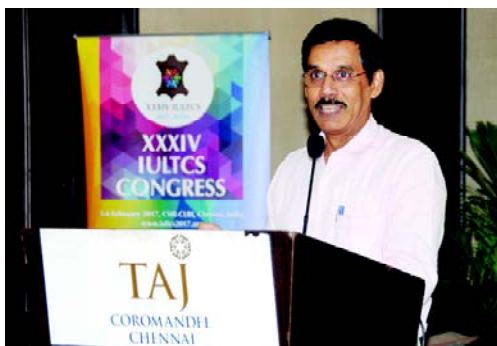
NEUTRAL MODEUROP AW 17/18

Manual be brought out which would help in understanding the intricacies and new technologies relating to 3D conceptual design, 3D last modeling, and sole design.

Shri P.R. Aqeel Ahmed, Regional Chairman (South), Council for Leather Exports and President, Indian Shoe Federation in his felicitation address stressed that ‘one has to always innovate to flourish’ and thanked CLE and CSIR-CLRI for the seminar and also thanked the members for their presence.

A manual on ‘Creative Solutions for Footwear Design & Pattern Engineering: 2D and 3D perspectives’ which is a step by step guide to the gamut of software options on both 2D and 3D CAD systems was also released by Shri M. Rafeeqe Ahmed, Chairman, Council for Leather Exports and Dr. B. Chandrasekaran, Director, CSIR-CLRI.

Dr. B. Chandrasekaran, Director, CSIR-CLRI in his remarks shared some of the recent developments and informed the members that he had just concluded discussions with the Central Salt & Marine Chemicals Research Institute, Bhavnagar to join CSIR-CLRI in providing solutions to the industry to purify the salt recovered during the Tanning process and commercially sell the end product. He also informed the gathering that the leather Industry Associations in Jalandhar and Kolkata have also sought CSIR-CLRI’s interventions to obtain fruitful solutions to their problems.



## CSIR-CGCRI and AIGMF Organise Interactive Session on Glass Packaging



Director CSIR-CGCRI addressing the audience

CSIR-Central Glass and Ceramic Research Institute (CSIR-CGCRI), Kolkata, in association with the All-India Glass Manufacturer's Federation (AIGMF) organised the Interactive Session-Glass Packaging supporting Swachh Bharat Abhiyaan (SBA) and AIGMF Executive Committee Meeting on 25 June 2016.

Apart from a veritable Who's Who from the Glass Industry, the Session was attended by senior members from the Drug Control, Health & Family Welfare Department, Govt. of West Bengal and Scientists of CSIR-CGCRI.

The Interactive Session was dovetailed excellently with the Government of India's flagship National Initiative, the Swachh Bharat Abhiyaan (SBA) or Clean India Movement. Glass as a material is an excellent candidate, almost a Brand Ambassador for the SBA and the Smart Cities initiative as the Interactive Session made it very clear as the event unfolded through the day.

Dr. K. Muraleedharan, Director CSIR-CGCRI, said that this was a very proud moment as it was the first time that the Institute was teaming up with the AIGMF for such a laudable cause.

The Glass Industry is currently better positioned compared to many other Industries in the country. He said that the Glass Industry was showing an overall growth of 15-20 per cent. One arena that glass has revolutionised is architecture and thus, the face of the urban

buildings. This is because the properties of glass fulfill the three basic needs of architecture: Aesthetics, Functionality and Transparency. Glass will have a major say in plans drawn up for smart cities, said Dr. Muraleedharan.

However, there are not many centres for testing Architectural Glass in India; Ahmedabad and Chennai are the only two cities that can boast of such centres that can certify glass for architectural and other uses. CSIR-CGCRI has been approached by Glazing Society of India (GSI) to establish a centre using some of the facilities already existing in the Institute for Energy and Safety Performance Testing of Architectural Glass to cater to the need in Eastern India.

Director, CSIR-CGCRI said that the Institute expected AIGMF to indicate areas where attention must be focussed and research must be concentrated. "Let's forge new alliance; new partnerships. Let's take this forward," he concluded.

