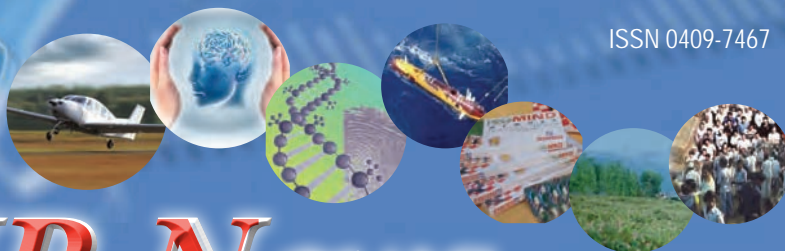




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In The News

New Molecule Isolated by CSIR-IIIM Scientists Shows Promise Against Arthritis

A team of scientists at the CSIR-Indian Institute of Integrative Medicine (IIIM), Jammu, has filed a patent for a new molecule found in a Himalayan plant with anti-arthritic properties. The molecule found in the plant locally known as patalbhedha (*Bergenia ciliata*), is a promising candidate for a drug against rheumatoid arthritis.

Rheumatoid arthritis, common in the elderly, is characterised by morning stiffness and inflammation of the joints. The drug developed by scientists of CSIR-IIIM has been found to prevent inflammation and reduce pain. The Institute would soon be approaching the Drugs Controller General of India for permission to conduct clinical trials.

Current drugs against rheumatoid arthritis have serious side effects, like osteoporosis, weight gain, tuberculosis and increased susceptibility to infections. However, the new molecule has been found to be safe in animal studies.

The scientists have published their findings in the *Journal of Medicinal Chemistry*.



Bergenia ciliata

CSIR-NEIST takes up Malnutrition Challenge in Assam District

Sonitpur district of Assam is among the four districts of Assam including Dibrugarh, Darrang and Chirang where 36% children between two to five years of age are underweight, while another 9.2% are severely underweight as per the World Health Organization (WHO) standards. Most adolescent girls and women in the tea garden areas of the district are anaemic because of poor diets.

CSIR-North East Institute of Science & Technology (NEIST), Jorhat has now stepped in to improve the quality of life for the people of Sonitpur district of Assam.

Under its 12th Five Year Plan Project, “S&T interventions to combat malnutrition in women and children”, CSIR-NEIST in association with the Institute of Integrated Resources Management (IIRM), Tezpur launched the project at a function held at Tezpur on 14 May 2014 where Dr. D. Ramaiah, Director, CSIR-NEIST, Dr. P.R. Bhattacharyya, Head-Medicinal, Aromatic & Economic Plants Division, Dr. S.P. Saikia, Nodal Scientist of the project and other team members were present.

The project is aimed at development and exploitation of nutritionally rich food products to combat malnutrition in women and children. The targeted women population will be trained to grow mushrooms, which are rich in folic acid and are of vital importance in treating anaemia in addition to several other health benefits.

Edible mushroom can be used as a weapon against starvation because of its high protein, vitamin and folic acid content. Daily consumption of mushroom and its value-added products will help to fill the gap of protein and micronutrient deficiency. Other technological interventions will be development of nutraceuticals and functional food from pigmented rice of the North Eastern region and also from Komal Chaul (Soft Rice), a unique instant food of Assam.

The project will strive to bring out a business model to promote entrepreneurship in rural and backward areas and generate employment opportunities for the local population in addition to ameliorating the health status of the population.

CSIR-CIMAP Achieves Recognition in Bioinformatics

The Bioinformatics Centre of CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP) was ranked second after the National Institute of Plant Genome Research (NIPGR), New Delhi in the 25th BTISnet Coordinators Meeting held at the CSIR-National Institute of Oceanography, Goa. The ranking was done on the basis of total Impact Factor of the publications by the participating institutes in the area of Bioinformatics. Third, fourth and fifth positions were obtained by CSIR-Central Drug Research Institute, Lucknow, Guru Nanak Dev University and Aligarh Muslim University, respectively.

Bioinformatics R&D activities were initiated at CSIR-CIMAP during 1997-1998 with the establishment of the Distributed Sub-Center (Sub-DIC) under the Biotechnology Information System Network (BTISNet) of Department of Biotechnology, Govt. of India. Since its inception in 1998, the Bioinformatics Centre has been the backbone of bioinformatics/computational analysis in R&D activities of CSIR-CIMAP. It is continuously progressing towards becoming a Centre of Excellence in the R&D of Plant Bioinformatics especially Medicinal & Aromatic Plants (MAPs).

Dr. Jitendra Singh inaugurates CSIR-IIIM J&K Aroma Festival at Kathua

CSIR-IIIM (Indian Institute of Integrative Medicine), Jammu organized a three-day J&K Aroma Festival at Kathua from 17th to 19th August 2014. The Institute displayed technologies available in the CSIR system for the benefit of this region. Farmers, entrepreneurs, ex-servicemen, experts and interested stakeholders from near and far villages of the state and outside were invited to this event.

The festival was inaugurated by Dr Jitendra Singh, Union Minister of State (Independent Charge) for Science and Technology and Earth Sciences at the Shaheed Bhagat Singh Town Hall, Kathua.



Dr Jitendra Singh inaugurating the festival



The Minister addressing the gathering

After inaugurating the festival, Dr. Jitendra Singh took a round of the stalls of stakeholders, which included farmers, entrepreneurs and industrialists.

The festival was organized considering the immense potential of J&K State for captive cultivation of high-value cash crops (aromatic and medicinal plants) in rainfed and wasteland (kandi areas) and to provide linkages with industries for job and wealth creation. During the festival, various seminars were held focusing on the development of micro, small and medium enterprises in the area of cultivation and value addition of medicinal and aromatic plants including development of botanical drugs, perfumery

products and food supplements.

While welcoming the participants, Dr. Jitendra Singh said that there is a great need to revitalize the micro, small and medium enterprises sector, laying special thrust on promotion of start-ups. However, to achieve success in this regard, there is a dire need of technological backup to promote innovation and entrepreneurship development. Dr. Jitendra also said, "One of the most important sectors where CSIR-Indian Institute of Integrative Medicine can effectively contribute in the development of micro, small and medium enterprises in India in general and Jammu & Kashmir state in particular is the cultivation, utilization and value addition of medicinal and aromatic plants." He further said that IIIM is committed to provide technical support for promotion of existing and start-up enterprises in the area of medicinal & aromatic plants.

Dr. P.S Ahuja, Director General, Council of Scientific and Industrial Research (CSIR) thanked the minister for considering CSIR scientists for this event. He emphasized on the availability of resources, quality and improved varieties available with the CSIR institutes and asked to collaborate with the concerned departments (Forest, Horticulture, Agriculture, Floriculture, etc). He motivated farmers to utilise the facilities available with the CSIR Institutes.

