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In This Issue

In The News

CSIR-NIO Study Contradicts Reports of Large Greenhouse Warming Potential of Indian Dams

A recent study by scientists of the CSIR-National Institute of Oceanography (NIO), Goa has refuted claims by a Brazilian research team that Indian dams were contributing around 33.5 million tonnes of methane to the corpus of greenhouse emissions. The results, published in the journal Environmental Monitoring and Assessment demonstrate that methane emission to the atmosphere from Indian dam-reservoirs had been greatly overestimated and that the hydroelectric power in the country appears to be quite green.

It has been realized lately that freshwater reservoirs created through construction of dams across rivers accumulate large amounts of methane. Methane is approximately 25 times more powerful as a greenhouse gas than carbon dioxide. A study by Ivan Lima and his colleagues from Brazil's National Institute for Space Research raised alarms that annual methane emissions from dam-reservoirs in India were estimated to be around 33.5 million tonnes. However, the study was based on estimates as there were no real data then available on methane concentrations from any Indian freshwater reservoir.

Scientists of the CSIR-NIO have now provided the real numbers that refute the alarming claims of the Brazilian study. Led by Gayatree Narvenkar, the CSIR-NIO team has made fairly extensive measurements of methane in eight dams-reservoirs spreading across India from the Western Ghats (Selaulim, Supa, Tillari, Koyna and Markandeya) to the central Indo-Gangetic Plain (Rihand) and the foothills of the Himalayas (Bhakra Nangal). Measured dissolved methane concentrations were found to be substantially lower than assumed in the Brazilian study.

Moreover, accumulation of methane generally occurred below the depths of water intake for power generation and irrigation, and methane concentrations were invariably very low in the well-oxygenated surface layer indicating insignificant emission flux. The study concluded that most of the methane produced in Indian reservoirs is converted to carbon dioxide by methane oxidizing micro-organisms (methano-trophs).

Automated System for Detection of Adulterated Milk (Ksheer-Scanner) Developed by CSIR-CEERI

An embedded system for detection of adulteration in milk based on electrochemical method has been developed by scientists of the CSIR-Central Electronics Enegineering Research Institute (CEERI), Pilani.

Ksheer-scanner

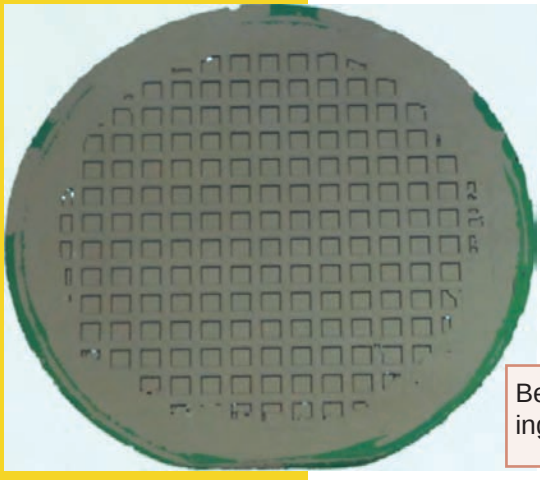
The system, named 'Ksheer-Scanner', is capable of detecting adulterants such as urea, salt, detergent, liquid soap, boric acid, caustic soda, soda and hydrogen peroxide in milk. The system is suitable for installation at village milk collection centres and has been successfully tested at various dairies located in Rajasthan, Uttar Pradesh and Haryana.

CSIR-CEERI has also signed a non-disclosure agreement with Rajasthan Electronics and Instruments Limited (REIL), Jaipur for field-testing the system. Some of the field trials were conducted jointly with REIL.

The specially designed hardware of 'Ksheer Scanner' is efficient in detection of adulteration in raw milk. It has dedicated software modules for signal acquisition, control, analysis and display and a user-interactive menu-driven software for calibration.

Among the many benefits 'Ksheer Scanner' offers is real-time automated scanning of raw milk samples at milk collection points. It is safe to use and is ideal for a dairy, milk society or other agency.

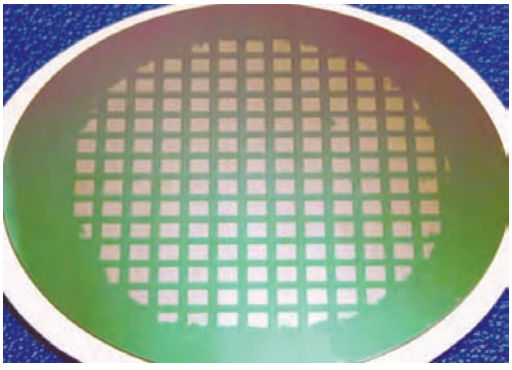
CSIR-CEERI Develops Acoustic Sensor for Launch Vehicles



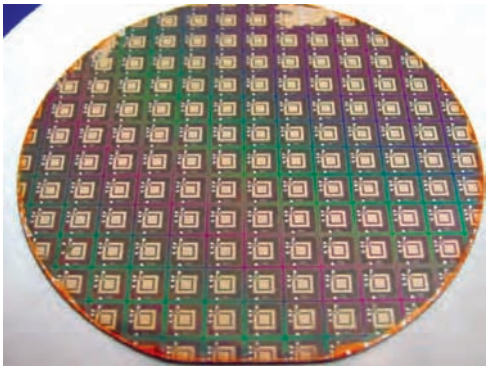
Before bulk-micromachining of silicon

An acoustic sensor exhibiting enhanced sensitivity, fabricated at CSIR-CEERI, will be used in the next generation PSLV/GSLV missions. The sensors have been fabricated after integrating the piezoelectric zinc oxide (ZnO) thin film with silicon micro-electro-mechanical system (MEMS) having pressure compensation tunnel.

The sensor structure comprises silicon diaphragm loaded with a layered structure where a highly *c*-axis oriented ZnO thin film fabricated by RF magnetron sputtering, has been sandwiched between PECVD deposited silicon dioxide layers. The pressure compensation in the developed acoustic sensor is achieved using a tunnel in the MEMS structure. The response

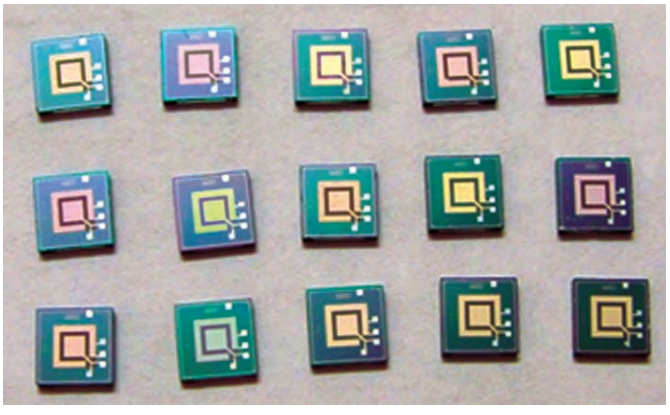


(a) After bulk-micromachining of silicon

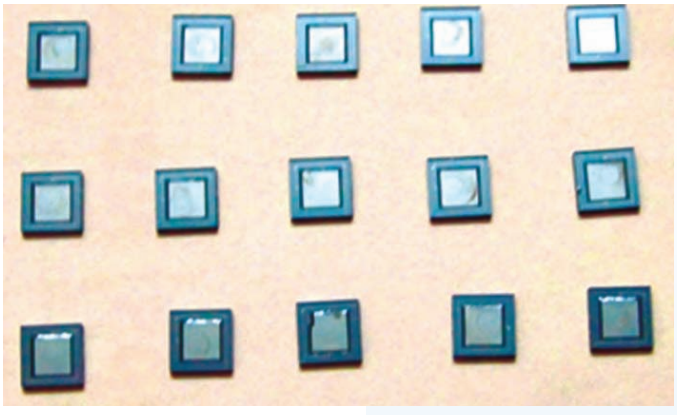


(b) Fabricated ZnO based MEMS acoustic sensor

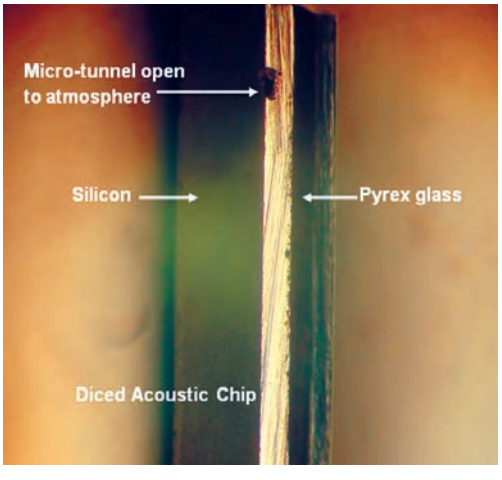
Four inch process wafers of improved ZnO based MEMS acoustic sensor



Front view of diced MEMS acoustic chips



Back view of diced MEMS acoustic chips



Micro-tunnel opening of fabricated acoustic chip

characteristics of the acoustic sensors are reproducible for the devices prepared under similar processing conditions under different batches.

