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## In The News

### CSIR-NAL's Drishti Aiding Pilots at IGI Airport

A visibility system designed by the CSIR-National Aerospace Laboratories (NAL) has made it safe for aircrafts to land with a visibility of 50-metres at the Indira Gandhi Airport in New Delhi.

Drishti, a 30-meter baseline visibility measuring system designed and developed by CSIR-NAL, is the first of its kind installed at any airport in the country. Drishti covers a span of visibility from 10 to 10000 meters (low to high visibility), and is one-third the cost of a similar imported system. A rugged system, working for the last two years at the Lucknow Airport and for the last one year at the IGI Airport, it requires low maintenance. Health monitoring through web enabling, servicing made easier by modular electronics and virtual instrumen-

tation concepts are the special features of Drishti.

Based on the performance of the systems earlier, in the month of December 2012, the India Meteorological Department (IMD) requested CSIR-NAL to install on a priority basis three more systems at the main runway of IGI Airport to cover the emergent need of the present fog season of 2012-2013. Three Drishti systems were fabricated in a record time of three weeks and installed on a war footing at the airport in the first week of January 2013. The systems were installed at touch-down, mid and takeoff points on runway 28, which is an important runway of IGI Airport.



Drishti systems installed at runway 28 (three in January 2013) and runway 29 (two in December 2011) at the IGI Airport, New Delhi and NSCBI Airport, Kolkata in December 2012

Presently, including two systems installed in December 2011 on Runway 29 and 11, there are five CSIR-NAL developed systems working satisfactorily at IGI airport (Cat III B) allowing aircrafts to land with 50 metres visibility. In December 2012, CSIR-NAL also installed one system at the Netaji Subhash

Chandra Bose International Airport, Kolkata under MoU with IMD.

*Drishhti* meets all the stipulations of ICAO and WMO, and has been issued International Class I NOTAM. As of today, seven state-of-the-art *Drishhti* systems are working at three international airports.

## Provisional Clearance Certificate for CSIR-DRDO Wankel Engine for Nishant UAV

The auditorium at Aeronautical Development Agency (ADE), DRDO, Sameeksha was witness to a significant event that took place on 7 February 2013. A provisional clearance certificate was issued

Adviser to Raksha Mantri, and Director-General DRDO.

Dignitaries who attended the event included Shri G. Elangovan, CC R&D (Avionics and Aero), Shri P.S. Krishnan, Director, ADE, Shri Shyam Chetty, Director, CSIR-NAL, Dr. Manmohan Singh, Director, VRDE, Dr. C.P. Ramnarayanan, Director, GTRE and Dr. K Tamilmani, CE CEMILAC. Representatives from CSIR-NAL, CEMILAC, VRDE and ADE were present at the occasion. Dr. V.K. Saraswat, in his keynote address, spoke about the importance of collaborative work culture.

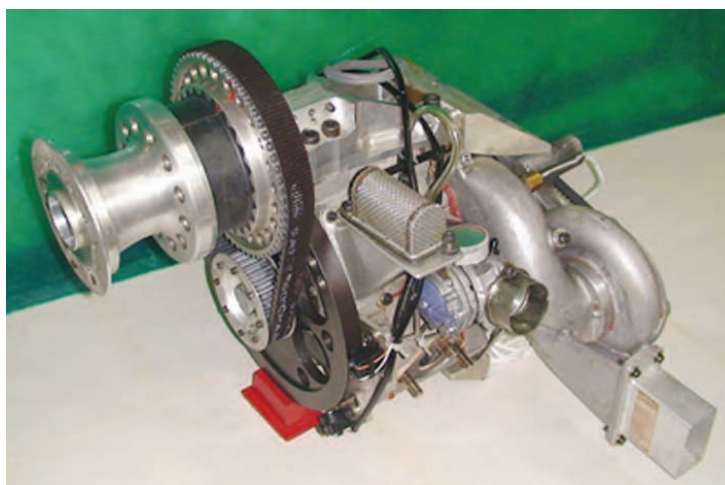
The Wankel engine has been actively considered for powering light aircraft and UAVs in view of its unique advantages such as a relatively small size and a correspondingly high specific output. In view of the salient features of the engine for lightweight aviation, an indigenous Wankel engine development programme was initiated by DRDO. The programme to design and develop a flight-worthy Wankel engine was



Provisional clearance certificate being issued to CSIR-NAL

to the completely indigenously designed and developed 55 HP Wankel rotary combustion engine, developed under a joint programme between CSIR-NAL and DRDO for the Nishant UAV built by the ADE.

This event attains significance as very few engines developed in the country have been issued flight clearance by CEMILAC, the certification wing of the DRDO. The occasion was chaired by Dr. V.K. Saraswat, Scientific



The Wankel engine developed by CSIR-NAL



jointly taken up by CSIR-NAL, VRDE, and ADE. CSIR-NAL, with its earlier exposure while working on Wankel engine for hang glider, took up the development of the core engine for DRDO.

As per the MoU, two flight-worthy prototype engines were delivered. The first engine successfully completed a 40-minute maiden flight on March 2009 at the Kolar airfield. The UAV was recovered safely at the intended place at the dried-up Muduvadi Lake. The flown engine underwent 20 hours and ten hours of pre- and post-flight tests respectively. The post-flight test confirmed that the engine's performance was matching with the pre-flight performance.

Based on the CSIR-NAL Design, DRDO initiated fabrication of twenty engines with the help of a Hyderabad-based

private firm. The second flight test of the engine was carried out on 20 June 2012. The flight took off at 1430 hrs and climbed to an altitude of 1.9 km. The total mission duration was 105 minutes. The first three engines produced by DRDO based on CSIR-NAL design, were also flight tested and the flight tests were up to requirements of the mission. Subsequently, CEMILAC accorded Certificate for Limited Series Production on 7 February 2013.

The Wankel engine is the first of its kind completely designed and developed in the country. These engines are used for powering smaller air vehicles, UAVs, target drones and also in automobiles (Mazda, and Racing Cars), out-board motor for boats and other industrial applications in particular for power generation, typically up to 80 kW.

## CSIR-NIIST Develops Technology for Making High Volume Flyash Building Components

A new technology developed by CSIR-National Institute for Interdisciplinary Science and Technology (NIIST) is the first of its kind to utilise fly ash to the extent of 80% in building material.

Fly ash is silica-rich fine powder, one of the residues generated in the combustion of coal. If the fly ash is released into the atmosphere via the smoke stack, it would create environmental problems. Therefore, fly ash is generally captured from the chimneys of thermal power plants and stored at the plant site or used as landfills along with other residual materials.

Although there are technologies that utilise 20–35% of fly ash as a component in building materials, there is a great demand for an alternate process or technology that can utilise higher volumes of fly ash. Large-scale mining of topsoil for clay is another issue that demands attention.

Flux bonded fly ash technology developed by CSIR-National Institute for Interdisciplinary Science and Technology (NIIST) uses fly ash to the extent of 80% in the building material. By doing this, it reduces the clay demand to less than 15%. This

technology is eco-friendly and the first of its kind to utilise high volume of fly ash for fired products. While the bricks and tiles made using this technology have better properties than clay-based building components, the colour of the products remain similar to that of conventional fired bricks and tiles.

All the present day technologies utilise fly ash by making admixtures with high volume clay followed by firing or by its use with cement/lime/gypsum, followed by curing. In flux-bonded fly ash technology, fly ash with certain additives are shaped and fired in the case of clay-based building components. The additives form a low melting point liquid like glass, which further reacts with fly ash during firing and finally forms a hard sintered product. In this process the fly ash also develops permanent 'red brick' color, similar to that of fired clays.

Flux-bonded fly ash products have a strength of 80–120 kilogram/square centimeter, density of 1.3–1.4 gram/cubic centimeter and water absorption of 15–20%, brick red colour and texture similar to fired clay products.

Although there are technologies that utilise 20–35% of fly ash as a component in building materials, there is a great demand for an alternate process or technology that can utilise higher volumes of fly ash.