"One of the most important sectors where CSIR-Indian Institute of Integrative Medicine can effectively contribute in the development of micro, small and medium enterprises in India in general and Jammu & Kashmir state in particular is the cultivation, utilization and value addition of medicinal and aromatic plants."

Dr Jitendra Singh,
Union Minister of State
(Independent Charge)
for Science and
Technology and Earth
Sciences

Dr. Ahuja mentioned how MSME can help the interested entrepreneurs and also focused on the establishment of Silicon production units in India. He also talked about area-specific crops that could be grown in the Kathua region and the kind of industries that can be set up in this region.

Earlier, Dr. Ram Vishwakarma, Director CSIR-IIIM, Jammu in his welcome address said that nature has bestowed a unique geoclimatic condition upon J&K state, which has not been cashed effectively yet. Showing

concern over the negligible contribution of the state in the international Aroma Market/ Industry, Dr. Vishwakarma emphasised that there is a need to sensitize the younger generation and the ex-servicemen of this state. He also said that apart from the technical knowhow, IIIM would ensure the quality as well as buy-back arrangement of the produce. Talking about location-specific crops, Dr. Vishwakarma said that there are several high international value medicinal and aromatic plants that can be grown in Kandi areas like Kathua.



Dr. P.S. Ahuja addressing the gathering



Dr. Ram Vishwakarma delivering the welcome address

R&D Highlights

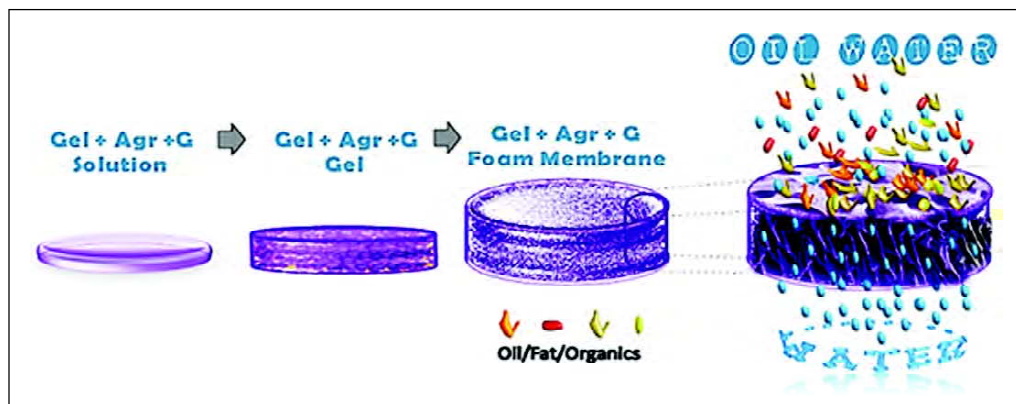
Bio-based Foam Membranes For Sustainable Oil-Water Separation

Many reports on the separation of immiscible effluents and complex emulsions have been reported in the literature using ceramic, PVDF, polyacrylonitrile (PAN) based nano fibrous membranes having pore structures in the range of the ultrafiltration regime. However, general shortcomings with the above synthetic membranes are chemical stability, membrane fouling, toxicity and material integrity under applied pressure. The major environmental risks involved are lack of recyclability and biodegradability.

Keeping these membrane problems in view, we have developed a low-cost, high-performance, sustainable, recyclable,

bio-based foam membrane technology with self-cleaning property of membranes to treat environmentally sensitive wastewater streams. Foam membranes (FMs) were derived from agarose (Agr) and gelatin (Gel) in combination with a non-toxic fruit extract and natural crosslinker, genipin (G). FMs were successfully tested for their oil-water separation efficiencies. FMs attained unique capillary microstructures as a result of the controlled lyophilization process, which allows selective permeation of water.

The most attractive properties of our foam membranes include natural abundance, easy to recycle and reuse, less-to-no toxicity,



stability under different testing conditions, easy processability and disposability. The biodegradability factor is a very significant characteristic of the foam membrane, which makes it an eco-friendly separation medium in comparison to conventional materials and methods. Over $500 \text{ L m}^{-2} \text{ h}^{-1}$ with $\sim 98\%$ pure water is a promising feature of our micro-porous membrane under gravity-driven force.

FM also works in an advanced cross flow configuration, which opens new avenues to faster water reclamation processes from large

industrial wastewater streams. A prospective focus of using FM is to reclaim water from oil or gas exploration operations. Oil-water emulsion wastes and oil sludge are easy to process with an improved rate of the dewatering process. Therefore, water recovery using a continuous filtration process and bio-based membranes is an economical and sustainable solution.

Dr Ramavatar Meena, Senior Scientist
CSIR-CSMCRI, *Green Chemistry*, 2014,
Advance Article, DOI: 10.1039/
C4GC01070A

Bone Cement-based Nanohybrid as a Super Biomaterial for Bone Healing

Researchers at the Nanoclay Lab of the Advanced Clay & Traditional Ceramics Division in CSIR-CGCRI have collaborated with researchers of Indian Institute of Technology-Banaras Hindu University and Indian Institute of Technology, Roorkee to develop a bone cement-based nanohybrid using nanoclay prepared in-house at CSIR-CGCRI. The nanohybrid acts as a super biomaterial for bone healing.

The findings of research revealed that with an addition of only 1wt% of the nanoclay, complete healing of the fractured bone was achieved in 30 days that was one-third of the time required for natural healing. A 4 mm diameter hole, as shown by the arrow in the image, was drilled on right rabbit tibias and treated with bone cement. Post-surgery radiographs of rabbit tibias on day 1 and day



Radiographic images of bone healing

30 showed that healing took place only in 30 days. Bone cement alone takes 90 days to heal.

The unique nanoclay with iron ions at octahedral sites in gibbsite layer improved several bone grafting parameters of bone cement, viz., mechanical properties, cell adhesion, cell viability, osteoconductivity and bone regeneration. The work was accepted in a high impact journal of materials science

documented as follows:

Govinda Kapusetti, Nira Misra, Vakil Singh, Swati Srivastava, Partha Roy, Kausik Dana (CSIR-CGCRI) and Pralay Maiti, *Journal of Material Chemistry B*, 2014, 25,3984-3997 (DOI: 10.1039/c4tb00501e).

CSIR-CLRI endeavour under STRAIT Project Unveils New Dimensions in Children's Shoes

Children's feet grow at a rapid rate thus necessitating a frequent change in footwear to accommodate the foot growth. As part of a CSIR-CLRI endeavor, "Science & Technology Revolution in Leather with a Green Touch (STRAIT)", reliable foot dimensions of children were done through 'digital capture' of the foot images. Cluster analysis enabled compression of the complete children's size range from Children Size 10 to Adult Size 3 into only five groups thereby optimizing the size range to be manufactured. These size ranges accommodate the foot growth in children and also reduce the frequent change of footwear.

As part of the project, CSIR-CLRI has developed shoes for children, which are comfortable, durable and developed from eco-friendly leather. Significant leads and accomplishments of the STRAIT project were presented to Dr Paramvir Singh Ahuja, Director General, CSIR during his visit to CSIR-CLRI on 11 July 2014.