CSIR-CEERI supplied a batch of 110 MEMS acoustic sensor chips to the Vikram Sarabhai Space Centre (VSSC), Indian Space Research Organisation (ISRO), Thiruvananthapuram. The chips have been space qualified by VSSC and will be used in the next PSLV/GSLV missions.

The devices having sensitivity of 300 mV/Pa are used to measure the sound pressure level (SPL) in the range of 120 dB to 180 dB during launching. The frequency range of the device is 30 Hz to 8 kHz.

R&D Highlights

Controlled Demolition of Coffer Wall of Teesta Low Dam Project, Stage-III of NHPC Limited, by CSIR-CIMFR

The National Hydroelectric Project Corporation (NHPC) Limited, a Government of India undertaking, constructed a 132 MW Hydroelectric Project in West Bengal, Darjeeling District on river Teesta. The barrage site is 7.2 kilometres downstream of Teesta river and the powerhouse is at 100 metres downstream of barrage axis on the right bank. The project was designated as Teesta Low Dam Project, Stage-III.

The project component comprised Barrage and Spillway, Intake, Penstocks, Surface Powerhouse, Tail Channel, Pot Head Yard and other associated civil works. To facilitate the construction of barrage and spillway, a concrete coffer wall was constructed on the upstream of the barrage. One end of the coffer wall abutted the barrage pier and the other end to the left bank onto the cellular wall. Since the project was shortly to be commissioned, it was therefore proposed to dismantle the concrete coffer wall before impounding of reservoir by drilling and blasting method. For the safety of the main structures (barrage pier and cellular wall), controlled blasting was essential for the demolition of the coffer wall.

Since the project was shortly to be commissioned, it was therefore proposed to dismantle the concrete coffer wall before impounding of reservoir by drilling and blasting method.

CSIR- Central Institute of Mining and Fuel Research (CIMFR) undertook the demolition task and carried out stage-wise demolition with assured safety to the nearby structures viz. Barrage, Spillway, Intake, Penstocks, Surface Powerhouse, Tail Channel, Pot Head Yard etc. Controlled blasts were conducted for the demolition work. Ground vibrations generated by blasting were monitored at different critical locations of the dam structures. Ultrasonic pulse velocity measuring Instrument was used to detect any structural damage caused by blasting.

Teesta Low Dam Project (Stage-III)

Teesta River has vast hydro potential in West Bengal as well as in Sikkim. In Sikkim, cascade development in six stages totaling over 3635 MW has been made. NHPC commissioned first of the six projects namely 510 MW Teesta V near Singtam in Sikkim in 2008. In West Bengal, Central Water and Power Corporation (CPWC) identified a hydro potential of 900 MW during 1960-63 using 90 metres high dam near Geil Khola, 25 kilometres upstream of coronation bridge. But this scheme was not pursued due to large submergence area in West Bengal and Sikkim. All these schemes were planned as cascade development in order to avoid the submergence problem and other environmental issues.

As an alternative to utilize the potential of Teesta basin. four projects were conceived by the West Bengal State Electricity Board (WBSEB) in cascade. These are referred as Teesta Low Dam Projects. The first two projects are Stage-I (40 MW) & Stage-II (60 MW) on Rangit River and their left bank falls in Sikkim, before its confluence with Teesta River Melli. The other two, namely, TLDP Stage-III (132 MW) & Stage-IV (160 MW) are on Teesta River located at Rambi and Kalijhora respectively, entirely in West Bengal, which are in active operational stage. The annual energy generation in 90% dependable year for the project is 594.07 MU. Considering unit cost of ₹ 2.52, the total revenue earned shall be ₹ 149.70 crores.

What is Coffer Wall?

A coffer wall is constructed (upstream and downstream) in the river bed to cut off the flow and also to divert the surface flow in the diversion path. It is basically required to facilitate the construction of barrage and spillway. M/s NTPC constructed the concrete coffer wall at Teesta Low Dam Project, Stage-III on the upstream of the barrage whose one end adjoined the barrage

View of coffer wall from the upstream side of the river

View of coffer wall from top of the Dam

pier and the other end was abutted to the left bank onto the cellular wall.

Dimension and Material Composition of the Coffer Wall

The coffer wall was made of cement concrete monolithic structure, trapezoidal in section where the width at the top was 1.5 metres and at the base was 13.875 metres. The total length was 56 m and its height was 16.5 metres. The total cross-sectional area of the coffer wall was 126.84 m^2 and the total volume was 7,103 m^3 approximately.

Structures near the Coffer Wall

The important structures that required protection from blast-induced ground vibrations during demolition were barrage pier (P-22 pier) and cellular wall. These two structures were abutted to the coffer wall. Barrage pier (P-22 pier) was located on the right flank of the coffer wall, whereas the cellular wall was located on the left bank. The barrage piers are made of reinforced cement concrete.

The heights of all the piers and cellular walls averaged between 28 to 30 metres. Apart from these two permanent structures, an operating crane was located just in front of the coffer wall, on the upstream side of the river. The flying fragments as well as throw of the blasted material could damage this crane. Therefore, the management was advised to remove the crane before the blasting operations commenced.

Sensitivity of the Work

As the coffer wall required to be dismantled was a massive monolithic concrete structure of 56 metres length in the shape of trapezoidal section with top width 1.5 metres, bottom width 13.87 metres and height 16.5 metres, it was a very sensitive job to execute the operation using explosives. It required judicial implemen-tation of blast design patterns and delay arrangements so that the important close-by structures like the barrage piers and cellular wall remained intact and at the same time complete control over flyrock and air overpressure could be maintained. Slight carelessness could lead to many unsavory situations.

Blast Design Patterns for Controlled Demolition

For controlled demolition of the coffer wall, maximum precaution was made for minimizing the magnitude of ground vibrations to the cellular wall and Pier No. 22, which were abutted to the coffer wall In order to control ground vibration, the blasthole diameter used was 32 millimetres, drilled with jack hammers. In the initial stage of the demolition work, blasthole depth used varied between 0.75 and 1.52 metres. Due to the height of the coffer wall, the excavator,could not remove the blasted materials from the blasting site and therefore they were removed manually. For that reason, smaller burden and spacing were used in the initial trials so that maximum blasted material could be thrown towards the upstream side. At the same time, the smaller fragments which were left out could be removed easily by manual labourers.

Initially, for 0.75 metres burden, the blasthole depth varied from 0.60 to 0.7 metres, whereas for 1.5 metres blasthole depth, it varied from 0.8 to 0.9 metres.

It was a very sensitive job to execute the operation using explosives. It required judicial implementation of blast design patterns and delay arrangements so that the important close-by structures like barrage piers and cellular wall remained intact.

Spacing between holes for 1.5 metres blasthole depth varied from 0.9 to 1.0 metres. The number of holes varied from 25 to 32. The specific charge factor varied from 0.60 to 0.67 kg/m^3. Explosive charge per hole for 0.75 metres blasthole depth was 250 gram and for 1.5 metres depth, it was 625 gram. The total explosive charge varied from 5.0 to 13.125 kilograms. Maximum explosive charge per delay varied from 2.5 kilograms to 7.125 kilograms.