In his Opening Remarks, Shri Sanjay Ganjoo, President, AIGMF said that it is vital that the role that glass plays in society should be aligned to governmental programmes and Missions. The AIGMF

is trying to educate society and raise awareness about how glass can be used for the betterment of societal conditions, environment etc. and has met with a fair amount of success. Interactions with Industry and policy makers would help AIGMF to promote the use of glass as well as explain the importance of glass and illustrate the significant impact it has on the daily lives of the citizens. The uses of glass in design and in packaging are other important areas.

A Power Point presentation showcasing the Recent Initiatives of the Glass Industry on the SBA was then presented to the audience by Shri Vinit Kapur, Joint Secretary, AIGMF, who also served as Anchor for the event. It was made patently clear that Glass represents a viable, non-polluting, endlessly recyclable option as packaging material for many consumable items, particularly water, beverages, medicines etc.

The Power Point slides presented events related to the SBA in great detail. It made apparent the fact that glass has a major role to play in Smart cities/Green cities/Solar cities of the future. It highlighted the need to promote the use of glass (over plastic) especially for certain specific products such as beverages.

Following this, Dr. Ranjan Sen, Chief Scientist and Head Glass Division and Fiber Optics & Photonics Division of CSIR-CGCRI gave an overview of the activities at CSIR-CGCRI. He explained that the 12 Divisions at CSIR-CGCRI worked tirelessly not just to meet national needs but also, to anticipate needs 15-20 years in the future and to be ready to meet those needs when these arise. While carrying out basic research, which is a pillar on which future inventions rest, CSIR-CGCRI also works in close tandem with the Industry and is responsive to

the demands of Regular Technology Transfer.

The Institute regularly carries out lab-scale trial glass melting, testing, and quality assurance of products for Industry. Although brief, the presentation touched upon the state-of-the-art facilities that CSIR-CGCRI has for melting glass. In recent times, the Institute has explored the possibility of melting glass using microwaves. The instruments used for the experiments were designed and customised in-house. The results were nothing short of marvellous when



Director CGCRI receiving lightweight glass bottle

it came to resource conservation, he announced. There was an incredible 50-60 per cent improvement in energy saving plus 60-70 per cent improvement in time saving when this eco-friendly melting process was deployed.

Dr. Sen also delineated the characterisation facilities available at the Institute which resulted in the much-sought after certifications by Industry. He gave a comprehensive list of the services provided for testing of glass/products and a list of clients.

However, it was in the field of Specialty Glass that CSIR-CGCRI is truly a leader, he said. This includes High-

density glass for radiation protection and glass beads for immobilization of nuclear waste, for which the NRDC Innovation Award was received in 2013. He highlighted the creation of Nd-doped Phosphate laser glass and said that this was a development about which the country could be proud. It was the first ever development of solid state laser material in India, he said. It was commendable that the raw material was developed indigenously.

Dr. Sen touched upon the area of Bulk Glasses and made a brief announcement about the mega event: International Conference on Advances in Glass Science and Technology (ICAGST-2017) preceded by a Tutorial jointly with International Commission on Glass (ICG) in January 2017 before concluding with the statement that CSIR-CGCRI is open to translational work, goal-driven collaborations and partnerships to mutual benefit.

Shri Arun Kumar Dukkipati, Sr. Vice President, AIGMF made an impassioned case for the Need of Glass Packaging for Health and Environmental Reasons. He reiterated the Glass Industry's commitment to SBA and said that glass is an environment-friendly material. He lauded the fact that the Government was looking at 100 per cent FDI in food processing Industry. This, he said, is a development that the Glass Industry is looking forward to as it will boost glass production.

Glass is non-toxic and environmentally-friendly since it is endlessly recycle-able. Also, because it has a non-porous surface glass does not allow food particles to adsorb onto it. Thus, it resists the build-up of food-odour and residual flavour. Glass is amenable to hot water washing. Glass has a long shelf-life. It does not fade, corrode or easily

deteriorate. Glass is impermeable. The contents remain protected from moisture in the atmosphere and do not degrade quickly.