## CSIR-CEERI Develops Micro-Heater for Gas Sensors

Investigations on various types of gas sensors are being pursued worldwide. Their applications vary from domestic sector to industrial sectors, from automobile sector to security and environmental sectors. The gases sensed typically include CO, NO<sub>x</sub>, SO<sub>2</sub>, LPG and methane.

Currently a lot of efforts are focused on silicon micro-sensors as gas sensors. These sensors basically consist of a layer of a gas-sensitive material, some electrodes, a heater element and a silicon-based micro-machined substrate. These sensors have benefits of small dimensions, low power, low weight, low manufacturing cost and the possibility of integration with other devices. The

most common gas-sensitive materials are various semiconducting metal oxides that operate only at elevated temperatures (usually 150°C-450°C). Hence, a micro-heater consuming low power is an important integral part of a gas sensor.

CSIR-Central Electronics Engineering Research Institute (CEERI) has developed a MEMS based process technology to realise silicon-based micro-heaters. The micro-heater fabrication process has three levels of masking. The first mask is to pattern Ti/Pt heater layer using lift-off technique. The second mask is for metal pad opening after passivation (Fig. 1). The third mask is for backside etching of silicon (using TMAH) to obtain heater on a membrane (Fig. 2). The typical heater size in Fig. 1 is 500 μm × 500 μm; pads are 300 μm × 300 μm and complete chip size is 2400 μm × 2400 μm. Silicon nitride deposited on the Ti/Pt heater serves as a protection layer.

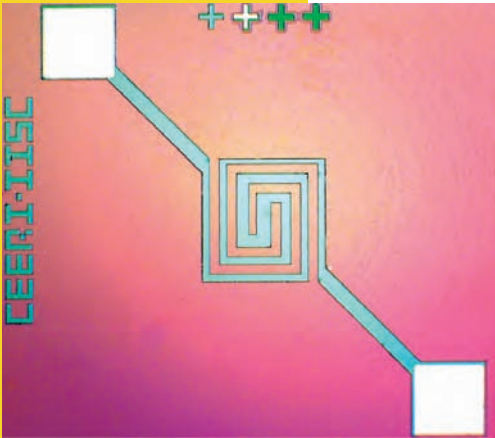


Fig. 1: Optical image of double spiral micro-heater after Si<sub>3</sub>N<sub>4</sub> passivation, pad opening and silicon etched from the backside of the heater

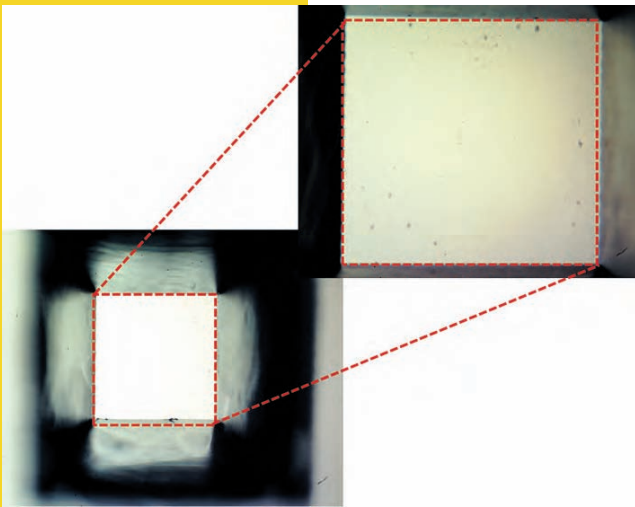


Fig. 2: Optical image of the backside cavity of micro-heater after TMAH etching of silicon. Upper image is the zoomed portion of the heater membrane.

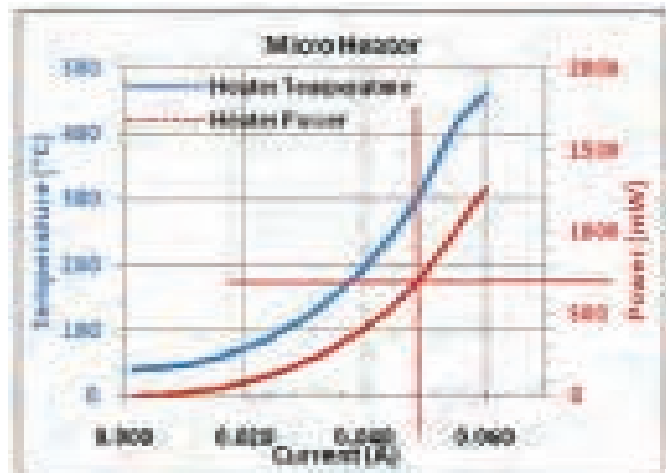


Fig. 3: Micro-heater temperature and power curves at different heater current levels

S. No.	Micro Heater current (mA)	Temperature (°C)	500μm x 500μm Heater Power (mW)	100μm x 100μm Heater Equivalent Power (mW)
1	30	158	179	7.16
2	40	202	385	15.40
3	50	246	604	24.16
4	60	290	966	38.64
5	70	333	1399	55.96

The temperature (blue-curve) and power rating (red-curve) of the micro-heater are shown in Fig. 3. The curves suggest temperature of 300°C is achieved at heater current of 48.5 mA, corresponding to power rating of 700 mW.

This work was carried out under a project on *Process Development and Fabrication of MEMS Microheater for Automotive Gas Sensor* sponsored by NPMASS, ADA, Bangalore.

## R&D Highlights

# CSIR-CDRI Study Shows *Mucuna pruriens* Could Help Recover Spermatogenic Loss

Spermatogenic failure in men involves several factors, such as age, oxidative stress, life style, pathological complications, nutritional deficiency, toxicity, and exposure to endocrine disruptors such as estrogens etc. These factors could compromise fertility by affecting sperm count, sperm motility, semen volume and penile erection. Identification of a particular cause and effect relationship in each affected individual is not possible; therefore, a large number of these individuals are labelled as idiopathic.

Highly directed therapies such as hormonal intervention have shown poor success. This forces a large number of subjects to choose expensive treatment options such as *in vitro* methods, which are unaffordable for a large section of the infertile population. Traditional Indian medicinal literature, Ayurveda, describes the use of a large number of plant products by men when the contemporary methods of treatment were not available. The use of specific plant products is well documented and has undergone anecdotal experimentation, but this lacks scientific evidence supporting the described effects of these products.

*Mucuna pruriens* (MP) is a tropical legume known as velvet bean or cowitch in English.

MP has been reported to possess anti-diabetic, anti-neoplastic, anti-microbial, aphrodisiac, and learning and memory enhancing properties. Pro-male fertility properties of MP are supported by few studies, including one of our studies on human subjects. The effect is likely to be due its anti-oxidant, adaptogenic and general nutritional properties, but the exact mechanism of its action remains elusive. MP is a rich source of L-DOPA (LD), a variety of alkaloids, fatty acids, amino acids, minerals and several nutritional elements.

Looking at the promising reported properties of *M. pruriens*, we undertook a study to evaluate its potential in recovering spermatogenic loss, and mechanism of its action by the study of reactive oxygen species, mitochondrial membrane potential, germ cell apoptosis and DNA content of testicular germ cells. We also included L-DOPA, a major chemical constituent



*Mucuna pruriens* and its seeds

**Table: A time-line profile of sperm count and motility during treatment. For statistical inference, EE was compared with control group, and MP and LD were compared with AR group**

Sperm parameter	Days	Control	EE	AR	MP	LD
Sperm count (million/ml)	14	202.1±15.4*	26.1±4.3***			
	28			43.5±4.5	61.1±6.9***	58.6±3.7***
	42			100.5±4.32	127.3±4.32***	118.5±4.5**
	56			174.2±8.4	214.6±11.9***	205.5±7.2***
% Sperm motility	14	60.5±5.1	16.8±9.0***			
	28			23.3±0.98	33.0±1.52***	28±0.93*
	42			31.5±3.39	46.1±3.12***	36.0±4.38
	56			49.3±7.8	64.3±3.6**	61.83±4.1**
% Progressive motility	14	17.5±2.0	4.5±2.0***			
	28			7.5±0.54	8.83±1.16	8.5±1.37
	42			9.0±1.41	12.1±1.72*	11.0±1.4
	56			16.6±4.0	21.67±5.7	18.83±2.4

\*the values (mean ± SD) are average of data for 6 animals. Statistical significance is indicated as \* P< 0.05, \*\* P< 0.005, \*\*\* P< 0.0005.



of *M. pruriens*, to find if L-DOPA accounted for the effect of MP.