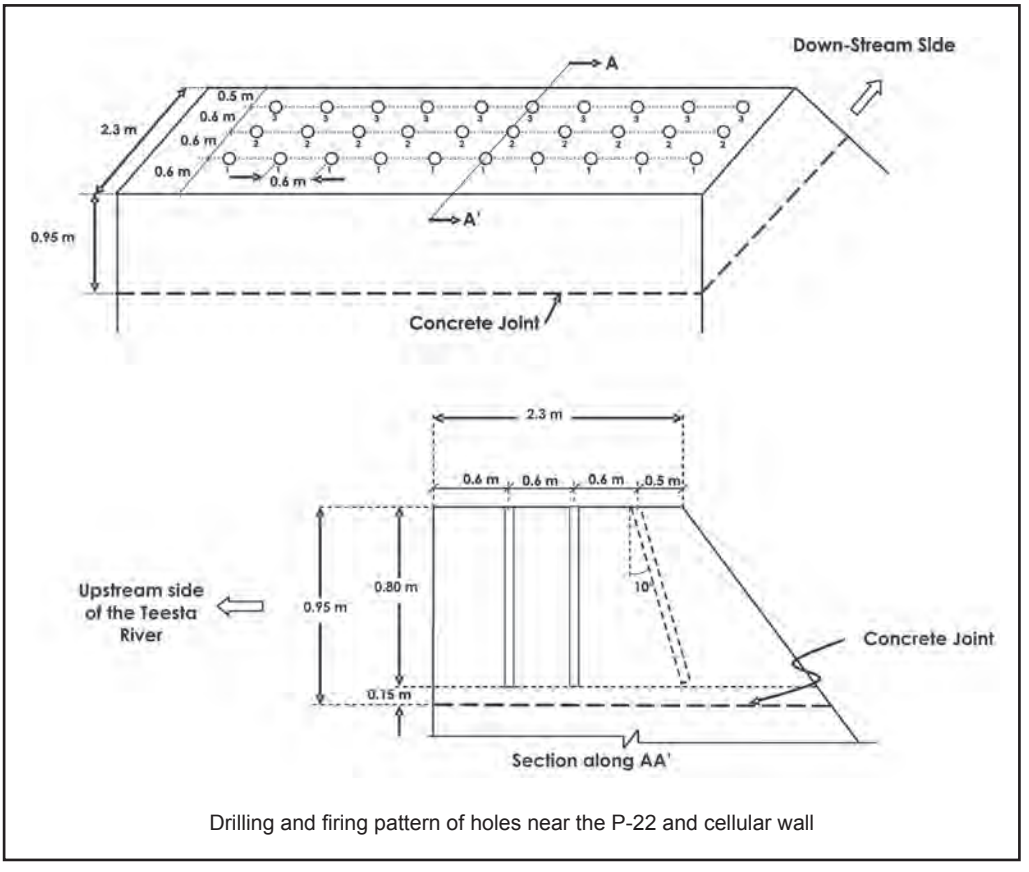
Based on the results of ground vibration monitoring, the number of holes were increased for faster progress of the demolition work. The total number of holes in a round of blast varied between 40 and 60. The total explosive charge in a round of blast varied between 10.0 and 37.50 kilograms. Maximum explosive charge per delay varied from 2.50 to 12.50 kilograms. Due to the presence of concrete joints in the coffer wall, larger blasthole depth could not be used while blasting with electric detonators. The blasthole depth was restricted by the concrete thickness. A parting of about 15 to 20 centimetres was left between the blasthole bottom and the concrete joint.

During the advancement of the blasting process, the coffer wall encountered increasing width. When the width of the coffer wall was more (≥ 6 metres), it was advised not to blast the whole width at a time. The number of rows of blastholes was restricted according to the blasthole depth realising the possibility of increased impacts of ground vibration and flyrock.

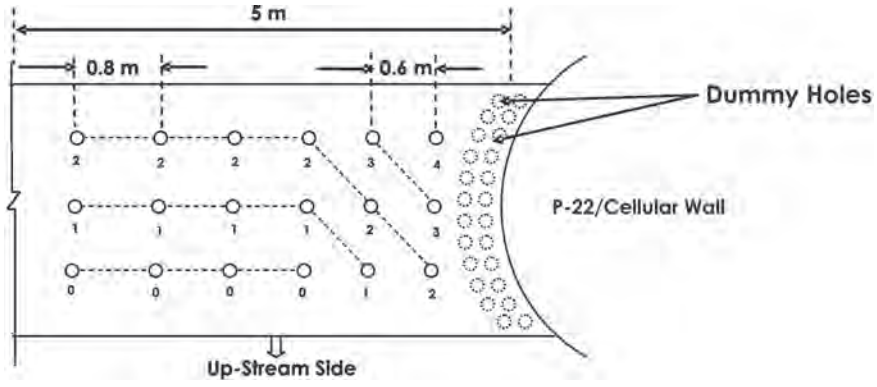
Controlled Blasting Closer to P-22 & Cellular Wall

Apart from the precautionary measures taken for the safety of P-22 and cellular wall, an additional measure was taken when conducting controlled blasting closer to these two structures. Controlled blasting very near to the cellular wall and P-22 was termed as 'Cautious Blasting'.

For cautious blasting near the cellular wall and P-22 (5 metres distance), the number of holes as well as explosive charges near these two structures were controlled judiciously in order to prevent any possible chance of structural damage. The following precautions were taken while blasting near

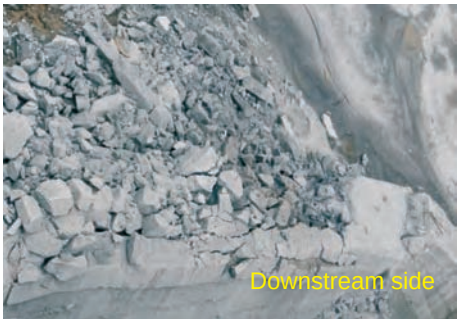


Drilling and firing pattern of holes near the P-22 and cellular wall



Drilling and firing pattern of holes near the P-22 and cellular wall

(a)



(b)

(c)

Breakage patterns (no material was thrown into the downstream side)

(a) P-21

(b) Cellular wall

(c) Extension Joint of P-22

Monitoring of ground vibration at different locations

the cellular wall and P-22.

The design patterns were set in such a manner that no blasted materials could go towards the down-stream side (i.e. towards Pier No. 21) and at the same time, proper breakage was maintained.

Results of Ground Vibration & Sonic Wave Velocity

The level of ground vibrations recorded on top of P-22 varied between 2.02 and 13.1 mm/s. The distance of vibration monitoring points at the top of P-22 from the blasting sites (i.e. coffer dam) varied between 8.5 and 36 metres. The dominant frequency of the vibration varied from 20.4 to 64.0 Hz.

On the cellular wall, the level of ground vibration varied from 0.93 to 4.33 mm/s. The distance of vibration monitoring points on the cellular wall from the blasting site varied between 28 and 36 metres. The dominant frequency of ground vibrations varied from

(a) On top of P-22

(b) Bottom of P-22

Measurement of P-wave velocity before the start of blasting operations

(a) On top of cellular wall

(b) On top of P-22

Measurement of P-wave velocity after the demolition of coffer wall

12.4 to 17.9 Hz. All the recorded vibration data were well within the safe limits.

P-wave velocities were measured at P-22 and cellular wall both before and after the demolition of the coffer wall. There were no changes before, during and after the completion of the demolition work .

This proved that no structural damage induced by blasting occurred in P-21, P-22 and the cellular wall due to ground vibrations, as shown below.

Successful completion of the demolition work of the coffer wall whose one end adjoined the barrage pier and the other end

Table 1: P-wave velocities measurement at different locations of P-22 and Cellular Wall before Blast and After Blast

Sl. No.	Location of Measurement	Average P-Wave Velocity		
		Before Blasting Operation (07-07-2012)	During Blasting Operation (01-10-2012)	After Blastin Operation (07-12-2012)
1	Top portion of P-22	1924 m/s	1925 m/s	1925 m/s
2	Bottom Portion of P-22	1903 m/s	1904 m/s	*
3	Top Portion of Cellular Wall	1912 m/s	1910 m/s	1912 m/s
4	Bottom Portion of Cellular Wall	1909 m/s	1910 m/s	*

*Measurement could not be taken due to impoundment of water after completion of the demolition work

abutted to the left bank onto the cellular wall.