Dr. Karmakar gave a short presentation on how glass packaging supports SBA, pointing out that plastic takes thousands of years to degrade thus adding to the pollution load on the environment. He said that the brittleness of glass has to be countered by making it more resilient to shocks and the bulkiness of glass has to be addressed by making it lighter.

Shri Sanjay Somany pointed out that since glass is inert, contents are not at risk of leached contaminants as is the case with certain types of plastics. With glass one can be sure that the quality of the contents reaching the consumer is of unchanged quality and there is no chemical cocktail added to the contents because of the packaging material.

Finally, Dr. K. Muraleedharan pointed out that the logical way of extending support to SBA and also enhance the use of glass would be to make a comprehensive list of the many areas in which it is suitable for application as opposed to the use of plastic. However, there are areas where plastic has a clear advantage and glass should accede that space to plastics.

As a Corporate Social Responsibility (CSR) initiative, AIGMF gifted 300 glass water bottles, specially manufactured by Hindustan National Glass and Industries, to CSIR-CGCRI and 100 glass bottles to Shri. C. M. Ghosh, Director, Drug Control, Health & Family Welfare Department, Govt. of West Bengal. The bottles carried a logo of Swachh Bharat Abhiyaan enabling people to demand responsible and safe packaging. Shri. Sushil K. Jhunjhunwala delivered the Concluding Remarks.

## CSIR-CIMFR Organises Indo-Australian Joint Workshop on “Recent Developments on Highwall Mining in India”



Dr. P. Pal Roy, Scientist-'H', CSIR-CIMFR & Convener delivering the welcome address

As a component of the Joint Research Project under the Australia-India Strategic Research Fund (AISRF) on “Highwall Mining Design & Development of Norms for Indian Conditions”, the CSIR-Central Institute of Mining and Fuel Research (CSIR-CIMFR) organised a one-day Indo-Australian Joint Workshop on “Recent Developments on Highwall Mining in India” on 27 July 2016 at CSIR-CIMFR.

The workshop was attended by senior officials of the Directorate General of Mines Safety, Members of the Australian collaborator viz. Dr. Baotang Shen, Senior Principal Research Scientist, CSIRO; Dr. Marc Elmouttie, Research Team Leader, CSIRO; Mr Zhiting Han, Research Scientist, University of Queensland; Mr Sungsoon Mo, Research Scientist, University of New South Wales; Dr. Amalendu Sinha, Former Director, CSIR-CIMFR; Scientists of CSIR-CIMFR Nagpur Unit led by Dr. John

P. Loui, Co-convener & Project Leader of Indo-Australia Joint Project of CSIR-CIMFR, Dr. Ishtiaque Ahmed, Head HRD and his group; team members of CIMFR Highwall Mining Group, participants from academic institutions and practising engineers from various leading industries of the country.



A view of the audience from Industries and Institutes

Dr. Pijush Pal Roy, Outstanding Scientist of CSIR-CIMFR and Coordinator of the Highwall Mining Group of CSIR-CIMFR. Dr. Pradeep Kumar Singh, Director, CSIR-CIMFR delivered the Chief Guest lecture during the inaugural function.



Dr. P. K. Singh, Director, CSIR-CIMFR delivering the Chief Guest lecture

Highwall Mining is a new technology that can extend the life of opencast mines without disturbing the surface dwellings, while maintaining economy and productivity. It is a remotely operated coal mining technology that comprises of extraction of coal from a series of parallel entries driven in the coal seam from the face of the Highwall. These entries are

unmanned, unsupported and unventilated.

The first Highwall Mining System in India started on 10 December 2010 at Opencast Project-II (OCP-II), Ramagundam Area-III (RG-III) of Singareni Collieries Company Ltd. (SCCL) and subsequently at Sharda OCP of SECL and few other mines in this country. M/s Cuprum Bagrodia Limited is successfully operating the Highwall Mining technology at Sharda OCP and Quarry SE of West Bokaro Collieries, Tata Steel Ltd. after the analytical extraction design provided by CSIR-CIMFR.