CSIR-CLRI proposes to provide an S&T

revolution in leather with a green touch (STRAIT), comprising of elements such as value engineering, chemicals for and from leather, green chemistry, smarter leather and leather products and environmental science support systems. Such an intervention is likely to provide maximum utilization of substrate and process chemicals, newer range of chemicals leading to smarter leather-based materials and products such as children footwear, therapeutic footwear and leather composites. In economic terms, a value enhancement of 700 to 800 % from the existing average of 400 %, leading to the industry in India meeting the national agenda on enhanced export earnings for the 12th plan is envisaged.

The approach in "Development of Children's Shoes" involved:

- Establishment and fabrication of special fitting range of lasts for children from the foot data gathered
- Understanding children's shoe trends
- Introducing new materials as well as



Dr. Paramvir Singh Ahuja, Director General, CSIR and Prof. Dr. A.B. Mandal, Director, CSIR-CLRI seen interacting with Team CSIR-CLRI Shoe Design & Development Centre

design concepts and manufacturing methods in children's shoes

- Identifying appropriate components and accessories for children's shoes to enhance their comfort properties
- Fabricating an improved range of children's shoes and
- Carrying out wear trials of the newly developed children's shoes.

Special eco-friendly leathers devoid of banned and toxic substances, which do not produce any health impact on the children, have been developed. These Leathers would accommodate for the natural foot growth and allow for natural foot function of the children.

The children's shoes have been developed in accordance to the trend forecasts prevalent for the current season. The styling has been done to ensure the 'comfort' and 'safety' of the children. Colours have been incorporated in the styling of these shoes in harmony with the House to which these children belong to in the school.

Comprehensive tests for evaluating the strength properties of the Upper Leather, Soling Materials, Lining Materials and Insock Material were carried out and the efficacy of using these materials was established.

The shoes were fabricated and the 'Fit' and 'Comfort' studies were carried out using

the "Gait Analysis" system where the walking pattern/gait of children wearing the new shoes was carried out and the pressure patterns were studied to establish the efficacy of the new shoes developed.

From the results, it is very clear that the peak impact has been reduced significantly on wearing the new shoes, which clearly demonstrates that the new shoes are able to provide better impact absorption and provide for better cushioning and shock absorption.

A pilot study was initiated and fifty pairs of shoes were manufactured by M/s Bachi Shoes Limited, Ranipet with soles from Euro Shoe Components and lasts from Sanghavi Shoe Lasts for 'wear trials' and comfort study. The shoes manufactured covered all the five size groups. The shoes were given to the students of KV CLRI where the foot measurements were earlier taken and they were then brought to the gait analysis laboratory of CSIR-CLRI for their movement analysis on wearing the newly designed footwear.



Shoes being fitted on the school children

Symposia/Seminars

CSIR-CIMAP organises Technology Awareness Seminars

With the objective of spreading awareness about latest and improved technologies for the production, processing, value addition and quality control in the area of medicinal and aromatic plants (MAPs) and to understand the needs of the Micro, Small and Medium Enterprises (MSMEs) for enhancing productivity and competitiveness, CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP), Lucknow organised two one-day Technology Awareness Seminars on 6 August 2014 and 12 August 2014 at CSIR-CIMAP, Lucknow



Prof. A.K. Tripathi inaugurating the seminar

and Rania, Kanpur Dehat, respectively. These seminars were organised with the support of Ministry of Micro, Small and Medium Entrepreneurship (MSME), Govt. of India.

Inaugurating the first Technology Awareness Seminar on 6 August 2014, Director, CSIR-CIMAP, Prof. Anil Kumar Tripathi said that technologies of CSIR-CIMAP are suitable for Micro- and Small Entrepreneurship and by adopting these technologies entrepreneurs can set up their units and enhance their earning while at the same time making available employment opportunities for others also. The technologies developed by CSIR-CIMAP are environment friendly green technologies. CSIR-CIMAP has been making efforts to develop livelihood opportunities for the people in rural areas, Prof. Tripathi added.

Earlier, Chief Scientist, Dr. A.K. Singh said that the programme was very useful for people who are working in the field of medicinal and aromatic plants. He informed that 32 participants including five women, hailing from various places such as Lucknow, Hardoi, Moradabad, Sitapur and Raebareilly districts of UP participated in the programme.

Shri Sanjeev Chawla, Director, MSME-DI, Kanpur spoke about the various schemes implemented by his Ministry of MSME, Government of India for the welfare of entrepreneurs. He emphasised how entrepreneurs could go for entrepreneurship a step at a time.

In the technical session, Dr. A.K. Singh, Chief Scientist, CSIR-CIMAP discussed the production technologies of medicinal and aromatic plants and told the participants that they could lead towards entrepreneurship in the field of medicinal and aromatic plants. Er. S. Tandon discussed the processing technologies of medicinal and aromatic plants. Dr. L.N. Mishra delivered a lecture on quality control aspects of medicinal and aromatic plants. Dr. Dinesh Kumar told the participants about the various herbal formulations developed by CSIR-CIMAP.

On the occasion, Principal Director of Fragrance Flavour & Development Centre (FFDC), Kannauj (UP), Shri Shakti Vinay Shukla addressed the participants about the



Shri Sanjeev Chawla delivering his lecture



Dr. V.K.S. Tomar delivering his lecture



A view of the audience

global scenario and market potential of essential oils, fragrances and flavours. Shri Shukla said that in India the market share of fragrances and flavours accounts for about 55% and 45%, respectively. The demand for natural perfumes and flavours is increasing at the global level, he informed.

In the concluding session, the participants in their feedback said that such programmes should be organised at regular intervals to enable entrepreneurs to acquire the knowledge of new technologies available for setting up of units by the young entrepreneurs.

The second Technology Awareness Seminar organised at Rania, district Kanpur Dehat (UP) on 12 August 2014 was attended by 24 participants.

Welcoming the participants, Dr. A.K. Singh, Chief Scientist, CSIR-CIMAP said that the purpose of the seminar was to apprise the prospective entrepreneurs about the processing and value addition technologies of medicinal and aromatic plants suitable for setting up of micro, small and medium enterprises. Dr. Singh, while talking about the improved production technologies of CSIR-CIMAP, said that a very large number of people including the unemployed youth and farmers have adopted CIMAP's technologies for their livelihood and employment. Due to the efforts made by CSIR-CIMAP, some important clusters of mint, aromatic grasses, ashwagandha, khus (vetiver), lemongrass etc. have been established in the country generating ample job opportunities in the rural sector. Outreach programmes of CSIR-CIMAP have been given a big push during the year, he added.

Shri Sanjeev Chawla, Director, MSME-DI, Kanpur talked about the various schemes available for the MSMEs and exhorted the participants to make use of the schemes launched by the government. Shri Chawla explained in detail about the procedure for setting up of an enterprise. He also answered the queries of the participants.