### Experiments Conducted

Experiments were conducted on five groups of male Sprague Dawley rats for ten weeks, as detailed in our recently published paper (Singh et al. *PLoS One*. 2013). Briefly, ethinyl-estradiol (EE) was used to generate spermatogenesis compromised model, followed by treatment with MP and LD. EE administration for 14 days compromised sperm count, percent sperm motility and percent progressive motility, providing us a suitable model for testing the efficacy of MP in recovering spermatogenic loss. Animals receiving EE exhibited shrinkage in luminal space of seminiferous tubules coupled with significant reduction in the number of germ cells and elevation in the ROS level.

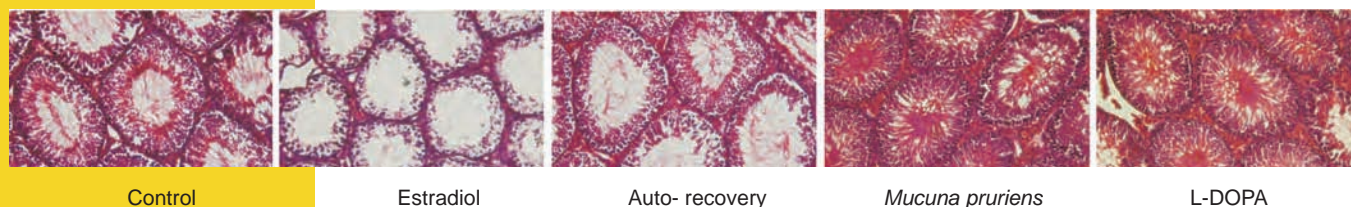
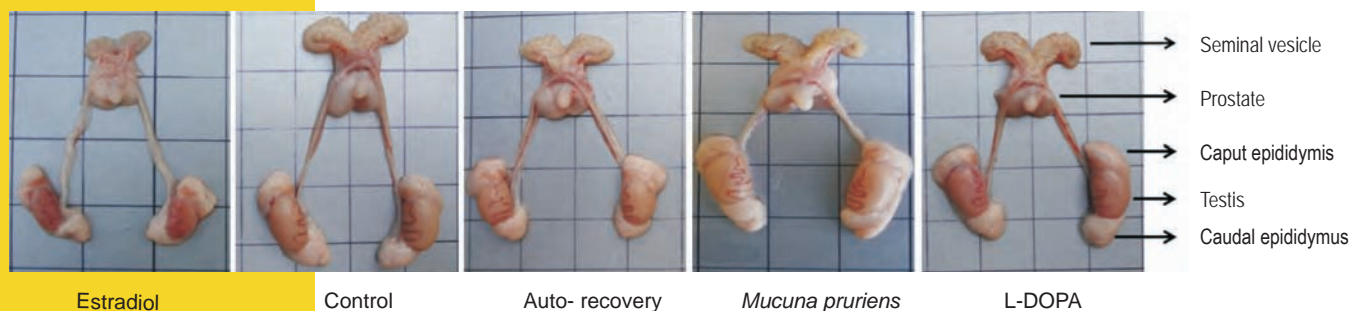
A reduced MMP after ethinyl-estradiol administration shows damage caused to the sperm mitochondrion. This animal model has been experimentally tested for the first time and would enable further studies on spermatogenesis and male infertility. Animals left for auto-recovery could regain sperm count and motility to a significant extent after 56 days. In contrast to auto-recovery, treatment with MP helped a highly significant

and faster recovery of both sperm count and motility at all time points of measurement.

Similar treatment with LD also helped better recovery of all the three sperm parameters in comparison to the auto-recovery group; however, the values reached statistical significance only in the case of sperm count. Apart from faster recovery, MP and LD also resulted in improved sperm parameters at the study end point. EE administration significantly reduced the serum testosterone, FSH and LH levels in comparison to the control group.

Both MP and LD showed recovery of the endocrine axis at all time points, but the differences were more significant in the case of MP. This suggests action of *M. pruriens* at the central nervous system level. Treatment with MP and LD resulted in much better recovery of the luminal architecture, regaining their normal architecture with spermatids completely filling the lumina.

The auto-recovery group recovered the loss of MMP to a significant extent, but MP was distinguishable by significant impact on MMP improvement. The recovery potential of LD was also comparable. FACS analysis showed that the level of apoptosis was significantly higher in the EE group as compared to the control. Animals left for





auto-recovery showed lesser number of necrotic cells, and apoptotic cell numbers were comparable to the EE group. Cell death was significantly checked by treatment with MP and LD.

The values in the four quadrants of MP group were comparable to the control group, which could not be achieved by auto-recovery or L-DOPA. EE administration significantly reduced the number of spermatids with an eventual increase in the number of primary spermatocytes, without any alteration in the population of secondary spermatocytes. Treatment with MP and LD helped achieve complete recovery, restoring back the proportion of spermatids with mild increase in the number of primary and secondary spermatocytes.

### Significance of Study

We got interesting insights into the possible mechanism of action of *M. pruriens*. It is worth noting that the physiological disturbances caused by ethinyl estradiol administration match the anomalies seen in a large number of infertile human individuals, justifying the selection of this animal model. *M. pruriens* seed powder efficiently recovers the spermatogenic loss induced due to EE administration. The recovery is mediated by reduction in ROS level, restoration of MMP, regulation of apoptosis and eventual increase in the number of germ cells and regulation of apoptosis.

The treatment also recovered the suppressed hypothalamic-pituitary-axis by maintaining the LH, FSH and testosterone level. The present study simplified the complexity of mechanisms involved and provided meaningful insights into MP/LD mediated correction of spermatogenic impairment caused by estrogen exposure.

This is the first study demonstrating that L-DOPA largely accounts for pro-spermatogenic properties of *M. pruriens* and we believe that the results are really encouraging and identify the first lead towards understanding the mechanism of action of this wonderful medicinal plant.

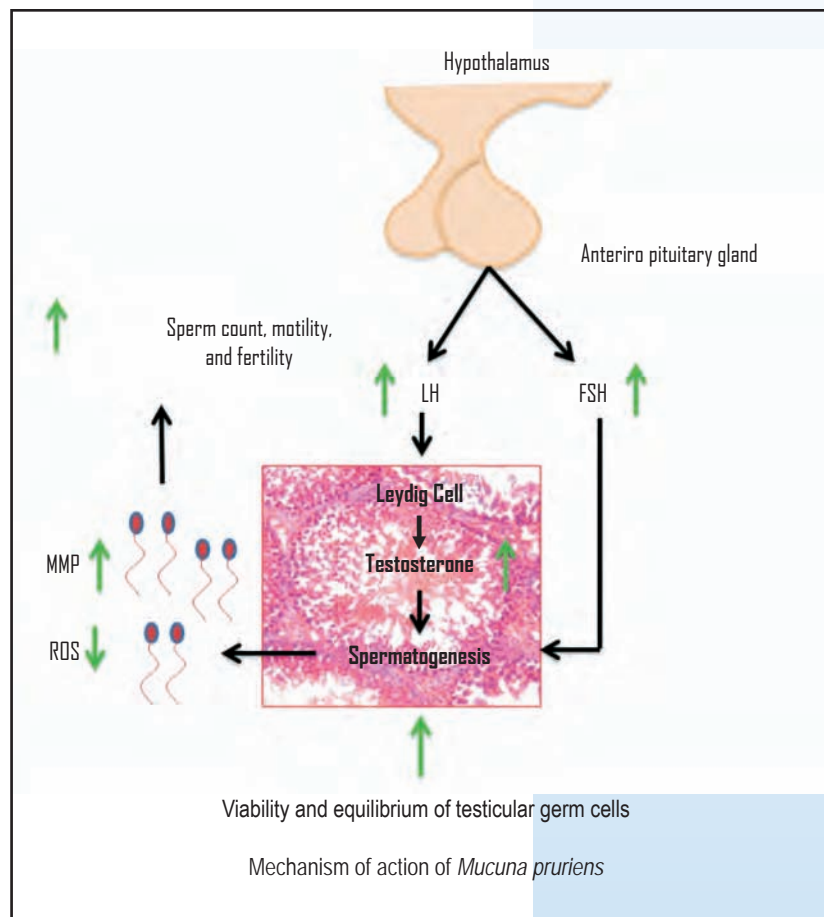
### Future Perspective

Environmental estrogens mimicking estradiol are ubiquitous and humans are exposed to them daily by a number of routes, contributing to declining semen quality over the last few decades. Such exposure could severely affect spermatogenesis, and promising recovery of spermatogenesis upon *M. pruriens* administration suggests its use in alleviating the adverse effects of environmental exposure to estrogens.