Till now 31.64+ lakh tonnes of coal costing more than Rs 550 crore has been recovered of which around 1.5 lakh tonne is from OCP-II; 10 lakh ton from Medapalli OCP; 20+ lakh tonne from Sharda OCP and 0.135+ lakh tonne from the newly started West Bokaro Colliery of TSL. The outsourcing charges vary between Rs 900 to Rs 1150 per tonne of coal production depending on the site conditions.

In the workshop, all findings and case studies were thoroughly discussed in the presence of a distinguished gathering for finalising the norms and guidelines for Indian geomining conditions. There were four lead papers and two support papers including:

- “Highwall Mining in India – Design Methodology and Guidelines”
- “Lessons learnt from past Highwall Mining failures in Australia”
- “CSIRO rock mass characterisation using photogrammetry, geophysics and structural modelling for Highwall Mining”
- “Perspectives of Subsidence Management & Stability Aspects of Highwall Mining”

The major emphasis was on understanding the complex, multiple seam scenarios for Highwall Mining technology to maximise locked-coal recovery from any given site and identifying areas



(L-R): Mr. Zhiting Han, Dr Marc Elmoutie, Mr Sungsoon Mo, Dr. P. Pal Roy, Dr. P. K. Singh, Dr. Baotang Shen, Dr. J. P. Loui and Dr. Ishtiaque Ahmed after the felicitation of Australian scientists

amenable to Highwall Mining and work out better economics and increased coal recovery thereby helping the mining companies to follow the norms to avoid hazards and minimise instability issues.

In the valedictory session, lively discussions were held on different operational and regulatory issues and their remedial measures to make this emerging technology more useful for India and other countries.



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## CSIR-NEIST Organises Training Workshop for Teachers

The Itanagar (Naharlagun) branch of the CSIR-North East Institute of Science & Technology, Jorhat in collaboration with the Royal Chemistry India Foundation (RCIF), New Delhi organised a two-day training workshop for teachers at the institute premises on July 18 and 19.

Resource person Vimala Oak from the Royal Chemistry India Foundation, New Delhi conducted the programme and provided some basic tips to the teachers on how to attract, motivate, and en-

courage students and develop their skills of understanding in broad areas of science. The Royal Chemistry India Foundation, New Delhi is a unit of the Royal Society of Chemistry, London.

Dr. Jagat C. Borah, Scientist incharge, NEIST Branch Itanagar, co-ordinated the programme which was attended by around 30 teachers from different schools from Itanagar, Naharlagun, Nirjuli, Balijan, Banderdewa, Yazali, Oyan, Sher, Doimukh, etc.

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## Training Programme on ‘Construction of Affordable Housing’

The CSIR-Central Building Research Institute (CSIR-CBRI) conducted a one-day training programme on ‘Construction of Affordable Housing’ on 13 May 2016 at Mysore in association with Mysore Nirmithi Kendra for Junior Engineers, Supervisors and Masons.

The training programme aimed to create awareness about planning and designing, construction techniques and quality control, innovative building materials and low cost sanitation systems and affordable housing/building construction practices. The programme was attended by more than 150

participants from Karnataka state.

Mr M.T. Manjunath, Project Director of Mysore Nirmithi Kendra welcomed the dignitaries of the programme and subsequently the training was inaugurated by the Chief Guest Mrs C. Shika, IAS, Deputy Commissioner of Mysore; the Guest Dr. C.G. Betsurmah, Commissioner of Mysore City Corporation (MCC), Mr Y. Pandey and Dr. B. Singh of CSIR-CBRI.

Later, Mr Y. Pandey said that the institute has been providing new technologies to central government sponsored programmes for construction

of affordable houses at low cost and it is planned to spread awareness about this across the country for the construction of safe and affordable houses.

Speaking on the occasion, MCC Commissioner Dr. C.G. Betsurmth said that the MCC under the 'Housing for All' schemes had planned to construction

the first session a short film on "Role of CSIR-CBRI in Building Construction Technology" was shown by Dr. R. Dharmaraju, Senior Principal Scientist, CBRI. In the second session Mr S.K. Negi, Senior Principal Scientist, CBRI, interacted with participants regarding the planning and designing of affordable housing. He also discussed the effectiveness and benefits of the CBRI building technologies in safe construction and cost reduction.