Conclusions

Ground vibrations were measured at different locations near the coffer wall. For monitoring of ground vibrations, maximum importance was given to P-22 pier and cellular wall as these two structures were abutted to the coffer wall. The distance of monitoring points from the blasting locations varied between 8.5 and 105 m. The magnitude of ground vibration varied from 0.93 to 13.1 mm/s. The dominant frequency of vibration varied from 12.1 to 85.0 Hz. P-wave velocity measurements (both before and after demolition) indicated that no fissure/crack was generated on such structures due to blasting of the coffer wall. Delay arrangements were designed in such a manner that the blasted materials were thrown towards the upstream side of the coffer wall. Flyrock was completely controlled with proper stemming of the blastholes using pieces of water-soaked jute bags, mixed with clay soils.

Systematic planning and judicious implementation of controlled blast design patterns executed by the Scientists of the Blasting Department of CSIR-CIMFR resulted in the barest minimum ground vibration levels to the adjoining structures and successful completion of the demolition works.

(a) Cellular wall and barrage pier

(b) Impoundment of water

Total view after complete demolition of the coffer wall

Workshops

Workshop on the Application of Formal Methods to Aircraft Industry conducted at CSIR-NAL

CSIR-National Aerospace Laboratories (NAL) has recognized the challenges faced in using formal methods as a key component in software development for the aircraft. In order to meet these challenges and achieve ultra-high reliability in both the software and hardware components, a research programme has been initiated. As a first step, a one-day workshop focussing on the application of formal methods to aircraft industry was organized at CSIR-NAL on 8 April 2013.

Employing formal methods enables a more comprehensive understanding of

- The methods/approaches and standards
- Analysis of requirements and design
- System behavior, including fault conditions
- Safety of critical systems

Mr. Shyam Chetty, Director, CSIR-NAL inaugurated the workshop. His address covered many important points such as advantages of formal methods for aerospace software development, including the evidence of the reliability claims that can be subjected to external scrutiny. Formal modelling and verification lead to deeper

understanding and higher consistency of specification and design than informal or semi-formal methods that are in use. Formal method tools allow comprehensive analysis of requirements and design and complete exploration of system behaviour, including fault conditions. They provide a disciplined approach to analysing complex safety critical systems.

Mr. K.G. Venkatanarayana, Head, ALD, in his address mentioned that the goal of the workshop is to create awareness about the importance of software engineering processes, use of formal methods and model-based design and development, various challenges faced by industry and how it is used by aerospace industry elsewhere. He thanked both sponsors M/s LDRA and M/s Esterel technologies.

Dr. Shyamasundar, TIFR, gave the introductory key note address. He mentioned the importance of formal methods in the design and development of safety critical applications. The audience was mesmerized by the insightful talks.

Ten renowned speakers from across the globe shared their expertise on the use of formal methods. The workshop had participants from organisations such as ABB Corporate, ADA, ADE, DARE, HAL, HCL, CDAC, CMC, Esterel, EADS, Honeywell, ISRO, M/s ComAvia Systems Technologies, Mahindra Aerospace, Prodigy Solutions, RayanTechnologies, RCMA Helicopter, Siemens, CEMILAC, UTC aerospace, Airforce SDI, Dassault Systems and students from different colleges.

The workshop concluded with a road map shared by Mr. S. Ramesh, Technical Fellow at General Motors Global R&D, USA, and an adjunct faculty at IIIT, Bangalore. Director, CSIR-NAL advised ALD to organise more such events by forming a special interest group and carry forward with research on formal methods.

Glimpses of the Workshop

Workshop for Betelvine Farmers held at CSIR-NBRI

A one-day workshop for betelvine farmers was organized on 28 March 2013 at the Banthra Research Station of CSIR-National Botanical Research Institute (NBRI), Lucknow. About 250 farmers from different districts of Uttar Pradesh participated in the workshop.

This year, due to excessive cold, there was serious damage to the betelvine crop leading to severe shortage of planting material of betelvine ion. CSIR-NBRI has decided to provide the planting material of betelvine to betelvine farmers, for which the workshop was organized.

Mr. P.L. Punia, Member of Parliament and Chairman, National Commission for Scheduled Castes, Govt. of India, was the Chief Guest of the function. Dr. C.S. Nautiyal, Director, CSIR-NBRI welcomed the Chief Guest. Good quality of planting material of betelvine, produced by the Institute, was distributed to the farmers by the Chief Guest, who also inaugurated the newly constructed betelvine conservatory and nursery, developed by CSIR-NBRI, and transplanted the betelvine plant in it.

Addressing the farmers, Dr. C.S. Nautiyal, Director, CSIR-NBRI said that CSIR-NBRI is determined to work for the benefit of betelvine farmers and would constantly work for their welfare.

Mr. P.L. Punia, in his address, highlighted the religious, cultural, social and economic importance of betelvine in India and expressed serious concern over the diminishing area and production of betelvine crop and pathetic condition of betelvine farmers. He appreciated the efforts of CSIR-NBRI for the benefits of the betelvine farmers.

Mr. Chhote Lal Chaurasia, General Secretary, Akhil Bhartiya Chaurasia Mahasabha, while discussing the economic condition of betelvine farmers of Uttar Pradesh said that the efforts of CSIR-NBRI will prove to be a milestone for betelvine farmers and will play an important role in cultivation and conservation of betelvine.

Meetings

CSIR-CIMFR Scientist Presents *Status of Coal Bed Methane and Underground Coal Gasification in India* at Beijing

The Bureau of Indian Standards, New Delhi and CSIR-Central Institute of Mining and Fuel Research (CIMFR), Dhanbad jointly deputed Dr. Ashok Kumar Singh, Principal Scientist and Head, Coal Petrology and Coal Charactersation Sections, CIMFR-Digwadih Campus, Dhanbad for ISO/TC263 meeting at Beijing, China to present a report on the *Status of Coal Bed Methane and Underground Coal Gasification in India*.

Status report was presented by delegates of different 'P' member countries including China, South Africa and Germany. In his report, Dr. Singh informed that India's CBM production is estimated to reach 4 million standard cubic meters per day (mmscmd) by 2016-17 as compared to the current level of 0.23 mmscmd. Total CBM

Dr. A.K. Singh presenting status report on CBM and UCG in India at Beijing, China

production in India (up to February 2012) was 74.833 mmscmd. The total coal resource of India was 294 BT (GSI, 2012) and most of the Indian coal bearing basins havee good potential resource of CBM. Prognosticated CBM resource of India (DGH) is about 1000 BCM. Other gas resources such as Coal Mine Methane (CMM), Abandoned Mine Methane (AMM) are in initiation phases and hold excellent potential.

He also highlighted the efforts being made for speedy exploration and exploitation of coal Bed Methane (CBM) reserve in the Coal basins. The CBM as well as CMM are still one of the greatest pollutants and cause greenhouse effect in several parts of the world. Global efforts are trying to trap these gases from the coalfields before the exploitation starts. Coal India Limited's subsidiaries like CMPDIL and others like DGH, ONGC, GSI, and CIMFR among government agencies and Reliance, ESSAR, GEECL, and several other private/ multinational agencies are already on the job for efficient and speedy exploitation of CBM from various coalfields.

Training Programmes

Three-day National Training programme on *Chemical Informatics in Biological Research* held at CSIR-NEIST

Dr. R.L. Bezbaruah, addressing the gathering. Also seen seated on the dais is Dr. R.C. Boruah, Acting Director.

A National Training programme on Chemical Informatics in Biological Research was successfully organized during 26-28 February 2013 at CSIR-North East Institute of Science and Technology (NEIST), Jorhat. The programme was sponsored by the Department of Biotechnology (DBT), Govt. of India.

The goal of the workshop was to disseminate and explore knowledge on Cheminformatics among biology students and emphasize the importance of computer application in modern biological research. Twenty-two participants from Dibrugarh University, Tezpur University, Bahona College and D.R. College and also four students from CSIR-NEIST participated in the workshop.