In the technical session, CSIR-CIMAP scientist Er. S. Tandon discussed the processing technologies of medicinal and aromatic plants, Dr. L.N. Mishra delivered a lecture on quality control aspects and Dr. Dinesh Kumar told the participants about

the various herbal formulations developed by CSIR-CIMAP. The scientist from FFDC, Kannauj, Dr. R.K. Srivastava in his presentation informed about the global business scenario and market potential of essential oils, fragrances and flavours. Dr. Srivastava said that natural perfumes and flavours of Indian origin are in great demand throughout the world and people are coming forward to adopt technologies for production and processing for setting up of the industries.



Dr. A.K. Singh welcoming the participants



Stall of herbal products of CSIR-CIMAP

A special lecture on the importance of bar coding by Shri A.K. Tripathi was also arranged by MSME-DI, Kanpur. Shri H.S. Rakhra, Chairman, Indian Industries Association, Kanpur also addressed the participants.

The participants suggested that such programmes organised with the support of MSME Ministry will have positive impact in providing necessary details and guidance to the enterprising youth who are willing to put up medicinal and aromatic plants based units in the country.

8th Mid-Year CRSI National Symposium in Chemistry inaugurated at CSIR-NEIST

CSIR-North East Science & Technology, Jorhat jointly in collaboration with Tezpur University, Tezpur, Assam inaugurated a two-day long National Symposium in Chemistry with general meeting of the 8th Mid-Year Chemical Research Society of India (CRSI) on 10 July 2014 at the Dr. J.N. Baruah Auditorium at CSIR-NEIST, Jorhat.

The symposium was largely attended by eminent scientists and professors in Chemistry from various institutes and

organizations across the country and participants from India and abroad viz., IIS-Bangalore, IIT-Mumbai, IIT-Kanpur, IIT-Madras, IIT-Guwahati, IISER-Kolkata, IISER-Bhopal, Rajasthan University, Pune University, Gauhati University, Gujarat University, Manipur University, University of Hyderabad, JNCASR, Bangalore, CSIR-NCL, Pune, IISER, Pune, IISER, Mohali, CSIR-NIIST, Trivandrum, IACS, Kolkata, NEHU, Shillong, BARC, etc. besides the scientific fraternity of CSIR-NEIST and Tezpur University.

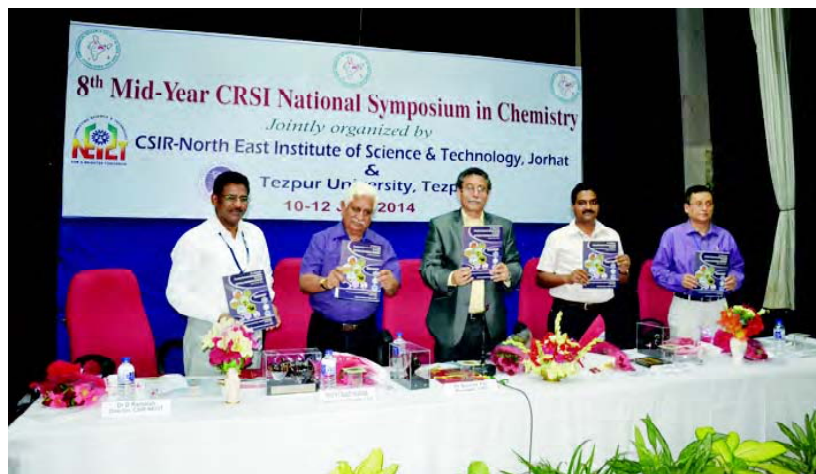
Welcoming the participants, Dr. D. Ramaiah, Director, CSIR-NEIST, mentioned about the significance of the symposium in the region with 21 invited lectures and presentations of 158 posters for the researchers in chemistry across the country, specifically the younger researchers.

Prof. G. Mugesh, General Secretary, CRSI and Professor at IIS, Bangalore, expressed happiness at the large number of registered participants, approximately more than 350, which is the highest of a Mid-Year CRSI National Symposium ever.

In his presidential address, Dr. Sourav Pal, President, CRSI and Director, NCL, advised the younger researchers to extract



Dr S. Pal, President, CRSI and Director, NCL, Pune delivering presidential address



The release of souvenir in the inaugural programme. (Dignitaries from left) Dr. D. Ramaiah, Chairman of Local Organizing Committee, CRSI and Director, CSIR-NEIST, Prof. S. Chandrasekaran, Immediate Past President, CRSI, Dr S. Pal, President, CRSI and Director, NCL, Pune, Prof. G. Mugesh, General Secretary, CRSI and Professor at IIS, Bangalore and Dr. R.C. Boruah, Co-Chairman, Local Organizing Committee and Outstanding Scientist, CSIR-NEIST



Prof. Neelima Gupta,
Rajasthan University,
Jaipur delivering an
Invited Lecture

benefits as far as possible from the symposium.

Prof. S. Chandrasekaran, Immediate Past President, CRSI, mentioned that CRSI was a unique undivided platform for all researchers in Chemistry.

On the occasion, a Souvenir including all the abstracts of invited lectures and poster presentations was released by Dr. Pal.

The inaugural programme was immediately followed by technical sessions. Six lead lectures were delivered by stalwarts of Chemistry from across the country followed by 15 invited lectures and 141 poster presentations on different branches of chemistry along with a thematic session on natural products based drugs.



Participants interacting with
the speaker in the symposium

Workshops

PRISM Workshop at CSIR-CGCRI

PRISM (**P**romoting **I**nnovations in **I**ndividuals, **S**tart-ups and **M**SMES) is a scheme under the Department of Scientific and Industrial Research (DSIR). A workshop was held at CSIR-Central Glass and Ceramic Research Institute (CSIR-CGCRI), Kolkata under the DSIR-TePP Outreach-cum-Cluster Innovation Centre (TOCIC) on 19 August 2014. The objective of the workshop was to help prospective innovator-entrepreneurs to understand the nitty-gritties of the PRISM scheme and to answer their queries regarding the scheme.

Mr Kamal Dasgupta, Acting Director, CSIR-CGCRI, warmly welcomed the participants from ADAMAS Institute of Technology, Barasat and other individual participants. He succinctly outlined the recent steps taken by DSIR and also by CSIR in cooperation with the Government of West Bengal to link entrepreneurs with scientists in an attempt to encourage innovation and job-creation even at the grassroots level. He encouraged the participants to come forward and project one targeted brilliant idea or project proposal instead of de-focussing their

energies on scattered ones. Mr Dasgupta announced that this was a workshop focussed on primary guidance mainly and that there would be other workshops shortly. He wished the participants success in their entrepreneurial efforts.

The PRISM scheme was then explained in great detail by Mr Indranil Biswas, who also explained the entire process of project screening. He advised the participants to pay attention to factors such as Novelty value, Thrust areas, Cluster-focus and Mission-aligned concepts.



