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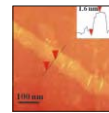
CSIR NEWS

Progress, Promise and Prospects

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C O N T E N T S

Transformation of Carbon Nanotubes to Graphene Nanoribbons



New Cultivars of Chrysanthemum Developed



The Hon'ble Minister Shri Vilasrao Deshmukh Visits TKDL Unit at HRDC, Ghaziabad



IAGR 2011 Annual Convention and 8th International Symposium on, Gondwana to Asia



Two New Books Released by CSIR-NISCAIR



NISCAIR Diamond Jubilee and CSIR Foundation Day Celebrations



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Transformation of Carbon Nanotubes to Graphene Nanoribbons

Scientists at the National Chemical Laboratory (NCL), Pune have recently reported a new method of transforming carbon nanotubes (CNTs) to nanoribbons comprising a few layers of graphene. This was achieved electrochemically by the oxidation of CNTs at controlled potential, followed by reduction to form graphene nanoribbons (GNRs) having smooth edges and fewer defects. Such an “unzipping” of CNTs (single-walled, multi-walled) in the presence of an interfacial electric field provides unique advantages with respect to the orientation of CNTs, paving the way to many new applications enabling possible production of GNRs with controlled widths and fewer defects.

Graphene is a ‘one-atom-thick’ planar sheet of carbon atoms, densely packed in a honeycomb lattice and has possible applications in nanoelectronics, supercapacitors, solar cells, and hydrogen storage. Graphene exhibits many exciting properties, such as room-temperature quantum Hall effect, long-range ballistic transport with ten times higher electron mobility than in silicon, availability of charge carriers that behave as mass-less relativistic quasi particles, and quantum confinement resulting in finite band gap and Coulomb blockade effects, which could be useful for making many novel, next generation electronic devices. However, in order to fully realize these properties and applications, a consistent, reliable, and inexpensive method for growing high-quality graphene layers in excellent yields is crucial, as the existence of residual defects will heavily impact their

electronic properties, adversely affecting almost all these applications.

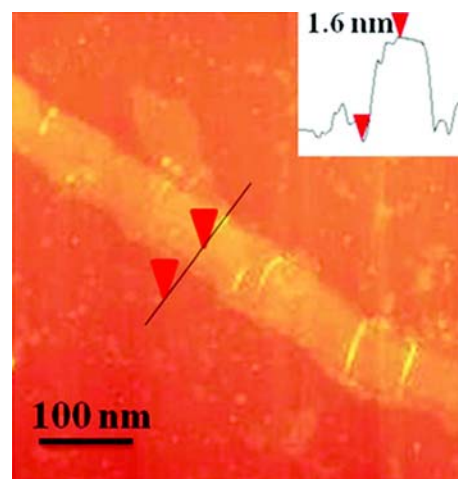
Existing methods of graphene preparation have several major limitations. For example, preparations by mechanical cleavage, silicon carbide sublimation, solvo-thermal synthesis, chemical vapour deposition, and plasma etching suffer from limitations such as poor quality and yield of graphene ribbons, formation of over-oxidized and defective nanoribbons, substrate-dependent behaviour, and the difficulty of controlling both layer thickness and edge smoothness in a predictable manner. Hence, accurate control of the quality of graphene layers along with their preparation in good yields poses a challenge.

Prof. James M. Tour and team from Rice University, Texas, USA in one of the more successful approaches converted carbon nanotubes (CNTs) to graphene with the longitudinal unzipping, using a mixture of potassium permanganate and sulfuric acid, facilitating a large-scale preparation of graphene nanoribbons (GNRs). However, this method has several disadvantages, primarily related to the selection of strong oxidizing agents. The choice to use chemical oxidation itself has serious issues, like over-oxidation of edges creating defect sites, which in turn, hamper the electronic properties of graphene. More significantly, electron mobility and conductivity diminish with this treatment, and there is also a possibility of evolution of explosive gases. In addition, the use of strong reducing agents causes several difficulties in controlling the layer

thickness of graphene ribbons, along with disposal concerns.

In comparison, electrochemical oxidation demonstrated by Dr. Vijayamohan and his student Dhanraj Shinde from NCL, has ensured accurate control of the degree and sites of oxidation (especially with controlled potential techniques) under ambient conditions. Hence, this method is capable of providing more precise unzipping of nanotubes in comparison with chemical and plasma-based approaches.

Since CNTs are graphene sheets seamlessly rolled into concentric tubes, it may be possible from a geometrical perspective to transform CNTs to graphene by a longitudinal cutting of all C-C bonds along the tube axis. Many computational approaches have recently attempted to reveal the exact geometric steps as well as the energetics of the process of unzipping, despite ardent challenges, and all these suggest that it is possible, in principle, to open the tubes by applying an appropriate electric field.