The training started with a brief inaugural function, presided by Dr. Romesh Chandra Boruah, Acting Director of CSIR-NEIST. Dr. T.C. Bora, Chief Scientist & Head, Biotechnology Division in his welcome speech emphasized the importance of Bioinformatics in the study of modern Biology. Dr. R.L. Bezbaruah, Head, I&BD Division and Coordinator of the BIF Centre spoke briefly on the scope of the programme. Prof. R.C. Deka from Tezpur University and Dr. M.J. Bordoloi, Scientist of NEIST delivered talks on *Chemical Informatics in Drug Designing* and *Phyto-chemical Screening*, respectively.

The hands-on training was conducted in the second half of the day on the topic *Retrieval of Journals and Informatics using online Search Engines* by Dhrubajyoti Gogoi.

The second day of the workshop started with lectures on *Molecular Dynamics and Bioprogramming in Cheminformtics* delivered by Dr. Rajeev Sarmah and Mr. Subrata Sinha,

Assistant Professors from Bioinformatics Department of Dibrugarh University. They shared their computational expertise with participants followed by a practical session with special focus on Biojava.

On the last day, Dr. Pankaj Chetia, Research Associate from Assam University delivered a speech on *Computer-aided Drug Design in Cheminformatics*. During the practical session in the first half, Dr. Chetia taught many Cheminformatics tools such as Autodock Vina, PharmaMapper, Openbable and some CADD web servers.

A Valedictory Function was held to conclude the programme which was chaired by Dr. Romesh Boruah, Acting Director, CSIR-NEIST. He emphasized the necessity of such training programmes in the present day context and encouraged the students.

Foundation Day Celebration

CSIR-Indian Institute of Chemical Biology

CSIR-Indian Institute of Chemical Biology (IICB), Kolkata celebrated its 57th Foundation Day on 2 April 2013 at its Dr. J.C. Ray Memorial Auditorium. Prof. Samir Bhattacharyya, Emeritus Professor, Visva-Bharati and former Director, CSIR-IICB, Kolkata was present on the occasion as the Chief Guest. Prof. Avadhesha Surolia, Professor of Biophysics, IISc, Bangalore and former Director, NII, New Delhi delivered the 25th Dr. J.C. Ray Memorial Lecture. Prof. Siddhartha Roy, Director, CSIR-IICB presided over the function.

Prof. Roy, in his welcome address, talked about the achievements of the institute. The younger generations have to take more responsibility to exceed our predecessors with more exciting and challenging scientific works, Prof. Roy added.

Dr. Tarun Kumar Dhar, Chairman, Organizing Committee also talked about CSIR-IICB's scientific contributions for the national interest. He also mentioned that the Institute was established in 1935 as the Indian Institute of Medical Research and later the name was changed to Indian Institute of Experimental Medicine. In 1982, the name was further changed to Indian Institute of Chemical Biology. He also mentioned that, as a fundamental research institute, the scientific contributions of this institute were always very high.

Prof. Samir Bhattacharyya, Chief Guest on the occasion, mentioned that he was overwhelmed after receiving the invitation for delivering the keynote address on this occasion where once he worked as a PhD student and later as Director only a few years back. Prof. Bhattacharya mentioned that among the CSIR laboratories CSIR-IICB has always maintained a consistent record of growth with a cordial working environment by means of pleasant relationship among the staff members. He expressed satisfaction that CSIR-IICB's scientists had many scientific contributions to their credit.

Mementoes were presented to staff members who had completed 35 years of service. A special memento was also awarded to Scientists who had obtained various National Honours and Awards during the last one year. Special prizes were given to the members of CSIR-IICB card team for wining the CSIR Hussain Zahir Memorial Bridge Tournament, 2012.

Prof. Avadhesha Surolia, Professor of Biophysics, IISc, Bangalore and former Director, NII, New Delhi delivered the 25th J.C. Ray Memorial Oration in the topic entitled *A new physical form of Insulin for a long lasting treatment of diabetes*. He talked about his work on development of a novel form of insulin for diabetics in which a single shot could help maintain near normal blood sugar levels for three to four months.

The function was graced by invited guests, distinguished scientists, employees, ex-colleagues and students.

The Institute was established in 1935 as the Indian Institute of Medical Research and later the name was changed to Indian Institute of Experimental Medicine. In 1982, the name was further changed to Indian Institute of Chemical Biology.

Annual Day Celebrations

CSIR-Central Institute of Medicinal and Aromatic Plants

Dr. C.S. Nautiyal (centre) presenting a kit of herbal formulations developed by CSIR-CIMAP to Dr. Ram Vishwakarma. Also seen in the picture is Dr. H.S. Das (*right*)

CSIR-Central Institute of Medicinal and Aromatic Plants (CIMAP) celebrated its Annual Day with great zeal on 26 March 2013 by organizing a special function. This event was attended by Dr. K.C. Gupta, Director, CSIR-IITR, Dr. P.K. Seth, CEO, Lucknow Biotech Park, Dr. M.K.J. Siddiqui, Director, CSTUP, scientists of CIMAP, staff members and students.

Silybum marianum (Milk Thistle)

Dr. Ram Vishwakarma, Director, CSIR-IIIM, Jammu was the chief guest and also delivered the Annual Day lecture on the subject of drug discovery from natural products. Dr. Harsharan Das, IAS, Principal Secretary, Science & Technology, Uttar Prdesh Government was the Guest of Honour.

Welcoming the guests, Dr. C.S. Nautiyal, Director, CSIR-CIMAP and CSIR-NBRI presented a summary of the research highlights for the year 2012-13. He said that CSIR-CIMAP was working on six Major Lab Projects (MLPs), 11 Other Lab Projects (OLPs), six Network Projects (as member) and one Supra Institutional Project (ChemBio) covering various aspects besides undertaking several grant-in-aid and consultancy projects. Dr. Nautiyal also stressed upon the need for collaborative work among CSIR-NBRI, CSIR-CIMAP and CSIR-IIIM, Jammu in the area of value addition and development of formulation using natural bioresources found in the Kashmir valley.

Dr. Nautiyal also informed that a dwarf mutant variety of *Sylibum marianum* (Milk Thistle) with high sylimarin content (≥ 8%) had been developed. Its cultivation promises doubled productivity of sylimarin over the source check *CIM-Liv*. This newly developed variety was released by the guests at the Annual Day function. The crop is best suited for marginal and dry land areas.

The variety CSIR-CIMAP SIL-9 is the outcome of extensive breeding work carried out during the last eight years. The variety has been developed by CSIR-CIMAP using directed breeding efforts utilizing conventional breeding approach of half-sib progeny selection in Gamma ray irradiated base population. The variety has two advantages: dwarfism combined with very high content of silymarin (>8%). Plants of this variety normally grow up to a height of 80-90 centimetres, making picking of capsules very convenient. The variety has a yield potential of about 80-85 kilogram of silymarin from an average seed yield of about 1000 kilogram per hectare.

The Chief Guest Dr. Ram Vishwakarma said that there are great opportunities available for development of life-saving drugs using new biology. The Guest of Honour Dr. H.S. Das, in his address, called upon the scientists to steer the efforts for spreading the results of research for the benefit of the masses.

CSIR-National Botanical Research Institute

The National Science Day was celebrated by the CSIR-National Botanical Research Institute (NBRI) on 28 February 2013. The day was observed as 'Open Day' when its various laboratories, *viz*., Exposition, Herbarium, Library, Botanic Garden, and R&D Laboratories were visited by a large number of students drawn from various local schools and colleges.

Prof. C.R. Bhatia, Former Secretary, Department of Biotechnology, Govt. of India, was the Chief Guest of the function. Prof. Bhatia delivered the National Science Day Lecture. Distinguished guests and scientists and staff of CSIR-NBRI, CSIR-CIMAP, researchers and students were present on the occasion

In his welcome address, Dr. C.S. Nautiyal, Director, CSIR-NBRI and CSIR-CIMAP said that NBRI had made commendable progress in research in the past few years. Recognizing its achievements in rural development, the Institute was bestowed with CSIR Award for S&T Innovations for Rural Development (CAIRD)-2011 on 26 September 2012 by Prime Minister of India, Dr. Manmohan Singh. This research, Dr. Nauiyal said, will provide inspiration to many researchers to aim S&T solutions for rural development.