Shri Kamal Dasgupta making a point



Shri Suman Mukhopadhyay addressing the audience

Mr Sumon Mukhopadhyaya, Vice President, Finance and Strategy, Banglanatokdotcom, who works to revive the crafts sector of West Bengal, delivered a

very interesting and interactive speech focussing on the success stories in his repertoire. It was his mission to link heritage to sustainable livelihood and in this quest he had found that in many cases the artisans engaged in traditional crafts have the potential to benefit from technology interventions. Technology interventions can help them address many problems such as fuel efficiency of furnaces; better heat control in furnaces, lesser pollution, protection of bamboo/timber against pest/fungus attack, or improved chip/peel-resistant paint.

In one such success story, Mr Mukhopadhyaya related the example of the field visit by scientists of the Technology Facilitation Centre at CSIR-CGCRI who realized that the Dokra workers needed better furnaces. An efficient furnace was available at National Metallurgical Laboratory, Jamshedpur, which proved to be the perfect solution for the existing problems of the workers at the Dokra cluster. Similarly, an in-depth-grassroots hands-on inspection could help the identification of the problems faced by the other artisans too, and technology solution (s) would be found for these.

Mr Mukhopadhyaya said that the way forward was by introducing small innovations that opened up access to technology citing the revolutionary marketing technique of sachet packaging of cosmetics that made a product accessible to many and opened up a new vista in marketing. He called for a change in mindset; a change that would lead from being a job-seeker to being a business generator. This is the need of the hour as jobs are diminishing even as production is increasing and markets opening up.

Mr Debasish Sarkar of CSIR-CGCRI walked the participants through the different sections of project writing and warned them about the most commonly made mistakes that often led to rejections. He told the participants to check that their submissions were indeed new and not unintentional duplications of schemes submitted by others, earlier. A proper search of Patents and

publications could help them to verify facts, he advised. He emphasized the need for clearly stating the objective of the proposed project, its deliverables along with the milestones and justifications. He advised the participants to have contingency plans factored in for any escalation in cost. His talk was followed by a brisk interactive

session largely focussed on the financial grants under PRISM, IP protection and other similar issues.

The participants were given a guided tour of the Exhibition Hall. This greatly fascinated the participants who eagerly asked many questions about the posters and products on display.



Training Programmes

CSIR-NEIST organizes Demonstration Programme on Mushroom Cultivation for Workers of Tea Estate

A demonstration programme on cultivation of Mushroom was organized on 21 May 2014 at Horuchorai Tea Estate, Jorhat under 44 no. Madhya Sarucharai Gaon Panchayat at Horuchorai, Jorhat under a project sponsored by DSIR, Govt. of India. Hundred and ten women from the area participated in the programme.

The programme was also attended by Mr Apurbo Kumar Sharma, Manager, Horuchorai Tea Estate, Mr Monuranjan Gogoi, President of 44 no. Madhya Sarucharai Gaon Panchayat, Mr Tulosi Bora, an active member of the Panchayat and a few staff members from CSIR-NEIST. Mrs Janumoni Bora, 44 A P member and Mr Bhaben Bharali, Ex- MLA were also present at the programme.

Dr. Mina P. Borthakur, Principal Investigator of the project spoke about the objectives of the project. Dr. A.K. Bordoloi, Co-Investigator, presented technical demonstration of the cultivation wherein he encouraged the participants to take up mushroom cultivation for income generation, entrepreneurship development and improving the quality of life. Dr. Bordoloi further said that the intake of mushroom can help in nutrition deficiency as it is a rich source of protein, vitamin and folic acid.



Dr. A.K. Bordoloi, Principal Technical Officer, CSIR-NEIST explaining the cultivation practice



Participants at the programme

Refractory Training Programme for MSME members of Bangabhumi Cluster of Refractories Association at CSIR-CGCRI

A training programme was held on 25 August 2014 at CSIR-Central Glass and Ceramic Research Institute (CSIR-CGCRI), Kolkata, to meet the needs of the Bangabhumi Cluster of Refractories Association, Asansol, West Bengal.



Shri Indranil Biswas making his presentation

Refractory materials are inherently resistant to creep deformation, high temperature slag corrosion, etc. Typically refractory products include Fire clay bricks, High alumina bricks, Mg-C bricks and Insulation bricks in addition to Refractory castables, Mortar bed materials and Ladle sleeves. Many of these products are in great demand by the steel, cement, glass and ceramics industry, where operating conditions are hostile.

The refractory cluster at Asansol, Purulia and Barakar in West Bengal are well known. This cluster not only manufactures refractory items of value but also provides significant employment opportunities for the local populace.

However, it cannot be denied that all clusters, irrespective of their standard of operation need technology interventions

from time to time. Focus must also be directed to aspects such as access to better raw materials, improved infrastructure, skill up-gradation, better design techniques, reduced wastage, enhanced energy efficiency, better adherence to emission norms, improved products in line with global demands, diversification of products in sync with customer expectations etc., for overall improvement of the cluster.

It is pertinent to note here that in September 2013, CSIR had signed an MoU with the Government of West Bengal for creating a sustainable ecosystem of micro, small and medium enterprises to drive economic prosperity of the state. CSIR-CGCRI was charged with the responsibility of carrying forward the activities as the Nodal Laboratory. Subsequently a Technology Facilitation Centre (TFC) was set up in the institute to facilitate technology interventions by serving as a bridge between the entrepreneurs (existing and aspirants) and research institutions (all CSIR sister laboratories and knowledge partners outside the CSIR network).

The Refractory Division of CSIR-CGCRI has designed a training module with the specific objective of catering to the needs of the Bangabhumi Cluster of Refractory Association. It is in this context that the Training Programme for MSME members of Bangabhumi Cluster of Refractories Association at CSIR-CGCRI assumes great importance.

Acting Director Shri Kamal Dasgupta warmly welcomed the guests and succinctly summed up the activities of CSIR-CGCRI. He said that while CSIR-CGCRI did high science at par with the best anywhere in the world, it was also capable of helping small-scale industries to address their problems. He then gave a brief idea about the reasons behind the setting up of the TFC and invited the guests to visit some of the modern research facilities of CSIR-CGCRI.



Shri Indranil Biswas made a detailed presentation on the MSME activities of CSIR-CGCRI. The guests were visibly impressed to learn that CSIR has a pan-India footprint with 37 laboratories across the length and breadth of the country; each with its impressive arsenal of diverse technologies available for the MSME sector. Shri Biswas walked the guests through the different links of the dedicated website (<http://msmetfc.in>) and emphasized that the entrepreneurs could post comments and/or queries directly under the appropriate links and be assured of a prompt response from the TFC-team.