The Ayurvedic system recommends the use of such herbs as protective health supplements to strengthen the natural defence against health hazards. Therefore, this plant could be further explored as a pro-health supplement in general, apart from its use in treatment of reproductive ailments such as infertility.

*Singh AP, Sarkar S, Tripathi M, Rajender S, Division of Endocrinology, CSIR-Central Drug Research Institute, Lucknow*

*For further reading, please refer: Singh et al. PLoS One. 2013;8:e54655*



**R&D Facilities****CSIR-NIIST joins hands with Government of Kerala to set up a Ginger Processing Plant in Wayanad**

CSIR-National Institute for Interdisciplinary Science and Technology (NIIST) has entered into a technology transfer deed with Director of Agriculture, Government of Kerala to set up an integrated spice processing facility at Wayanad, Kerala for the recovery of ginger oil and ginger oleoresin from fresh green ginger and other spices. CSIR-NIIST has also been identified as a consultant for providing engineering consultancy for preparing a Detailed Project Report indicating the cost of civil, electrical and the cost of plant and machinery. The project will be implemented through a Project Engineering Company.

The plant will be set up on the land owned by Malabar Union of The Kerala Co-operative Milk Marketing Federation

Ltd. (MILMA) at Meenangadi, which will be managed by MILMA with the technical support of CSIR-NIIST. The spice processing facility is meant to process 7.5 tons of fresh ginger per day of which approximately 4 tons will be marketed as cleaned waxed ginger and the balance will be processed for making ginger oil/ginger powder or both. The ginger powder is proposed to be marketed in consumer packs as is being done by several northeastern states and the oil to be exported.

The ginger samples from the state have been analyzed for the oil content and have been found to be as per requirement. The plant will break even at 47% capacity and internal rate of return works out to be 15%.

**MoU****Technology Business Incubation Centre for Agro-processing to be set up at CSIR-NIIST Campus**

CSIR-National Institute for Interdisciplinary Science and Technology (NIIST) has inked an MoU with Director of Agriculture, Govt. of Kerala, for setting up a Technology Business Incubation Centre (TBIC) for Agro-processing in the CSIR-NIIST campus, which is intended to act as a catalyst for the development of medium and large enterprises for making value-added products from the cash crops of the state.

TBIC at CSIR-NIIST offers a platform for demonstrating existing technologies and help in the development of newer processing techniques. Facilities for carrying out various unit operations required to add value to a product will be made available to the prospective entrepreneur. This semi-commercial facility will help him to identify any lacunae in the technology that he is planning to adopt, generate sufficient finished

goods to do test marketing and for evaluation of the product. The centre will also facilitate in refining an idea floated or brought in from elsewhere by an entrepreneur with or without seeking assistance from outside. The services of CSIR-NIIST personnel for process development or any sponsored work will be made available for the functioning of TBIC.

Proximity to multidisciplinary R&D personnel as well as demonstrated capability to solve technical problems from CSIR-NIIST will help in circumventing major problems during the journey from laboratory to market. The day-to-day operation of the incubator facility will be entrusted to a Scientist/Technologist from CSIR-NIIST designated as Facility Manager, who will be assisted by an Associate Facility Manager, both having necessary expertise in the area. The overall management of

TBIC at CSIR-NIIST offers a platform for demonstrating existing technologies and help in the development of newer processing techniques.

the incubator facility would be done by a team constituted at CSIR-NIIST for the purpose with periodic inputs from the representatives of Government of Kerala, financial agencies, other technology institutions, commodity boards, Small Farmer Agribusiness Consortium (SFAC), Krishi Vigyan Kendra, etc.

CSIR-NIIST will make available to TBIC its pilot plant equipments and

analytical equipments for immediate use. The Government of Kerala through Director of Agriculture will provide an amount of Rs. 100 lakhs to CSIR-NIIST towards the cost of additional equipments. The TBIC is planned to be a self-sustaining entity with marginal support. CSIR-NIIST will bear the upkeep, civil maintenance and utility costs of the TBIC and will make use of the revenue generated by TBIC to meet this expenditure.



## Conferences

### 'Nano India 2013' hosted at CSIR-NIIST

'Nano India 2013', the national conference on nanoscience and technology was hosted by the CSIR-National Institute for Interdisciplinary Science and Technology (NIIST). This event was sponsored by the Nano Mission under the Department of Science and Technology and held at CSIR-NIIST from 19–20 February 2013.

The major objective of 'Nano India 2013' was to provide exposure to scientists and students to nanoscience and nanotech research. The Government of India launched the Nano Mission in May 2007, with an allocation of Rs. 1000 crore for five years to promote research and development in this emerging and highly competitive area. Several scientists from all over India are working on different branches of nanotechnology under this program.

Prof. C.N.R. Rao, Head, Scientific Advisory Council to the Prime Minister, inaugurated the conference. He exhorted Indian scientists to work in groups rather than functioning in isolation. Major accomplishments in science will not be possible unless Indian scientists put aside their differences and learn to work together in groups. "In the recent past," he said, "China has literally frightened developed nations in terms of growth in science and this emergence of China as a global leader owes to the hard work and team spirit of the Chinese. The R&D investment of China for the next five years is a whopping 1.3 trillion dollars. Even small countries like South Korea had registered remarkable growth in science over the past two to three years. It is

attributable to the extraordinary investment in education and science and the importance given to teaching."

Further, he added, "Science will grow only if there is respect for learning and scholarship. Our politicians, administrators and planners should realise that. Much more money is likely to come to science. The 12<sup>th</sup> Five-year Plan outlay for science and technology is expected to be Rs. 125 lakh crore. If it comes, it must be used fruitfully."

Prof. Rao distributed awards instituted by the Nano Mission. D. Bahadur of IIT-Bombay received the National Research Award in Nano Science and Technology. Arun Chatopadhyay, IIT-Guwahati, and B.L.V. Prasad, National Chemical Laboratory, Pune, received the young career award in nano science and technology.

Prof. A.K. Sood, Chairman, Nano Science Advisory Group; Dr. Praveer



Prof. C.N.R. Rao inaugurating the conference

Asthana, Member Secretary, Nano Mission Council; Dr. Suresh Das, Director, CSIR-NIIST and Dr. M.T. Sebastian,

Scientist, CSIR-NIIST also delivered their addresses.

About five hundred delegates from various academic institutions and industries participated in the conference. The conference featured three plenary talks and 21 invited lectures by eminent scientists working in various institutes and universities in India. These talks covered most of the important areas in nano science and technology such as health care applications of oxide functional nanostructures, light matter interactions at nanoscale, optical and electronic properties of semiconductor nanomaterials, molecular DNA devices in living systems, and agri-nanobiotech in India. The conference was followed by a two-day review of the ongoing projects under the Nano Mission program.