On this occasion, the technology of *Lip Balm*, jointly developed by CSIR-NBRI and CSIR-CIMAP was transferred to Ms. Chiara Herbals Pvt. Ltd., New Delhi. Dr. C.S Nautiyal elaborated that lip balm is a unique formulation developed by using herbal colour and natural ingredients to protect the lips. The Lip Balm protects the lips from dryness and bacterial infection. The formulation forms an emollient moisture barrier on the lips, which helps in keeping them smooth, soft and shiny even when exposed to cold, dry heat, wind and sun.

Prof. C.R. Bhatia, in his lecture, congratulated the institute for its achievements and technology transfers. He said that a scientist had to prove that his technology works and would be accepted by the public. He shared various examples where scientists not only mastered the art of technology but were also successful in establishing profitable business ventures. These success stories are motivating aspiring researchers and entrepreneurs.

Prof. C.R. Bhatia addressing the gathering

Lip Balm technology being transferred

Prof. Bhatia said that the government is establishing Biotech parks and incubation centres that help in providing gainful employment to the public. Touching upon the theme *Genetically modified Crops and Food Security* of the National Science Day this year, Prof. Bhatia asserted that genetically modified crops approved by regulatory authorities are definitely safe and the public has to believe in them. However, the response to GM crops has been mixed in various states of the country. For instance, in U.P. there is strong opposition to its introduction, while in Maharashtra there was support for introduction of BT Cotton.

CSIR-North East Institute of Science and Technology

Left: Dr. Prabir G. Dastidar, Director and Policy Maker (R&D), Ministry of Earth Sciences, Govt. of India delivering the National Science Day lecture. *Right*: Dignitaries on the dais (*from right*): Dr. Prabir G. Dastidar, Dr. R.C. Boruah,

CSIR-North East Institute of Science and Technology (NEIST), Jorhat celebrated the National Science Day 2013 with a well charted out programme on 28 February 2013 at its premises. Held at Dr. J.N. Baruah Auditorium, the programme was presided over by Dr. R.C. Boruah, Acting Director, CSIR-NEIST. Dr. Prabir G. Dastidar, Director and Policy Maker (R&D), Ministry of Earth Sciences, Govt. of India, New Delhi graced the occasion as Chief Guest and delivered the National Science Day lecture. The programme was largely attended by invited guests, eminent personalities of Jorhat town, faculty members and students of nearby schools, press and media personnel, besides CSIR-NEIST staff members, both retired and existing.

Welcoming the gathering, Dr. Pabon K. Borah, Senior Principal Scientist said that the National Science Day is celebrated throughout the country on 28 February every year to commemorate the great discovery of Indian scientist, Dr. C.V. Raman, christened as the 'Raman Effect' for which Dr. Raman received the Nobel Prize in Physics in the year 1930. He spoke elaborately about the discovery and informed that Dr. Raman was the first Asian to receive the Nobel Prize in the area of Physics.

Delivering his lecture on *Analytical framework for research and innovation studies with examples from some subject specialities*, Dr. Dastidar gave an overview of India's vision and its policies in diverse areas for economic growth and development. He said that an analytical study for investment in research and innovation is important when the country is passing through a transitory phase with a vision to become one of the scientific superpower by the year 2020. Speaking about the vision and its goals, he highlighted the 12th Five Year Plan and its approach to position India among the top five global scientific powers by 2020. He also informed that the decade 2010 to 2020 had been declared as the *Decade of Innovation* for realizing that goal. Dr. Dastidar also talked about innovations from the Indian subcontinent such as the Invention of Zero and Decimal system, India as a home to one of the three ancient civilizations (Indus Valley Civilization), India's Traditional Knowledge System in Medicine, Dance, Art, paintings, etc.

Dr. Dastidar said that the success and failure of societies and systems often depends on the patterning of their internal structure. He opined that connectivity is as important as its patterning for better output and increased growth in all social or scientific systems. Dr. Dastidar further touched on various issues such as internationalization of science, S&T *vis-à-vis* food security for

India, evolution of S&T policy in India over the years, competitive intelligence and its building blocks, etc. and said that science is the core of national development and R&D should be linked with commercial processes. Further, Dr. Dastidar gave a glimpse of the country's position in comparison with other developed and developing countries in terms of publications, research growth, knowledge economy index, GDP, etc.

Delivering his presidential address, Dr. Boruah talked about the history and growth of S&T in the country over the years. He further informed that as a part of the celebration day, the institute keeps its doors open to facilitate the students and general public to visit CSIR-NEIST and learn about the work going on in the Institute.

During the 'Open Day' around 300 students from in and around the Jorhat district visited the laboratory.

Seminar/Symposia

LERIG 2013 Organized by CSIR-CLRI

The 47th Leather Research Industry Get-Together (LERIG 2013) was organised during 28-30 January 2013 at the CSIR-Central Leather Research Institute (CLRI) on the theme *Global Alliances with Integrated Networking to GAIN Value for Leather*.

The event was inaugurated by Dr. T. Ramasami, Secretary to the Government of India, Department of Science and Technology, in the presence of Mr. Tadesse Haile, State Minister, Ministry of Industry and Mr. Wondwossen Kiflu, State Minister, Ministry of Education, Federal Democratic Republic of Ethiopia, Shri M. Rafeeque Ahmed, President, All India Skin and Hide Tanners and Merchants Association (AISHTMA) and former Chairman, Council for Leather Exports (CLE) and Shri N. Shafeeq Ahmed, Vice Chairman, CLE.

In his Welcome Address, Prof. Dr. A.B. Mandal, Director, CSIR-CLRI deliberated on the achievements of the Institute and also focused on the events of LERIG 2013, scheduled to be organized during the period. Global alliances with different countries and international organizations, already forged by the Institute, were highlighted.

Global-Academia-Industry collaboration as a central theme for the development of leather industry was discussed. Experience from Ethiopia was shared by Mr. Wondu Legesse, Director General, Leather Industry Development Institute (LIDI), Ethiopia. He highlighted the success of Benchmarking Programme for technological up-gradation of Ethiopian tanneries and the Twinning Programme for capacity building of LIDI

Dr. T. Ramasami, Secretary DST released LERIG 2013 Souvenir and a book on Global Alliances of CSIR-CLRI

undertaken by CSIR-CLRI.

In another presentation, the United Nations Industrial Development Organization (UNIDO) and CSIR-CLRI collaboration was highlighted in assisting the small tanneries in India for implementing the best practices and cleaner processing methods in leather manufacture.

The need to position leather over substitutes through policy support, adopting new finishing technologies and by design and texture innovations was emphasized in detail during the event. Environmental challenges, regulations and technological developments in the global leather industry for sustainable developments

were also discussed. Further, the need for networking of trade bodies/associations for catalyzing the growth of leather sector with active partnership with Government agencies was emphasized. A Global Think Tank (GTT) as a deliberative body was also mooted for improving the growth of leather industry.

Practical demonstration of products by chemical companies, colour matching technologies and design improvements by National Institute of Fashion Technology (NIFT); poster sessions on recent developments in applied research on leather process technologies as well as basic research and exhibition on *Designed in India* were held during the event. A technology vision 2035 prepared by CSIR-CLRI for Technology Information, Forecasting and Assessment Council *(*TIFAC*)*, Govt. of India providing a comprehensive road map for the leather sector under Material and Manufacturing Technology was also presented during the event.

LERIG 2013 also included two memorial lectures, organized in memory of the former Directors of CSIR-CLRI, Prof. B.M. Das and Prof. Y. Nayudamma, who were instrumental in establishing and elevating CSIR-CLRI to a world class leather research institute.

Dr. T. Ramasami, Secretary to Govt. of India, Department of Science and Technology delivered the B.M. Das Memorial Lecture on the topic *Horizon of Leather: In tribute to Prof B.M. Das*. He discussed how knowledge generation can be converted into wealth generation and emphasized the need for strengthening the technology-trade coupling for greater growth of the Indian leather sector. He suggested the need for an innovative ecosystem and integrated networking to achieve this objective.