He stressed the fact that the TFC was empowered to access the technology portfolios of knowledge partners outside the CSIR family too, effectively enormously enlarging the potential of technology access for the benefit of entrepreneurs of West Bengal. This would no doubt help in meeting the mission of achieving technological enablement of West Bengal's small-scale sector. He admitted that technology adoption is a slow process but was optimistic that TFC activities would lead to large-scale technology diffusion and accelerated technology adoption and the impact would be realized as reinvigoration of the small-scale sector and inclusive economic development.

The participants were delighted to learn that this was a Not-for-Profit initiative and so, charges, if any were unlikely to be prohibitively expensive for entrepreneurs of the MSME sector. The lively interactive session highlighted the importance in which the participants held this event.

Dr. (Mrs) Mou Sen, General Manager, District Information Centre (DIC), Durgapur, West Bengal said that the TFC is a bridge between the entrepreneurs and the technology providers. She expressed satisfaction that the response of TFC to a query received was not only swift, but also affordable, because the entrepreneurs in this sector are economically constrained and cannot invest huge amounts. She said the DIC would encourage entrepreneurs to take advantage of the technologies available with government organizations such as CSIR. She

was confident that when a premier organization such as the CSIR comes forward with a technology solution, it is definitely good. Thus, better technology will lead to better products, which will be able to capture the market easily, she said.

The training programme started with a general introduction to refractory raw materials and products followed by refractory properties evaluation and monolithic refractory. The participants of the training programme were exposed to the state-of-the-art characterization facility of the Institute.



Shri Kamal Dasguta presiding over the Inaugural session. Dr Arup Ghosh is on the left

In the Valedictory Session Shri Beni Prasad Biyani, President, Bangabhumi Cluster of Refractories Association profusely thanked CSIR-CGCRI for the excellent training programme which benefitted all the participants. He made a list of different issues on which he sought the assistance of CSIR-CGCRI. He requested CSIR-CGCRI to continue extending its good offices and extension of assistance to address vexing issues as also the development of new products, as and when prompted by market demands.

Shri Biyani hoped that CSIR-CGCRI would help in treating cheap and locally available raw materials available in West Bengal so that these could be used to make better products. There was also a request for CSIR-CGCRI to train groups of entrepreneurs in refractory testing. His wish list of specific areas where CSIR-CGCRI intervention could be profitable included

development of calcined raw materials through rotary kilns; development of low cement and self flow castable; value addition such as silimanite aggregates (not fines which are traditionally used) to make products that could be of economic benefit to the cluster; improvement of indigenous Bauxite to make it high value; Magnesia-Carbon bricks and any other technology development suitable for the cluster and which had a robust local market.

Summing up, Shri Kamal Dasgupta thanked all participants and encouraged them in their efforts. He said in today's economic scenario it was imperative that the initial emphasis should be on innovation that would

create a firm platform for the future. Whatever the scenario, R&D has to continue or the innovation chain would dry up. He suggested that entrepreneurs should use the available knowledgebase to generate income.

He recounted the success stories of CSIR-CGCRI's Naroda Centre which has contributed significantly to the thriving ceramics industry of Gujarat and expressed the hope that history would repeat itself in West Bengal with the sustained intervention by the institute. His final message was that the services of CSIR-CGCRI would always be available for the inclusive development of society and for the assistance of entrepreneurs who approached the institute.

Science Awareness Programmes

CSIR-NEIST organizes Motivation Programme for School Students



Dr. P.C. Neog, Former Chief Scientist of the Institute speaking on the occasion as Chief Guest

A six-day 'Motivational Programme for Talented Students' was organized by CSIR-NEIST, Jorhat during 26-31 May 2014 at its premises. The programme was sponsored and catalyzed by NCSTC, DST, Govt. of

India, New Delhi and attended by 38 class XII science students along with 10 guardian teachers from different schools of Assam, Nagaland and Arunachal Pradesh.

The week-long programme commenced with an inaugural session on 26 May 2014 presided over by Dr. R.C. Boruah, Outstanding Scientist & Director-in-Charge, CSIR-NEIST. Dr. P.C. Neog, Former Chief Scientist, CSIR-NEIST attended the session as Chief Guest while Dr. Pinaki Sengupta, Chief Scientist & Area-Coordinator Materials Science attended as Guest of Honour.

In his address, Dr. Neog emphasized on the need to promote science education among school students especially in the North East region. He encouraged the students to cultivate the quality of public speaking, nurture creativity and an innovative mind right from the school level.

Dr. Pinaki Sengupta gave a short interesting lecture on "Career and Research Opportunities" in his address as Guest of Honour.

Delivering his presidential remarks, Dr. R.C. Boruah, mentioned that the Institute has been organizing motivational programmes since the 1980s, which has benefitted nearly 26000 students. He further urged the students to take full advantage of the programme.

Earlier, Dr. Jatin Kalita, Scientist & Coordinator of the programme spoke in detail about the programme, its objective and the various activities to be held under the programme.

The six-day programme covered a series of activities like popular science lectures delivered by various scientists, science elocution competition among the participating students, face-to-face with scientists, practical project work by students under the supervision of scientists, cultural programme and visit to nearby research Institutes, biosphere reserve spots and ancient engineering heritage sites. The programme concluded with a valedictory session held on 31 May 2014 under the presidentship of Dr. R.C. Boruah where he distributed certificates and prizes to the participants.



Students conducting experiments as part of their project work



Participants of the Motivation Programme along with the organizers

Lectures

11th Atma Ram Memorial Lecture at CSIR-CGCRI

Dr. Sourav Pal, Dr. H.S. Maiti and Shri Kamal Dasgupta (left to right) on the dais

The 65th Foundation Day of CSIR-Central Glass and Ceramic Research Institute, (CSIR-CGCRI), Kolkata, was celebrated on 26 August 2014. CSIR-CGCRI celebrates its Foundation Day with a Lecture series named after Dr. Atma Ram, Founder Director of CSIR-CGCRI and CSIR's fourth Director General.

The 11th Atma Ram Memorial lecture entitled *Chemical Science in Shaping Functional Materials and Technologies of the Future* was delivered by Dr. Sourav Pal, Director CSIR-National Chemical Laboratory, Pune.



Dr. Sourav Pal delivering the 11th Atmaram Memorial Lecture

Dr. H.S. Maiti, former Director, CSIR-CGCRI, a host of other dignitaries, scientists, staff members, and research scholars also attended the programme.

The ceremony commenced with a warm welcome extended by Shri Kamal Dasgupta, Acting Director, CSIR-CGCRI. He was happy to share with the audience some highlights of the Institute's achievements in the year gone by. From increase in the number of research publications to demonstration of products and processes perfected at the Institute, the impact of the list was clear; the Institute was making significant progress in all spheres.

Dr. H.S. Maiti introduced Dr. Sourav Pal and mentioned that the Atma Ram Memorial Lecture had been introduced during the Golden Jubilee celebrations of the Institute, under his Directorship. It was a happy coincidence, Dr. H.S. Maiti said, that Dr. R.A. Mashelkar who had delivered the First Atma Ram Memorial Lecture was from CSIR-National Chemical Laboratory, Pune as was Dr. Sourav Pal.