Dignitaries at the Conference

### Workshops

## CSIR-CGCRI organizes International Workshop on Recent Advancement in Membranes for Liquid and Gas Filtration



Swachha Mazumdar addressing the audience. (Seated from left to right) Dr S. N. Roy, Acting Director Shri Kamal Dasgupta, Dr Binay K. Dutta, Dr. Ganesh Ch. Sahoo

The day-long workshop had three well-attended technical sessions that included Invited Lectures and also, about twenty Poster presentations. Delegates included scientists from Laboratoire Sciences des Matériaux Environnement, Tunisia; BARC, Mumbai; Entech Metals Pvt. Ltd., Kolkata; Heritage Institute

of Technology, Kolkata; Genesis Membrane Sepratech, Mumbai; Bidhan Chandra Krishi Viswavidyalaya, Nadia and Indian Institute of Technology, Kharagpur.

CSIR-Central Glass and Ceramics Research Institute (CGCRI), Kolkata, organized the International Workshop on *Recent Advancement in Membranes for Liquid and Gas Filtration* on 27 December 2012. The aim of the workshop was to develop bilateral scientific cooperation with different countries in the relevant fields to develop cutting-edge technologies and to demonstrate technologies in different Mission Mode programmes of CSIR-India.

The technical sessions and poster presentation covered the following topics: membrane development, membrane based decontamination of drinking water, membrane based wastewater treatment and gas separation membrane and storage materials.



At the inaugural session, in his Welcome Address Mr. Kamal Dasgupta, Acting Director, CSIR-CGCRI stressed that India's greatest asset was its manpower and China had already shown that manpower could do wonders! However, to maintain the manpower, wastes must be removed from the living space as there is need to provide a clean environment. Clean water is an absolutely essential part of healthcare. He stressed that if citizens drink clean water, fifty per cent of the diseases that plague India would be gone. He said that CSIR-CGCRI was possibly amongst the first few that had explored the use of ceramic membrane. He was certain that such a workshop was important from both the societal and scientific points of view. He expressed his happiness at the international participation.

At the Inauguration Ceremony, Dr. S.N. Roy, Head, Ceramic Membrane Division, briefed the delegates and participants about the workshop. He said that the theme of the workshop was *Clean Energy and Green Environment*, with emphasis on technologies developed in the last ten years and those that will be developed in the near future. He pointed out that such workshops would provide a common platform for all concerned to speed up the prospect of better utilization of the ceramic membrane technologies. He announced that under societal missions, sixty plants were using CSIR-CGCRI technology for ceramic membrane-based water purification. Plants for arsenic and iron removal for saline, ground and river water for producing potable water in a community scale (capacity 5000-80,000 litres/day) have been installed in West Bengal and seven states of the North-Eastern region.

Dr. S.N. Roy said that the aim of the workshop was to share the knowledge and experience amongst the experts of ceramic membranes, drinking water, wastewater treatment, hydrogen production and separation, and carbon dioxide capture etc. He expressed the hope that various industrial sectors would make the best use of the opportunity to maximize their contributions at the global level.

Chief Guest Prof. Binay Kumar Dutta, Chairman, West Bengal Pollution Control Board also addressed the august gathering. He spoke on the relevance of the theme of the workshop, saying that the world is at the crossroads because of a crunch in raw materials and energy. Added to this was the problem of global warming because of increased energy use. Energy sources are getting depleted while energy use is increasing. The picture is not a rosy one, but it is difficult to compromise on energy use. Development implies more consumption of various items, including energy.

Prof. Dutta stated that the entire world is now trying to become more energy efficient and also trying to explore alternative sources of energy. One aspect of becoming more energy efficient involves developing better and newer separation processes, he said. In traditional chemical industries, about seventy per cent of the operating cost goes towards separation processes. So, if more efficient separation processes can be developed, it will help reduce, to some extent, energy consumption in the chemical industries.

Prof. Dutta highlighted that membrane-based separation technology is the most energy efficient separation technology. The Reverse Osmosis (RO) technology of the 1950s and 1960s got commercialized very soon and now these RO modules for the preparation of potable water from seawater are one of the biggest applications of membranes. Of course, earlier membranes were used in gas-filtration but then there was a dramatic evolution of membranes. Many



A view of the audience

different types of applications of membranes came up and some of these applications have found use, not only in industrial processes but also in the area of medical applications.

The biggest membrane market now is for making artificial kidneys. A lot of development has taken place in other areas also. Prof. Dutta said that development of new membranes is a big challenge and much of the expensive membranes used in the country are still imported. He expressed the hope that the technology could solve

the problem of arsenic contamination of drinking water in West Bengal.

Two prizes were awarded for the Best Posters. The prize winner posters were: *Tb-doped Barium Cerate: A High Temperature Proton Conductor for Dense Ceramic Membrane* by Quazi Arif Islam, S. Nag and R.N. Basu of the Fuel Cell and Battery Division, CSIR-CGCRI, Kolkata and *Synthesis and Mechanistic Studies of Rectangular Palladium Nanoparticles* by Debaleena Bhattacharjee & Subrata Dasgupta of the Ceramic Membrane Division, CSIR-CGCRI, Kolkata.

## CSIR-NGRI organizes 13<sup>th</sup> PLANEX Workshop

CSIR-National Geophysical Research Institute (NGRI) organized the 13<sup>th</sup> PLANEX workshop on *Impacts on Solar System Objects* from 6-12 January 2013 at CSIR-NGRI Campus, Hyderabad. This workshop was composed of lectures and interactive sessions for four days, and a field visit to the Lonar impact crater in Maharashtra.

Dr. P. Senthil Kumar, Senior Scientist of CSIR-NGRI and Prof. S.V.S. Murty, Senior Professor of Physical Research Laboratory, jointly convened the workshop. Dr. P. Senthil Kumar guided the participants to the Lonar

crater illustrating the geology of the impact structure. About 35 MSc/PhD/MTech/BTech students from various universities, IITs, and engineering colleges attended the workshop. The participants were given the textbook *Planetary Surface Processes* written by H. Jay Melosh, and a copy of the special issue of the *Elements Journal* on the impact.

Fourteen lectures covered various aspects of impact cratering processes taking place in various Solar System objects (planets, satellites and asteroids), and terrestrial impacts. Lectures were delivered by experts



Group photograph of the PLANEX workshop participants at NGRI

both from national and international institutions. The participants also carried out a small research project on different aspects of the science of impact craters, mentored by experts.

Prof. Mrinal K. Sen, Director, CSIR-NGRI distributed the participation

certificates to all the participants, and Prof. J.N. Goswami, Director, PRL, delivered a motivational lecture to the young participants. The participants said that they had benefited from the workshop and expressed their deep interest in considering planetary geology for their further research career.



## Training Programmes

### **CSIR-NEIST Organizes *Way Forward Programme***

CSIR-North East Institute of Science & Technology (NEIST) organized a *Way Forward Programme* on 26 December 2012 at its premises. DG-CSIR and Secretary, DSIR Prof. Samir K. Brahmachari and Prof. Vani Brahmachari of B.R. Ambedkar Centre for Biomedical Research, Delhi University graced the occasion as Chief Guest and Guest of Honour respectively.

The programme began with a welcome address by Dr. R.C. Boruah, Outstanding Scientist, CSIR-NEIST. Dr P.G. Rao, Director, CSIR-NEIST highlighted the reason behind organizing the programme. He recapitulated what CSIR-NEIST had done so far, particularly in the decade 2002-2012 and the projects scheduled during the 12<sup>th</sup> Five Year Plan. He presented the outcome of the one-day symposium held a few days back urging the scientists to start thinking and planning for research to be carried out in the 13<sup>th</sup> Five Year Plan and beyond which may lead to societal benefits.

In this context, a number of new projects have already been initiated by CSIR-NEIST. The first being establishing a Herbal Drug Processing Unit with manufacturing capacity of 40,000 tubes/day. The unit was inaugurated by the Chief Guest Prof. Samir K. Brahmachari, who also released *Fungi-Destruct*, an anti-fungal herbal formulation developed by CSIR-NEIST, and a brochure on *Fungi-Destruct*. Prof. Samir Brahmachari also inaugurated a 100 KWp capacity Offgrid Solar PV Power Plant appropriately entitled *Surujmukhi*.