Prof. G. Padmanabhan, former Director of IISc, Bangalore delivered the Y. Nayudamma Memorial Lecture on the topic *Biotechnology Innovation and Entrepreneurship*. He highlighted the success stories of the government of India in initiating, incubating and developing many biotechnology institutes for developing vaccines and drugs. He complemented CSIR-CLRI's initiative for the development of enzyme-based bio-processing methods for tanning industry under the New Millennium Indian Technology Leadership Initiative (NMITLI) project. He urged the leather industry to look at the possibility of adopting such cleaner methods.

Exhibitions

CSIR-NBRI Participates in Science Expo

Dr. S.K.S. Rathore, Scientist, explaining the R&D activities of the Institute to Shri Akhilesh Yadav, Chief Minister of Uttar Pradesh

CSIR-National Botanical Research Institute (NBRI) participated jointly with CSIR-CIMAP in the Science Expo at the 1st UP Science Congress held in Gorakhpur during 2-4 March 2013.

The Science Expo was inaugurated by the Chief Minister of Uttar Pradesh, Shri Akhilesh Yadav. He was apprised about the efforts of CSIR-NBRI in the area of microbial based technologies (bio-inoculants for sustainable crop production) leading to *CSIR Award for S&T Innovations for Rural Development (CAIRD)-2011* to CSIR-NBRI, Lucknow and Directorate of Agriculture, Govt. of U.P. for *Plant Growth Promoting Microbial Bio-inoculants for Enhanced Crop Productivity*. The Chief Minister was appreciative of the synergy among the CSIR-National Botanical Research Institute and Directorate of Agriculture, U.P. benefitting farmers of the state.

A large number of scientists, researchers, students and general public visited the pavilions of CSIR-NBRI and CSIR-CIMAP and took keen interest. The Institute displayed its products like Herbal Gulal, TRICHA, BASH, Herbal Cough Syrup, Herbal Sindoor, Herbal Soft Drink, etc.

CSIR-CIMAP organizes *Kisan Mela* : A Unique Annual Meet of Farmers, Scientists and Entrepreneurs

About 3000 participants including farmers of medicinal and aromatic plants, distillers, buyers, industry representatives, scientists, students and people from different parts of the country visited CSIR-Central Institute of Medicinal and Aromatic Plants (CIMAP) on 31 January 2013 to attend the annual *Kisan Mela* (Farmers' Fair). The technology displays and stalls of herbal products and publications put up by CSIR-CIMAP and beneficiaries of CSIR-CIMAP technologies and women trainees received overwhelming response from the visitors.

The day long *Kisan Mela* was inaugurated by Agriculture Minister of Uttar Pradesh, Shri Anand Singh. In his address, the minister stressed upon the need for adopting improved technologies for medicinal and aromatic plants to increase the yield and to utilize 'Usar' soils. These crops are also not destroyed by wild animals. The minister further said that marketing of medicinal and aromatic plants should be strengthened by entering into agreements with user industries. He lauded the efforts of CSIR-CIMAP in promoting the cultivation of medicinal and aromatic plants.

An interactive meet between farmers and scientists was also held in which salient features of improved agrotechnologies and marketing tips were provided to the growers and questions asked by the farmers were answered. A special souvenir named *Aus-Gyanya* containing details of agrotechnologies of major medicinal and aromatic plants was released on the occasion and distributed to the participating farmers.

Release of souvenir *Aus Gyanya* by Shri Anand Singh, Minister of Agriculture, UP (*second from left*)

Geranium Biovillage being launched by presentation of saplings to two farmers

Demonstration of improved planting technique of menthol mint

A view of participants in the *Kisan Mela*

Visiting exhibition stall of herbal products

Women SHG members displaying agarbattis made from offered flowers

CSIR-CIMAP *Khus-Digger* released in *Kisan mela*

A new agro-system developed by CSIR-CIMAP by which productivity of menthol mint can be increased with significant decrease in land, labour, water and time resources was released and demonstrated to farmers. The new agro-system comprises new methods for the production of planting material (suckers/roots), raising seedlings from suckers, transplanting/planting, preparation before harvesting and precautions to be taken at the time of harvest followed by improved method of distillation. The new system reduces cropping period, water requirement and problem of weeds by 15-20% and leads to 15-20% increase in productivity over the traditional "Flat" method. Similarly, the modern distillation unit developed by CSIR-CIMAP apart from being more safe at work reduces time and fuel by about 20-30% and increases recovery of oil by about 15-20%.

An agriculture implement named *Khus-Digger* suitable for harvesting vetiver (Khus) roots developed by CSIR-CIMAP was also released by the chief guest. Farmers face problems in Khus root harvesting due to its deep penetration in the soil, which requires significant physical and monetary inputs when done manually besides root losses. *Khus-Digger* is an efficient, hi-tech, low cost, robust and sturdy tractor-driven implement. It reduces harvesting costs from Rs 60,000 to only Rs 10,000 per hectare apart from saving of time.

The 'Geranium Biovillage' for production of high value essential oil used in perfumery and flavour industries and 'CSIR-CIMAP Techvill' projects was also launched under the CSIR-800 programme, which will extend the benefits to a large number of farmers and entrepreneurs.

A special training programme sponsored by the Plant Variety Protection and Farmers' Right Authority (PPVFRA) was also organized on this occasion, which was attended by about 100 farmers.

CSIR-CIMAP *Trichoderma*-based biofertilizer and suckers of menthol mint were made available to a group of farmers belonging to Barabanki and Lucknow district and selected under a Department of Biotechnology (DBT) sponsored project. While launching a DST project about 70 DST-sponsored project beneficiaries from the tribal belt of Uttar Pradesh located near Lakhimpur Kheri district were also provided with the technical details and planting material of menthol mint for demonstration purpose.

The *Kisan Mela* at CSIR-CIMAP also supplied menthol mint planting material along with technology to growers who came from far of places of different states. The women participants hailing from different districts were imparted training in making of agarbattis from offered flowers and rose water. Members of women SHGs displayed the products made by them.

Former CSIR-NBRI Director Elected as Fellow of the Royal Society of Chemistry

Dr. P. Pushpangadan, former Director, CSIR-National Botanical Research Institute (NBRI), Lucknow, and presently Director General, Amity Institute for Herbal and Biotech Products Development, Thiruvananthapuram has been elected as the Fellow of the Royal Society of Chemistry (FRSC), London, UK for significant contribution in the area of chemistry/ biochemistry and biological sciences.

The Royal Society of Chemistry is one of the oldest chemical societies founded in 1841 incorporated by Royal Charter in 1848. Her Majesty the Queen is the Patron of the Society. The Fellows are nominated by the Royal Society of Chemistry for the significant contribution in Chemical and allied biological sciences.

Dr. Pushpangadan has carried out original research in Cytogenetics and Plant Breeding, Biotechnology, Molecular Taxonomy, biosynthesis of secondary metabolites, Ethnobiology, Ethnopharmacology, Bioprospecting and Natural Product Development etc. He has published over 515 original research papers (220 in peer reviewed journals, 79 chapters in books and 216 in proceedings of scientific seminars/symposia) in national and international journals and proceedings, authored and edited 26 books and 36 reports.

He has about 232 patents to his credit. Twenty of his patented products are now commercially produced and globally marketed. Dr. Pushpangadan brought a unique distinction to India as the first in developing a benefit-sharing model that implemented Article 8(j) of the Convention on Biological Diversity (CBD).

Dr. Pushpangadan has received many national and international medals/ awards including the prestigious UNEP Borlaug Award in 1998, the UN-Equator Initiative Award-2002 at World Summit at Johannesburg, South Africa in September 2002, Ayurved Gaurav Award 2009 and Padma Shri Award in 2010. He is a fellow of the National Academy of Sciences (FNASc), Fellow of the National Academy of Agricultural Sciences (FNAASc) and also Fellow of five other Scientific Bodies in India. He is the President of the National Society of Ethnopharmacology and also served as the President of the International Society of Ethnopharmacology (1998-2001), and International Society of Environmental Botanist (1999 to 2006).