Dr. Sourav Pal said this was his first formal visit to the Institute and began his talk by appreciating the galaxy of eminent speakers who had delivered the Atma Ram Memorial Talks from this podium. He also said that the subject of his talk had been

chosen in consideration of the fact that there were a substantial number of young research scholars in the audience and he wanted to drive home the point that Chemistry is a central science; central to phenomenal developments in many varied fields such as astronomy, physics, material science, biology, and geology. Chemists, physicists, biologists, and engineers, all study chemistry.

Dr. Pal said that Chemistry had a special place since it is the foundation for Materials Science – an area where CSIR-CGCRI is active. Globally too, the importance of Chemistry is undisputed. The year 2011 was declared *The International Year of Chemistry* to celebrate the achievements of chemistry and its contributions to the world. The year marked the 100th anniversary of the Nobel Prize in Chemistry that was awarded to Marie Curie. Fortuitously it also coincided with the 150th birth anniversary of Acharya Prafulla Chandra Ray—India’s first entrepreneur chemist who called Calcutta, home.

He then treated the audience to a brief idea about the history of Chemistry and introduced them to the pioneers of the field. Interestingly, he mentioned that the world’s first recorded chemist is a woman: a perfume maker named Tapputi. She is mentioned in a tablet dated 2nd millennium BC in Mesopotamia. She distilled essential oils from flowers to make perfume and although she did not understand the chemistry underlying the creation of the products, there was no doubt that she was one of the first chemists of the world.

After her, came many illustrious scientists such as Robert Boyle, Lavoisier, Volta and Dalton to name a few. Incredible advances were made even before J.J. Thomson discovered electrons in 1897. So, apparently Chemistry advanced down the ages even though concepts were firmed up much later. This is what makes Chemistry both a modern as well as an ancient discipline. As it advanced newer discoveries were made in structure (DNA, Collagen etc.) and this in turn enhanced our understanding of the properties of the material studied. No wonder, G. N. Lewis, the well-known American Chemist once defined physical



Shri Kamal Dasgupta garlanded the photo of Dr. Atma Ram

chemistry as encompassing “everything that is interesting.”

Dr. Pal motivated the young researchers in the audience by saying that one’s actions should not be governed by job description. He gave the example of young Michael Faraday who was employed as “chief bottle washer” by the renowned chemist Humphry Davy. To what heights Faraday reached from that humble job needs no reiteration. As Dr. Pal emphasized, no one can stop innovators and science has moved forward thanks to the never say die spirit of such people. One must have scientific temper and follow the scientific method rigorously. He quoted George Whitesides and said that Chemistry moves on two wheels, Curiosity and Utility.

As examples of areas where knowledge of Chemistry could be of use to address burning issues he posed some challenges. Most of the challenges facing society today are related to energy. For example, the challenge of providing inexpensive solar energy. He listed some other equally important areas where Chemistry could provide answers including affordable drugs, carbon sequestration, management of Nitrogen-cycle, clean water technologies, fuel from bio-resources, hydrogen storage, engineering of simulation tools to perfection, chemicals for clean environment, new



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carbon-based electronics materials (graphenes, graphanes), etc. In this context he touched upon the achievements of the CSIR laboratories working in these and other areas.

Dr. Pal said that smart materials are needed to address issues more efficiently. Materials with response sensing and actuating characteristics are the need of the hour. Smart materials can be used in many areas such as food packaging, aerospace and civil engineering to name a few. He said that the

strategic goal of sustainable development is the big picture of Chemistry. He said that the drivers of Green Chemistry and future applications seem like a dream now but there is no doubt that advances in Chemistry will make these come to pass. He advised the researchers to Think Big and to move from understanding molecules to systems. Systems are useful for application he said.

Dr. S.K. Bhadra read out a brief biography of Dr. Atma Ram and also, delivered the eulogy.

20th Dr. J.N. Baruah Memorial Lecture held at CSIR-NEIST



On the dais from left Dr. D. Ramaiah, Director, CSIR-NEIST, Dr. P.S. Ahuja, DG, CSIR and Chief Guest, Mr U.C. Borah, President of Dr. J.N. Baruah Memorial Trust and Assam Science Society, Jorhat, Dr. Sudeep Kumar, Head, PPD, CSIR and Dr. R.C. Boruah, Outstanding Scientist



Dr. P.S. Ahuja, DG, CSIR and Chief Guest delivering the 20th Dr. J.N. Baruah Memorial Lecture at CSIR-NEIST

“The next major step towards sustainable development is to improve the value of our products and services per unit of natural resources employed,” remarked Dr. P.S. Ahuja, Director General, Council of Scientific and Industrial Research (CSIR). Delivering the 20th Dr. J.N. Baruah Memorial Lecture at CSIR-NEIST, Jorhat on the topic “My Tryst with Plant Research”, he talked about the need for translational research for the Industry, Society and Environment as per the main ethos of CSIR.

The lecture was held on 2nd September 2014 in the honour and fond memory of Late

Dr. J.N. Baruah, former Director of CSIR-NEIST and an educationist. The lecture was organized by the Dr. J.N. Baruah Memorial Trust, Jorhat, Assam Science Society, Jorhat Branch in collaboration with CSIR-North East Institute of Science & Technology, Jorhat for spreading awareness about science and technology and to motivate young students to take up science as a career and to encourage scientific research in biology and chemistry in the NER.

Prof. Latha Rangan, Biotechnology

Division, IIT-Guwahati was conferred the Dr. J.N. Baruah memorial award in Biological Sciences for the work “Tapping *Zingiberaceae*: Wilderness to Gene Mining”, while Ms. Smitashki Goswami, Salt Brook Academy, Dibrugarh received the J.N. Baruah Student Fellowship for securing more than 96% marks in HSSLC Exam of SEVA Board. Ms Papori Saikia, a student of Higher Secondary Science was conferred the J.N. Baruah Student Fellowship for the second year grant.



Dr. P.S. Ahuja, DG, CSIR addressing the staff members at CSIR-NEIST. On the dais from left Dr. R.C. Boruah, Outstanding Scientist, Dr. D. Ramaiah, Director, CSIR-NEIST and Dr. Sudeep Kumar, Head, PPD, CSIR

Dr. P.S. Ahuja, Director General, Council of Scientific and Industrial Research during his visit addressed the staff members and students of CSIR-NEIST in a meeting held at the Dr. J.N. Baruah Auditorium within the premises of the laboratory.

Dr. Ahuja emphasized on certain critical issues of the system like upgradation of manpower skills at large in Administration, full implementation of ERP by 2015 in a mission mode, generating balance sheet through ERP with more emphasis on Purchase and Finance and requested to focus on the ethos of the Council like technology/product/process development for Industry, Society, Environment and to some extent for strategic sector leading ultimately to translational research.