Release of Anti-fungal herbal drug Fungi-destruct by Prof. Samir K. Brahmachari, DG, CSIR and Secretary, DSIR



Release of Book Effective Science Writing by Prof. Vani Brahmachari

CSIR-NEIST has added a fully modernized Applied Microbiology Block to its Biotechnology Wing with all the infrastructure and state-of-the-art facility. The Block was inaugurated by Guest of Honour Prof. Vani Brahmachari. The block has a BSL lab of Level II.

Prof. Vani Brahmachari also formally released a book titled *Effective Science Writing* edited by Mrs Pramila Majumdar and Mr Biman Basu and published by CSIR-NEIST

on the occasion. The book was brought out with the objective of helping budding science writers and researchers in effectively popularizing science.

In his speech, Chief Guest Prof. Samir K. Brahmachari appreciated the research work carried out at CSIR-NEIST and said that CSIR-NEIST has justified its establishment through both the research and the societal development of the North East and its people.

### Lectures

## 9<sup>th</sup> PrIEST Lecture on *Colour Matching and Quality Control in Leather Dyeing*

CSIR-CLRI, ILTA, CLCTA and ILPA have been organizing jointly a series of lectures and demonstrations under a Programme for Implementing Emerging and Sustainable Technologies (PrIEST) in Kolkata since April last year. The 9<sup>th</sup> lecture in this series was held on 17 January 2013 at the auditorium of Freya Design Studio in the Calcutta Leather Complex.

Ms. Malathy Jawahar from the Leather Processing Division of CSIR-CLRI delivered the lecture. The lecture was attended by eighty-two persons from various sections of the leather industry and training institutes.

In his short welcome address, ILTA President Shri Arnab Kumar Jha stressed

the importance of colour matching in leather manufacture and shared his own experiences in this area. He said it was indeed very challenging at times to match the grain colour with that of the flesh. Speaking about quality control in dyeing, he said that it was a very critical area as dyeing has a great impact on defect hiding, which in turn is reflected in the grade of the final leather. Shri Jha concluded his speech with the hope that the participants would find the presentation interesting.

Dr. Dipankar Chaudhuri, Scientist in charge of RCED (CSIR-CLRI), Kolkata addressed the gathering and made some observations about PrIEST. Mentioning impressive participation in all the previous lectures and demonstrations, he attributed this to the excitement generated by PrIEST, which, he felt, could be considered as the first step towards implementation of new technologies. Dr. Chaudhuri also presented a brief review of the events organized so far under this programme and reported the present status of the various initiatives taken by RCED.

The speaker, Ms. Malathy Jawahar began her presentation with an explanation of how human beings perceive colour. She emphasised the importance of knowledge and experience of the behaviour of various substrates, as well as dyes and their interaction in colour matching. She spoke about the selection of multiple dyes for combination in colour matching and



Dignitaries on the dais (from the left) Shri Susanta Mallick, General secretary, ILTA, Shri Arnab Kumar Jha, President, ILTA, Ms. Malathy Jawahar, Sr. Scientist, Leather Processing Division, CSIR-CLRI, Chennai and Dr. Dipankar Chaudhuri, Head & Scientist, RCED, CSIR-CLRI, Kolkata



Ms. Malathy Jawahar, Sr. Scientist, Leather Processing Division, CSIR-CLRI, Chennai, making her presentation titled Colour Matching and Quality Control in Leather Dyeing

highlighted the roles played by several factors like dye class, compatibility, exhaustion characteristics, depth of shade, and fastness characteristics. She also recommended a careful consideration of these contributing factors before arriving at the final choice.

Ms. Malathy Jawahar elaborated the various steps to be followed in colour matching and pointed out the need for identification of the dominant hue, selection of a suitable dyestuff of required penetration, exhaustion and fastness characteristics to get the desired hue, picking the minor shading dye for the combination, and prior knowledge of the behaviour of the substrate before proceeding for colour. However, all these require considerable skill and experience, which comes after a lot of time and of course at the expense of material resources like leather and dyestuffs. Moreover, manual colour matching is a slow process with a lot of subjective elements involved in it.

Ms. Jawahar suggested using computer-aided colour matching system for eliminating a large part of these limitations. She informed that computer-aided colour matching was based on reflectance measurement. A spectrophotometer interfaced with a computer takes all the measurements using leather samples for making an objective assessment of matching, which could be used in in-house colour matching as well as quality control in production. While this system could be used for generating various possible combinations of dyes for colour matching for tannery using a database made available beforehand, the same equipment

could prove useful for taking the colour measurement of dye samples in solution form for assuring input quality as well.

She said that CSIR-CLRI was in possession of a database for a group of dyestuffs and that the institute could generate a tailor-made one to suit the requirement of any individual tannery, if it so desires. Ms. Jawahar concluded her presentation by a giving a short demonstration of how colour measurement for leather samples could be taken and recipes could be predicted for colour matching based on the database generated by CSIR-CLRI.

After the presentation session, comments and questions were invited from the participants. Mr. Pankaj Taygi, a



A participant interacting with the speaker



Ms. Malathy Jawahar demonstrating her work to the participants

faculty at Aligarh Muslim University, who is currently pursuing the M. Tech. course at the Government College of Engineering and Leather Technology, asked if the values of  $a^*$  or  $b^*$  (under  $L^*a^*b^*$  system of CIE 1978) could exceed 100. Ms. Jawahar replied in the

negative and advised Mr. Taygi to check the procedures and calculations. Many students, who heard Ms. Jawahar patiently, later met her individually and interacted with her for clarifying their doubts.

### Visits

## Students from NML-Kerala Public School visit CSIR-NML

Under the aegis of the School-NML Interactive Programme (SNIP), a group of fifty Students from NML-Kerala Public School, Jamshedpur accompanied by two teachers, Shri Ashish Prasad and Shri Vikash Kumar Das visited CSIR-National Metallurgical Laboratory (NML), Jamshedpur.

Students, most of whom belonged to Class X, expressed their excitement and happiness over the laboratory visit as

well as interaction with the scientists and research scholars involved in R&D work. The programme was scheduled for three-and-a-half hours, which comprised an overview on Indian Science and Technology, documentary film show on CSIR and CSIR-NML, laboratory visit, career counseling and interaction with R&D personnel.

Prashan Nikumbh a student of Std. X said, "For the first time we came to know about CSIR's contribution in different



S&T areas.” Suney Chandra, a Class X Std., was delighted to know about CSIR products like Tractor, Drugs for Malaria, Asthma, birth control contraceptives, baby foods etc., available in the market for the common people. Gurpreet Singh and Sudhir Kumar Pappu were excited to learn about Mint Menthol based on CSIR know-how, which had made India the largest producer displacing China and provided employment for four crore Indians.

Abhishek Mukerjee and Gurpreet Kaur were motivated to know that DNA fingerprinting technology is a product of CSIR and is often used in our courts in detecting crime. Chetan Kumar and Archana Pandey were excited about the recovery of metals from the Indian Ocean in Goa. Sagar Sharan and Shivam Thakur expressed their happiness that 37 CSIR Laboratories were working in different scientific disciplines for ensuring better quality life for the people of India. Shubham Kumar Chourasia and D. Kumar Karan for the first time came to know about re-use of metals from Electronic Waste. Prem Kumari and S. Manisha expressed their happiness over the significant

achievements of CSIR-NML especially in use of natural resources. Sudhanshu Ranjan and Mr. Anuj Kumar said, “This programme helped us to know how one can develop in life and society by pursuing science.”

Teachers and many students requested another visit to the laboratory. Both the teachers said that this programme would certainly motivate their students to pursue science in a more meaningful way.

Dr. N.G. Goswami, Chief Scientist, Information Management and Dissemination Centre, briefed about the programme and gave an over view of CSIR and NML contribution in different areas like Physical Science, Chemical Science, Bioscience, Engineering Science, and Information Science. Dr. P.N. Mishra Senior Scientist coordinated the lab visits and facilitated in the interactive programme with scientists of the concerned R&D units.

CSIR-NML launched the School-NML Interactive Programme (SNIP) more than a year back. Under this programme, students visit the lab every Friday. The registration is done on ‘first come first serve’ basis. Already 64 schools have participated in the



“For the first time we came to know about CSIR’s contribution in different S&T areas.”