Subsequently, the session on Cost Effective Building Materials and Construction Techniques was taken by Dr. B. Singh, Chief Scientist, CBRI, in which he explained the use of local materials as alternate wood substitute for the production of composite from natural fibres, door shutters, jute frames, roofing sheets and composite shuttering plates etc. Further, he discussed the innovative technologies developed by the institute for use of industrial/demolition waste for the production of different types of bricks such as fly-ash bricks, clay fly-ash bricks etc. for the sustainable development.

Mr H.K. Jain, Principal Technical Officer (Rtd) interacted with participants on issues related to quality in construction, maintenance and repair of buildings. He mainly apprised the participants about inspection and maintenance, repair and rehabilitation methods, repair of cracks and use of fibre reinforced polymer composite in rehabilitation and retrofitting of buildings to enhance the safety. The low cost sanitation systems developed by the institute were also discussed with participants in detail. Apart from this, the participants also visited the CSIR-CBRI technologies displayed through charts and products at the venue.

The training programme concluded after obtaining feedback from the participants. The participants expressed

2,700 houses with the approval of the council and added that Rs.15,000 was being spent on construction of a toilet. He sought the help of CSIR-CBRI in bringing down the expenditure with the help of new technologies to construct good quality toilets.

Mrs C. Shika during her inaugural speech stated that the BPL families were being provided with individual houses at rural areas and apartments in urban areas. She urged CSIR-CBRI to provide the district administration with new technologies to construct good quality houses at affordable areas. She also mentioned that the tribals in forest areas were being provided housing facilities using bamboo technology which was implemented by Nirmithi Kendra.

Finally, Dr. R. Dharmaraju, Coordinator from CSIR-CBRI proposed the vote of thanks.

About six technical sessions were planned in the training programme. In



that the training programme would enable them in improvement of their scientific knowledge and adaptation of building technologies at grass root level, with technical support of the CSIR-CBRI scientific community.

The CSIR-CBRI scientific team that visited Mysore Nirmithi Kendra reported that they had developed and adopted several new technologies such as concrete blocks, low cost sanitation systems, concrete windows & door frames, bench for schools, steel frames etc. in their projects. The low cost houses constructed under the Jawaharlal Nehru National Urban Renewal Mission (JnNURM) for the people shifted from slum areas and Vivekananda Girijan

Kalyan Kendra (VGKK), are major projects where typical low cost CSIR-CBRI technologies have widely been adopted.



## CSIR-IICT Organises Apprenticeship Programme for Students

As part of work education programme, 20 students of class XI (CBSE section), Delhi Public School, Hyderabad underwent a three-day apprenticeship programme at the CSIR-Indian Institute of Chemical Technology (CSIR-IICT), Hyderabad to have a first-hand experience in the various areas of excellence available in the national laboratory.

Since CSIR-IICT has a variety of research areas in the field of chemical

science giving plenty of career choices to the students, it provides exposure to students of the various R&D activities through this apprenticeship programme.

This exposure and direct interaction with scientists is a lifetime experience for these students who are aspiring to choose pure science as their graduation subject. The apprenticeship programme inspires and motivates many of them to take up science and research after school.



Visits**Minister Visits CSIR-Institute of Microbial Technology**

Dr. Harsh Vardhan, Hon'ble Union Minister of Science & Technology and Earth Sciences, visited CSIR-IMTech on 9 June 2016. He was welcomed by Dr. Girish Sahni, DG-CSIR and Prof. R.K. Sinha, Director of CSIR-IMTech.

The Minister first visited the G.N. Ramachandran Protein Centre building of CSIR-IMTech, where he interacted with scientists. He then discussed ongoing projects with individual scientists attending the meeting. During this discussion, Dr. Harsh Vardhan insisted on collaborations across scientists in India for mass contentious issues such as tuberculosis, pre-term birth, anemia, etc. He suggested that the current government would help in synchronising the energies in different science departments to solve problems faced by the people of India.