Dr. Sudeep Kumar, Head, PPD, CSIR addressing the staff members at CSIR-NEIST

The meeting started with welcome remarks by Dr. D. Ramaiah, Director, CSIR-NEIST. Dr. Sudeep Kumar, Head, PPD, CSIR also addressed the gathering on the occasion.

Exhibition**Lab-to-Land Exhibition Organized by CSIR-NEERI**

A Lab-to-Land Exhibition was organized at CSIR-National Environmental Engineering Research Institute, Nagpur during 12-14 July

2014 to showcase the significant achievements/activities of the Institute. Information about those technologies and processes was disseminated that have been implemented or are ready to implement in the interest of environment and society. The objective of this exhibition was to provide information on environmental science, engineering and technology to the general public and students.



Dr. Satish R. Wate, Director, CSIR-NEERI explaining to the Minister for Road Transport, Highways & Shipping Shri Nitin Gadkari about CSIR-NEERI's initiatives and achievements for potable water in the country

Thirty-four achievements, covering research and development in various areas of environmental science and engineering, were exhibited through information panels in the exhibition. Various technologies were depicted under the themes "Clean Air Mission", "Clean Water Mission", "Waste to Wealth", "Transformation of Barren Lands into Productive Lands", "Wastewater Treatment, Recycle and Reuse", "Renewable Energy", "Ecosystem Restoration", including prediction of air, water and noise environment through modeling studies.



Dr. (Mrs) Asha Juwarkar, Chief Scientist & Head, Eco-System Division, CSIR-NEERI briefing Dr. R.A. Mashelkar about ecosystem restoration

Hon'ble Minister for Road Transport, Highways & Shipping Shri Nitin Gadkari and Dr. R.A. Mashelkar, former Director General, CSIR also visited the Lab to Land Exhibition during their visit to the Institute on 12th July 2014. Shri Gadkari took keen interest in the achievements of the Institute, in particular the activity related to production of biodiesel from microalgae. He interacted with the Director, CSIR-NEERI and scientists. Dr. Mashelkar also visited various R&D facilities of the Institute.



A view of the Lab to Land Exhibition



Dr. R.A. Mashelkar visiting the 'Water for Crops' facility at CSIR-NEERI

Honours & Awards

CSIR-CGCRI Scientist becomes Fellow of Royal Society of Chemistry, London



Dr. Goutam De, Chief Scientist and Head, Nanostructured Materials Division, CSIR-CGCRI has been admitted as a Fellow of The Royal Society of Chemistry, London.

Dr. De has also won the National Research Award in Nano Science and Technology for the year 2014 from Nano Mission, DST, Govt. of India. The award was conferred on him in the International Conference on Nano Science & Technology (ICONSAT-2014) during 3-5 March 2014 at the Institute of Nano Science and Technology (INST), Mohali, Chandigarh.

Earlier, Dr. De had received the MRSI-ICSC Superconductivity & Materials Science Annual Prize for the year 2014 in the Annual General Meeting of Materials Research Society of India during 12-14 February 2014 at Bangalore. Dr. De has also been inducted as Associate Editor, *Journal of Materials Chemistry A*, which is a high impact journal of the Royal Society of Chemistry. Dr. De has made outstanding contributions to the advancement of the science and technology



Dr. Gautam De second from left with Prof. C.N.R. Rao (left) and Dr. T. Ramasami, Secretary DST/DSIR and Prof. Arun Kumar Grover, VC, Punjab University, Chandigarh on extreme right after he received the National Research Award in Nano Science & Technology for 2014

of the functional nanocomposite coatings on the surfaces of plastics, metal and glass substrates

CSIR-CLRI Scientist Conferred Fellowship of The Royal Society of Chemistry

Dr. J. Raghava Rao, Chief Scientist and Head, Chemical Laboratory, CSIR-Central Leather Research Institute (CSIR-CLRI), Chennai, has been admitted as a Fellow of The Royal Society of Chemistry (FRSC), London, UK for his significant contributions in the area of leather science and technology through green chemistry approach. [a](#)

Dr. Rao's research activity, spanning over two decades mainly focused on chrome management in leather processing; bio-based leather processing; cleaner leather processing; secured utilization of solids waste; zero discharge concepts; bioaccumulation of chromium from wastewaters; development of eco-benign leather chemicals; renovation technologies

in leather processing; wastewater treatment through bio-adsorption, molecular level understanding of tanning; novel composite materials, green chemistry approach for leather processing; development of natural colors on leather using natural dyes and recovery of value added products from wastewaters.

Dr. Rao is Fellow of Indian National Academy of Engineering (FNAE), Andhra Pradesh Akademi of Sciences (APAS) and member of various professional bodies, both India and abroad. He has received several awards and honours including Indira Gandhi Paryavaran Purashkar Award for Environmental Protection, Govt. of India; Biotech Product & Process Development &



Commercialization Award, Department of Biotechnology, Govt. of India, Tamil Nadu Scientist Award (TANSA) in the field of Engineering and Technology; NRDC and WIPO award for the best patent invention and has been selected for CSIR-DAAD Fellowship.

Dr. Rao has served as a member of various research and advisory committees such as Value Based Management task force on Environment; Environmental Research Committee, Ministry of Environment & Forests, Govt. of India, and was convener for Environmental Management Committee, Council for Leather Exports, India.

Dr. Rao has taught generations of students for their Masters and Bachelors

programme in Leather Technology and guided several students for their Bachelor and Postgraduate thesis. Under his guidance, 8 students have been awarded Ph. D degrees.

He has published more than 215 papers in peer-reviewed journals of national and international repute. He has been granted with 19 patents, including 7 US patents and has successfully commercialized 3 patents. He is the first Indian Editorial Board Member of the prestigious journal in leather science and technology, *Journal of the American Leather Chemists Association*. He has also developed some products and process technologies and also transferred the know-hows to the user industry.

Dr Pijush Pal Roy receives the Life-time Achievement Award of MEAI at New Delhi

Dr. Pijush Pal Roy, Director (Acting), CSIR-CMERI and Outstanding Scientist of CSIR-CIMFR received a Life-time Achievement Award on 21 June 2014 at the India Interna-

tional Centre, New Delhi. The award ceremony was organized by the *Indian Mining & Engineering Journal* in association with FICCI, MEAI and AKS University (the Knowledge Partner) during a two-day seminar 'SDMinER-2014'.

Dr. Pijush Pal Roy received the award from Shri P.K. Lahiri, IAS (Retd.), Chairman, Executive Board of ISM and Shri S. J. Sibal, Former Director General of Mines Safety at New Delhi.

The award was presented to Dr. Pal Roy in recognition of his innovative work in the area of rock excavation technology, basic and applied research in explosive applications, cost optimization in blasting and Highwall mining spanning nearly three decades of dedicated efforts. Recipient of several national awards, Dr. Pal Roy is known globally in blasting research.



Dr Pijush Pal Roy, receiving the Life-time Achievement Award from Shri P.K. Lahiri and Shri S. J. Sibal

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