“This programme helped us to know how one can develop in life and society by pursuing science.”

## CSIR-CLRI Scientists Participate in International Footwear Expo at Kozhikode

During the International Footwear Exhibition at Kozhikode, a technical seminar was organised by the organisers of the Kerala Small Scale Association (KSSIA) on 10 December 2012. The main objective of this technical dissemination was to impart knowledge on processing technologies of footwear to footwear manufacturers in Kozhikode. Scientists from CSIR-CLRI participated in the technical sessions of this event.

The seminar was inaugurated by Dr. Debhashish Chatterji, Director, Indian Institute of Management, Kozhikode. In his inaugural address, he touched upon the significant aspects of footwear as a product of importance for customers. He suggested a changeover of the traditional artisan-

based system to mechanised footwear in an organised manner for the development of small and medium enterprises of footwear of Kozhikode.

The topics for deliberation were divided into four sessions, namely Footwear market, Stuck-on process of footwear, Product development and design of footwear and Materials and quality control measures in footwear manufacture.

Shri Salaimaran, Executive Director, FDDI briefly presented the overall view of the world footwear industry and discussed the export data of the countries engaged in the footwear business across the world. He also elaborated the scope and potential of Indian footwear industry to pose challenges.

Shri S. Mathivanan, Senior Principal

Scientist, CSIR-CLRI gave a presentation on the future trends and opportunities for the Indian footwear industry. He touched on aspects like HRD initiatives, skills up-gradation concepts for footwear artisans,



Discussion with Hunstman International officials on polyurethane materials for footwear

adaptation to green technological options, exploring environment friendly materials and applications, market strategies, role of ergonomics and industrial engineering principles, design and development of footwear for deformed foot-related complexities and so on. He said there is a wider gap between the decentralised and organised sectors of footwear and this gap needs to be bridged.

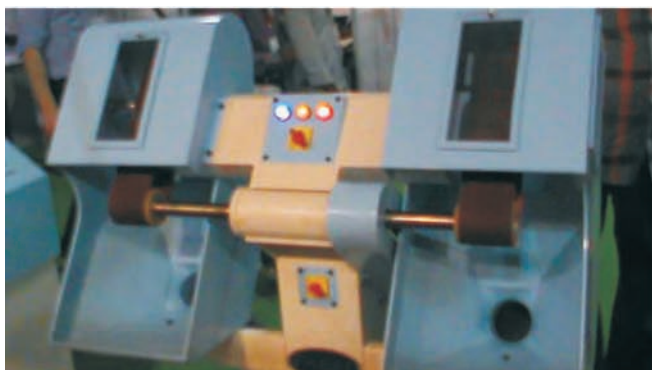
In the second session, Shri Anil Sahoo, Ex-Reebok Technical Director, deliberated on the operational aspects of sports footwear and its technological background. Design modifications to add value gain in terms of material productivity was well explained to the participants. He infused innovative ideas into the mindset of the participants, and made them understand the value and importance of the materials being utilised in the process of footwear manufacture.

Shri S.K. Neogi, Technical Consultant, Mayur Leathers Pvt Ltd, spoke on the product development and design aspects of footwear. In his presentation, he emphasized bright and brilliant prints, colourful shades and heels of varied nature and their necessities in the future market for footwear manufacturers. He specified the engineering concepts on pattern development.

Shri Ganguly, Former Director, CFTI, Agra, and presently working as a consultant for Toe Tech Group, presented the overall mechanical aspects of Stuck On construction footwear for the participants. He described in detail the operational methodologies and the role of footwear machines to perform the process of stuck on based footwear.

In the fourth session, materials and their quality parameters were discussed. Shri Jogan Van Dyck, Global Footwear Technical Head, Huntsman International presented quality aspects of soling materials and environmental friendly technologies in footwear industry. He emphasized the importance of understanding the design characteristics and productivity challenges. His presentation on green technology was felt to be the call of the day for the entire footwear community.

The subject of sole finishing, appeals and effects was deliberated by Shri Sauraba



Footwear machines and materials on display at exhibition

Bhalla, Director, KB Polychem. He emphasized that the release agents play a pivotal role to ease the removal of sole from the mould during the manufacture. He presented the methods in achieving varied finishings like Matt, Gloss, Velvet, Rubberised, Cork, Metallic and Cracked.

The role and application of adhesives in stuck on footwear construction was deliberated upon by Dr. Ashish Chamankar, TS and PD Manager, Henkel Adhesives. His presentation was focussed on driving the footwear industry towards green chemistry applications. He briefly explained the working mechanism and the basic theories of adhesives used in footwear manufacturing process.

Shri R. Mohan, Principal Scientist from CSIR-CLRI presented about the quality aspects of materials used in the process of footwear manufacture. Shri Mohan threw light on standards and specification of varied materials used in footwear.

After the successful conduct of the technical seminar, the inaugural function of the International Footwear Expo was held on 11-12 December at the Kadavu Resort at Kozhikode, Kerala. The Chief Guest of

this function was Padmasri Rafeeq Ahmed, Chairman, Council of Leather Exports and an eminent politician Shri Elamaram Kareem, Former minister of Industries, Kerala was invited to inaugurate this function.

Shri Rafeeq Ahmed expressed happiness at the conduct of the exhibition at Kozhikode and encouraged the young team members of Calicut jointly working for the success of the programme. He expressed his views on the scale-up initiatives of the present value of Rs 200



Cork as a potential material for footwear applications

crores to the tune of Rs 900 crores particularly on the non-leather footwear segment at Kozhikode. He informed the participants about the establishment of a Footwear Design and Development Centre with an investment of Rs 110 crores at Kozhikode. Shri Ahmed opined that the participation

of International exhibitors would certainly boost the progress and prosperity of the footwear sectors, especially on the non-leather based footwear. The SSC Sector Skill Council Development had been planned to impart training to the workforce of 50000 people in our country. He informed that the government of India had allocated a fund of Rs 600 Crores for the execution of this proposal.

Shri Elamaram Kareem said that Kozhikode is progressing with impressive growth in the footwear segment. It is gaining popularity as the manufacturing hub of non-leather based footwear in the country. He announced that the next International Footwear Expo would be held in the month of September 2014 at Kozhikode.

The exhibition comprising 170 stalls had exhibitors from China, Taiwan, Turkey and other countries displaying their machines and materials. This exhibition marked a good beginning for the domestic players to promote their business opportunities in the



Footwear machines for full shoe manufacture

### Honours & Awards

## International Groundwater Conference Young Scientist Award-2012 Conferred upon CSIR-NGRI Scientist

Mr. E. Nagaiah, Senior Technical Assistant of Groundwater Division, CSIR-NGRI, Hyderabad was awarded the Prof. S.C. Puranic Award for Young Scientist for the year 2012 by the International Groundwater Conference (IGWC). The award was presented by Prof. V.P. Singh, Professor Civil and Environmental Engineering, Texas A&M University and Chairman, Scientific Advisory Committee of IGWC, on 21 December 2012 at the 5<sup>th</sup> IGWC held at Aurangabad.

The Young Scientist Award was instituted in the name of the legendary Prof. S.C. Puranic to be awarded to an outstanding earth scientist below the age of 35 years and for scientific contributions in the specific branches of hard rock hydrology and related studies. Mr. Nagaiah was awarded for his work on delineation of zeolite cavities for groundwater exploration using integrated geophysical methods in the Deccan Volcanic Province (DVP). He completed his Doctoral Research in Geology and submitted thesis for PhD degree in Osmania University, Hyderabad in December 2012.



## CSIR-NEIST Scientist Conferred Fellowship of the Royal Entomological Society



Dr. B. G. Unni, Chief Scientist and Area Coordinator (Biotechnology/Biological Sciences), CSIR-North-East Institute of Science & Technology (NEIST), Jorhat, Assam has been elected as a Fellow of the Royal Entomological Society (FRES), London, UK for his significant contribution in the area of Silkworm Biochemistry and molecular endocrinology.