Dr. Harsh Vardhan was then given a tour to different facilities like the 3-D facility for protein structural analysis and molecular docking, the Biochemical Engineering Research and Process Development Centre (BERPDC) and the Fermentation Facility.

The Hon'ble Minister then inaugurated the Microbial Type Culture Collection and Gene Bank (MTCC), National Facility new building and visited the various facilities i.e. seminar hall, reception area, service labs, etc. During the interaction with the MTCC staff the Hon'ble Minister was briefed about the contributions of MTCC to the nation in the form of service, scientific research and discovery of about 100 novel microbial taxa by MTCC scientists. He showed keen interest in the activities of MTCC and observed microorganisms under the microscope.

Later, Dr. Harsh Vardhan addressed the staff and students of CSIR-IMTech



in the auditorium. He insisted that CSIR-IMTech should synergise the energy and efforts among their scientists and with scientists across CSIR to solve the problems faced by the common masses. He said that science can be constructively used to solve the socio-economic challenges faced by the country.

The Minister applauded the scientific achievements of CSIR and said that CSIR was the only institution that comes in the top 100 institutions of the world out of more than 5000 well-established research and technology institutions. However, now the CSIR shall bring a radical change in their approach and shall focus on providing technological and scientific answers to the problems of national interest.

He asserted that the current government under the able leadership of Hon'ble Prime Minister Shri Narendra Modi would make every effort in supporting the scientists of the country to bring out the remedies of a large number of problems faced by the people of this great nation. He said the leadership under the former Prime Minister, Shri Atal Bihari Vajpayee also recognised the contribution of science in nation-building and gave the slogan of "Jai Jawan, Jai Kissan, Jai Vigyan" to reflect on the contribution of science.

Dr. Harsh Vardhan emphasised that

every scientist of the nation should dream of a scientific innovation that children would be proud of and start on the journey towards the realisation of that dream. He also provided an example of his own dream of making this great nation free of Polio and how he had chased this dream.



## Visit of Norwegian Delegation to CSIR-NIO

A delegation comprising of Ms Marianne Jensen and Ms Merethe Sandberg Moe from Research Council of Norway along with Mr Tor Dahlström from Consulate General of Norway visited the CSIR-National Institute of Oceanography, Goa on 27 May 2016.

The purpose of the visit was to explore common ground and possibilities for collaboration with Norway. Norway has a strong position in ocean sciences and currently a number of collaborative projects are going on with India. The delegation wanted to explore the future collaboration at a more strategic and

structural level with CSIR-NIO, a natural partner.

During the visit, Director Dr. SWA Naqvi made a presentation on various activities and programmes of the Institute and highlighted possible areas of collaboration in ocean sciences with Norway. He also mentioned that NIO had very strong ties with Norwegian researchers in the past and would like to pursue it further.

The members of the delegation expressed their interest in many areas of research at NIO such as aquaculture, bio-remediation, ocean acidification and ocean energy.

### Forthcoming Events

#### 4<sup>th</sup> National Conference on Innovations in Indian Science, Engineering & Technology (Focus: RURAL HOUSING) March 4-5, 2017; CSIR-NPL, New Delhi

##### Areas to be covered

Innovative indigenous inter-disciplinary translational research & scientific efforts/ ecofriendly technology in the path of Traditional Knowledge and Sustainable Consumption/Living/Development in areas such as Rural Households, Rural Urban Connections, Demographic Trends and Housing Needs, Access level of Housing Supply, Housing Conditions, House Construction Activities in Rural areas by Public Sector, Private Sector and PPP model, Environmental Impact of Rural Housing, Rural Housing Schemes by Union and State Governments, Sanitation, Drinking Water, Water harvesting, Energy (e.g. Solar panels, Solar Rooftop systems) & Wastewater Technology, Role of Cooperatives in Rural Development in present scenario, Materials & Technologies such as agricultural and industrial wastes like plastic, Bio-waste, fly-ash, rice husk/straw, coconut husk, vegetable reinforced concrete, Bamboo Mat Board, Banana leaves & stalks, Animal & Poultry shelter designs, etc. for rural housing, quake resistant technological guidelines of disaster management and IPR leveraging vis-à-vis new economic environment.

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