ISEAC Award 2013 for CSIR-CGCRI Scientist

Dr. R. N. Basu, Chief Scientist and Head, Fuel Cell and Battery Division, CSIR-Central Glass and Ceramic Research Institute (CGCRI), Kolkata, has won the ISEAC Eminent Scientist Award for the year 2013 for his contributions in the area of Electrochemical Science and Technology. The award was conferred upon him by the Indian

Society for Electro Analytical Chemistry (ISEAC)on 16 January 2013 in Hotel Sitara, Ramoji Film City at Hyderabad during the occasion of the Fifth ISEAC Triennial International Conference on Advances and Recent Trends in Electro-chemistry (ELAC-2013). The award carries a cash prize of 20,000/- and a citation.

CSIR-NGRI Senior Scientist Awarded Indian Geophysical Union Electrotek and Geomatrics Gold Medal

Prof. Harinarayana receiving the medal from Prof. V.P. Dimri

Prof. Harinarayana, Senior Scientist and currently Director, GERMI-RIIC (on lien from CSIR-NGRI), Gandhinagar, Gujarat has received the prestigious Electrotek and Geomatrics gold medal and a citation for the year 2012. He received the medal from Indian Geophysical Union President, Padmashree V.P. Dimri as a part of Endowment Lecture during its 49th Annual Convention organized by GERMI, PDPU and ISR on 29 October 2012 at Pandit Deendayal Petroleum University auditorium, Gandhinagar, Gujarat. Prof. Harinarayana received the award for his outstanding contributions in the field of Electromagnetics.

Dr. Harinarayana has applied Deep Electromagnetic technique – Magnetotellurics – for various geological problems such as oil exploration, geothermal exploration, deep crustal studies, earthquake studies in different parts of India. He has introduced a new geophysical technique called "Marine Magnetotellurics" in India applying it in the Gulf of Kutch region, Gujarat for oil exploration. He was a national mineral awardee (1991) and also received the A.P. Best Scientist (2008) award. He has over 80 research publications to his credit in national and international journals. He is a member of the Russian Akademi of Natural Sciences, Moscow and bureau member of ElectroMagnetic Studies for Earthquakes and Volcanoes (EMSEV).

Indian Society of Applied Geochemists (ISAG) Award for CSIR-NGRI Scientist

Dr. M. Satyanarayananreceiving the medal from Prof. Pushpati Nath Razdan

Dr. M. Satyanarayanan, Scientist, CSIR-National Geophysical Research Institute, Hyderabad received the "Smt. Manthripragada Sita Devi-Sri Rama Rao Medal" for Best contribution in the field of Analytical Geochemistry during the last ten years (2002-2012) by the Indian Society of Applied Geochemists (ISAG), Hyderabad.

The award was conferred on him by Prof. Pushpati Nath Razdan, Vice-Chancellor, Dr. D.Y. Patil Vidyapeeth (DYPV), Pune, in the presence of Dr. K.K. Dwivedi, President (ISAG, Hyderabad) and Prof. K. Surya Prakash Rao, Secretary (ISAG, Hyderabad), during the Annual General Body Meeting and National Seminar on *Synergy of Geochemistry, Geology, Geophysics towards natural and energy resources, environment and health*, at the University of Pune.

CSIR-IHBT Scientist Awarded CRSI Bronze Medal for 2012-2013

Dr. Arun K Sinha, Senior Principal Scientist, CSIR-Institute of Himalayan Bioresource Technology (IHBT), received a Chemical Research Society of India (CRSI) Bronze medal in the year 2012-2013 for noteworthy work in chemistry.

Dr. Arun K. Sinha obtained his M.Sc. (Organic Chemistry) from B.H.U., Varanasi and PhD from the Indian Institute of Technology in 1990. Subsequently, he worked as a postdoc at Illinois Institute of Technology, Chicago (1994-95) and then at the University of Illinois at Urbana Champaign, U.S.A (1996-97). Thereafter, he returned home and joined CSIR-IHBT in 1997 and is presently working there as a Senior Principal Scientist. Besides his academic training, he also has wide industrial exposure in the area of agri-polymer-pharma industries (1990-1993). Dr. Sinha also visited Umea University, Sweden during 2007-08 as a visiting scientist.

Dr. Sinha has over thirty years of research experience in management of multidisciplinary scientific domains ranging from Natural Products to Synthetic Organic Chemistry besides green and economical synthesis of bioactive molecules. Under his supervision, nine students have already completed their PhD (2004-2012) while ten more are currently pursuing their doctoral studies.

Dr. Sinha has 89 publications in peer-reviewed journals and is a principal inventor of 16 patents (mainly US/European). Amongst his various accomplishments, Dr. Sinha has disclosed a new perspective on the century old classical Knoevenagel-Doebner reaction renamed as Knoevenagel-Doebner-Sinha protocol which provided an economical and single step route to industrially important FEMA GRASS approved 4-vinylguaiacol.

Dr. Sinha has made significant contribution towards the well known Heck reaction, wherein, for the first time, a one pot-waste free synthesis of bioactive hydroxylated stilbenoids (symmetrical/unsymmetrical) was developed directly from secondary aryl alcohols or halophenol/acrylic acid as economical coupling partner.

Appointments

Dr. S.W.A. Naqvi Takes Charge as Director CSIR-NIO

Dr. Syed Wajih Ahmad Naqvi, Outstanding Scientist and Acting Director of the CSIR-National Institute of Oceanography (NIO) was appointed Director of the institute on 8 April 2013.

Dr. Naqvi has been working on the biogeochemistry of the oceans. His current research largely focuses on the effects of human-induced changes on marine biogeochemistry and ecosystems. He specializes in processes in aquatic low-oxygen zones, especially microbially-mediated redox transformations of nitrogen such as denitrification and nitrous oxide production. He demarcated the zone of denitrification, the dominant process of reactive nitrogen loss, in the Arabian Sea, studied its variability in space and time, and determined its rate using several diverse physico-chemical, isotopic and enzymatic techniques. His work provided new insights into processes associated with suboxic ecosystems, including high respiration rates and associated bacteria-produced turbid layers, and mechanisms of nitrous oxide production. He demonstrated that human activities are causing

an increase of nitrous oxide emission from the oceans.

Dr. Naqvi has been conferred with several prestigious awards including the Shanti Swarup Bhatnagar Prize in Earth Sciences (1996). He is Fellow of all three science academies of India – the Indian Academy of Sciences, Bangalore (1994), the Indian National Science Academy, New Delhi, (2001) and National Academy of Sciences, Allahabad (2002). He has also been elected as the Fellow of the Third World Academy of Sciences, Trieste, Italy (2008).

Dr. Naqvi has been working in CSIR-NIO in various capacities since 1974, and guided many students for their doctoral studies. He has authored over 147 research papers. He is also serving as the Chief Editor of an international journal, *Biogeosciences*, and as associate editor of *Marine Biology and Aquatic Biology*.

Dr. Lakshmi Kantam Appointed Director of CSIR-IICT

Dr. Mannepalli Lakshmi Kantam has become the first woman scientist to become the Director of a national laboratory under the Council of Scientific and Industrial Research (CSIR). Dr Lakshmi Kantan took over as the Director of the CSIR-Indian Institute of Chemical Technology (IICT), Hyderabad, one of the largest among the 38 national labs under the CSIR.

An eminent scientist who has made outstanding contributions towards the development of specially designed homogeneous/heterogeneous catalysts for chemical reactions with innovative scientific inputs to achieve highest possible atom economy, Dr. Lakshmi Kantam has been heading the inorganic and physical chemistry division of CSIR-IICT for the past eight years. Her group's work has led to development of eco-friendly processes relevant for the chemical/pharmaceutical industries. At present, she is leading an inter-disciplinary team under the ongoing National Solar Mission to harness sustainable energy.

A fellow of several national and international academies, Dr. Lakshmi Kantam is the Chairperson, Subject Expert Committee, Women Scientists Scheme, Department of Science and Technology, Government of India. She is also an adjunct professor at RMIT University, Melbourne, Australia.

Dr. Lakshmi Kantam has guided 27 PhD students. She has more than 260 research publications and 43 US Patents to her credit. She is a member of several committees such as the Expert Committee on Nano-Agriculture, Department of Biotechnology, and Editorial Board Member of *The Chemical Record, The Open Catalysis Journal*, and *Bulletin of the Catalysis Society of India*.

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