The Royal Entomological Society is one of the oldest entomological societies, founded in 1833 as the Entomological Society of London. In 1855, a Royal Charter was granted to the Entomological Society by Queen Victoria and the privilege of adding the word “Royal” to the title was given by King George V in 1933. The Royal Entomological Society plays a major national and international role in disseminating information about insects and improving communication between entomologists. The fellows are nominated by the Royal Entomological Society for their significant contribution in the area of entomology and related areas.

Dr. Unni's research mainly focused on studies related to isolation and characterization of insect neuropeptides by *in vitro* techniques, its molecular and functional properties with respect to juvenile hormone biosynthesis and silk protein biosynthesis in silkworms and *in vitro-in vivo* assays with the chemically synthesized insect neuropeptides. The research has had significant impact among serifarmers with respect to the enhanced growth of the silkworms and silk fiber quality and quantity.

Dr. Unni is the Fellow of the Indian Academy of Neurosciences and Fellow of Indian Society of Agricultural Biochemists. He is the first Scientist from CSIR-NEIST to get this honour.

Dr Unni has also received other awards and honours such as the Fulbright Fellowship, Texas A&M University, USA; Dr. B.M. Das Memorial Science Award for outstanding contribution in the area of life sciences; Hebrew University Award, Jerusalem,

Israel; DAAD Fellowship to visit Germany under CSIR-DAAD Exchange programme; WellMark International Scholarship, and Best Fulbright Alumni Chapter Leader-South Asia Selected by the United States Education Foundation in India. He was also nominated



to represent India at the International Fulbright Scholars meet at Marrakech, Morocco. Dr. Unni also received the Technology Award for life sciences-2011 awarded by CSIR at the foundation day and Distinguished Sericulture Scientist (2012) at the International Consultative meeting on Seri-biotechnology held at Imphal recently.

Dr. Unni's name had been nominated twice by the Governor of Assam as a member, High Power Committee for development of sericulture activities with special reference to Muga, Eri, Tassar and Mulberry in Assam. He has held other posts including Vice President, Society of Biological Chemists-India (1998-2000); Member, Advisory Board, Post graduate Biotechnology programme (2000-2003); Member, Academic Council, Assam Agricultural University (2001-2003); Member of Research Council, Central Silk Board, Ministry of Textiles, Govt of India (2004-2007); Member Board of Studies-Botany, Nagaland University (2005-2008) and Member Board of Studies-Biotechnology, Saugar University, Madhya Pradesh (2005-2006).

Dr. Unni has published more than hundred research papers in national and international journals, 140 abstracts in national and international conferences, four patents, one technology, 35 papers in proceedings, twenty chapters in books, edited three books/proceedings and guided fourteen students for PhD in biochemistry, biotechnology and life sciences.

The research has had significant impact among serifarmers with respect to the enhanced growth of the silkworms and silk fiber quality and quantity.



## CSIR-IHBT Scientist Elected NAAS Associate and Conferred ISCA Award

Dr. Sudesh Kumar Yadav, Senior Scientist, CSIR-Institute of Himalayan Bioresource Technology (IHBT) has been selected NAAS Associate by the National Academy of Agricultural Sciences from 2013 and conferred Prof. Hira Lal Chakravarty Memorial Award of the Indian Science Congress Association (ISCA) for the year 2012-2013 during the 100<sup>th</sup> Session of the Indian Science Congress at Kolkata.

Dr. Yadav obtained his M.Sc. in 1999 and PhD in 2002 from the Department of Biochemistry, CCS Haryana Agricultural University, Hisar. Subsequently, he worked as post-doctoral fellow at ICGEB, New Delhi (2002-2004). He joined the CSIR-Institute of Himalayan Bioresource Technology (IHBT), Palampur in 2004 and is presently working there as senior scientist.

He has been working in the area of metabolic engineering, gene silencing, abiotic stress tolerance and epigenetic regulations in plants. Under his guidance, one student has been awarded PhD degree and two have submitted their thesis while five more are currently pursuing doctoral studies.

Through research he has contributed towards understanding the caffeine

metabolism in tea and reducing its caffeine levels through gene silencing. Also, flavonoid biosynthetic pathway genes from tea were explored in raising transgenic tobacco plants with improved flavonoid and antioxidants potential. His research work has provided the evidence to the production of low-seeded fruits through decreasing flavonol level by silencing of flavonol synthase. He has also initiated working in the area of epigenetic regulation and role of small RNAs in the metabolic processes of plants.

He has published more than 70 research articles in peer-reviewed journals and has contributed 8 book chapters so far. For his outstanding research contributions in the area of plant sciences, he has been honoured with many prestigious awards, among them being, Indian National Science Academy (INSA)-Young Scientist Award-2008, The National Academy of Science, India (NASI)-Platinum Jubilee Young Scientist Award-2009, Council of Scientific and Industrial Research (CSIR)-Young Scientist Award-2010. He has also been awarded BOYSCAST Fellowship during 2008 by DST for conducting advanced research at University of California at Riverside, USA for one year.



## CSIR-NGRI Faculty Receives ISCA Young Scientist Award for 2012-13

Dr. Parijat Roy, INSPIRE Faculty, Geochemistry Division, CSIR-National Geophysical Research Institute (NGRI) received the ISCA Young Scientist Award for the year 2012-13 in the Earth System Sciences category for his work on PGE geochemistry of kimberlites from Eastern Dharwar Craton, Southern India. He received the award at the Indian Science Congress (ISC) held at Kolkata during 3-7 January 2013. Dr. Roy was also a recipient of the A.P. Young Scientist Award in 2011.



## Krishnan Gold Medal 2012 for CSIR-NGRI Scientist

Dr. M. Ram Mohan, Senior Scientist of the Geochemistry Division of CSIR-National Geophysical Research Institute (NGRI), Hyderabad was awarded the Krishnan Gold Medal for the year 2012 by the Indian Geophysical Union. The award was presented by Dr. V.P. Dimri, President, IGU on 29 October 2012 at the 49<sup>th</sup> IGU Annual Convention held at Pandit Deendayal Petroleum University, Gandhinagar.

Krishnan Medal, instituted in the name of the legendary Dr. M.S. Krishnan, is awarded to an outstanding geophysicist or geologist below the age of 40 years and for significant contributions in the specific branches of geophysics and geology and related sciences.

## Lifetime Achievement Award to CSIR-NGRI Chief Scientist

Dr. Vijaya Rao, Chief Scientist, Controlled Seismic Studies group of National Geophysical Research Institute, Hyderabad, received the *Lifetime Achievement Award* for his significant research contributions in Geophysics, from Indian Institute of Oriental Heritage (IIOH), Kolkata. The award was presented by Prof. Satyanarayan Chakrabarty, Chancellor, IIOH. Dr Rao has carried out studies of the continental crust using seismic refraction /wide-angle reflection and multifold deep crustal near-vertical reflection studies in different parts of the Indian shield. He has also developed new methodologies for modeling complex structures and waveforms . Dr. Rao has published fifty research papers in national and international journals and 17 technical reports.



Dr. Rao receiving the award from Prof. Chakrabarty

### Announcements

Nominations are invited for

### **G.N. Ramachandran Gold Medal for Excellence in Biological Sciences & Technology 2013**

The Council of Scientific & Industrial Research (CSIR) invites nominations for the **G.N. Ramachandran Gold Medal for Excellence in Biological Sciences & Technology for the year 2013**. The award is bestowed every year to an outstanding Indian scientist who has made conspicuously important contributions, applied or fundamental, in the inter-disciplinary subject/field of Biological Sciences and Technology. The award would be given for the work done primarily in India during ten years preceding the year of the award.

Nominations addressed to **Scientist Incharge, SSB YSA Unit, Human Resource Development Group, CSIR Complex, Library Avenue, Pusa, New Delhi 110 012** should be sent as per prescribed proforma (Original + one copy) along with reprints of five most significant publications of the last 10-year's period by **31 May 2013**. The details of the award and the prescribed proforma for nomination may be downloaded from the website <http://csirhrdg.res.in>

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I, Deeksha Bist, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Sd/- Deeksha Bist

Dated 15 March 2013

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