A typical AFM image of graphene nanoribbon made from multi-walled carbon nanotubes by the two-step electrochemical process



The NCL team has proposed an unprecedented method for transforming CNTs to GNRs by using an electrochemical approach with the unique advantage that it allows controlling the graphene layer thickness and orientation. The electrochemical approach is an effective way to modify electronic states by modulating the electric field (chemical potential) to change the Fermi level of the electrode materials. An interfacial electric field is expected to orient the CNTs in this method, and hence longitudinal unzipping is more likely with possible C-C cleavage initiated at topological defects having enough strain, rather than a random breakdown in chemical methods.

Dr Vijayamohanan says that large graphene sheets cannot be made in this way, since the size of the graphene is limited by the diameter of the multi-walled carbon nanotubes (MWCNTs). However, single, double and multi-walled carbon nanotubes, all can be opened by this uncanny approach which validates the generic utility of this approach as verified by collaborative support from Dr. Aslam's group in IIT-Mumbai.

This study has opened new pathways for the preparation of high-quality graphene in good yield, and there are also profound implications for certain applications like field emission, fuel cells and Li battery electrodes, where CNTs are continuously kept under an electric field, and the durability of such materials could be affected by this continuous transformation.

(Dr. Vijayamohanan is now with Central Electrochemical Research Institute (CECRI), Karaikudi)

For Further Reading:

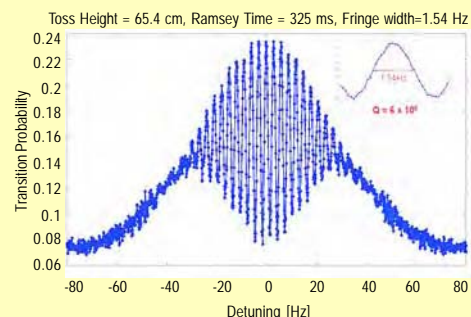
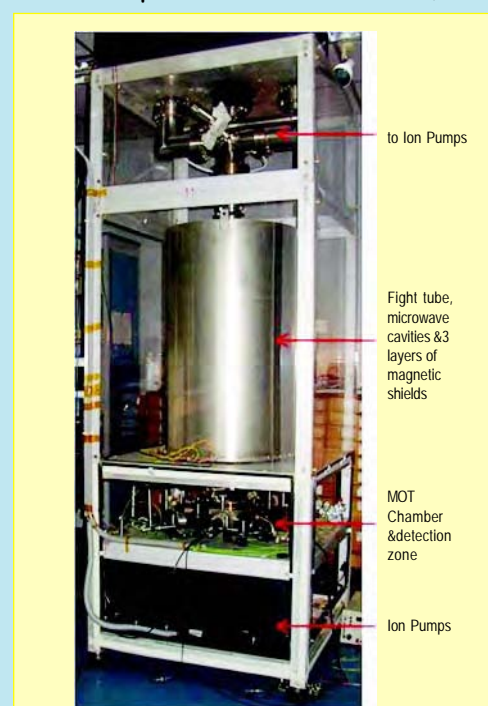
1. B. Shinde, Joyashish Debgupta, Ajay Kushwaha, Mohammed Aslam, and Vijayamohanan K. Pillai, Electrochemical Unzipping of Multi-walled Carbon Nanotubes for Facile Synthesis of High-Quality Graphene Nanoribbons, *J. Am. Chem. Soc.*, 2011, 133, 4168–4171
2. D. V.; Higginbotham, A. L.; Sinitskii, A.; Lomeda, J. R.; Dimiev, A.; Price, B. K.; Tour, J. M., Longitudinal unzipping of carbon nanotubes to form graphene nanoribbons, *Nature*, 2009, 458, 872–877.

First Ramsey Fringes Observed with the Cs Fountain Clock Developed at NPL, New Delhi

National Physical Laboratory (NPL), New Delhi has reported the successful development of the first and only Cs fountain clock in India. This is one of the most accurate clocks on Earth, based on laser cooled atoms of Cs. Such a clock also acts as primary frequency standard. In this fountain, trapping of about 10 million atoms and cooling these to a few μK above absolute zero, has been demonstrated.

These atoms could be launched up to a meter and the return signal is detected by measuring the fluorescence. During the flight, these cold atoms interact with a synthesized microwave signal twice and this leads to its operation as an ultra-precise clock. The first clock signal (Ramsey Fringes) was recently demonstrated at NPL.

There are at the moment less than about ten Cs fountains around the world, which are pushing the limits of the most accurate measurements on Earth – namely, measuring time to better than about one part in 10^{15} . To help visualize this level of accuracy – imagine measuring the distance between the Earth and the Sun with an accuracy of one tenth of a millimeter.



The Fountain Clock designed and developed by NPL Scientists (*top*) and the First clock signals or Ramsey Fringes (*bottom*). This clock, when operated continuously, will lose or gain one second in several million years



New Cultivars of Chrysanthemum Developed

The National Botanical Research Institute (NBRI), Lucknow has recently developed the following new varieties of Chrysanthemum:

NBRI Kaul

This cultivar of chrysanthemum has been evolved by hybridization and named *NBRI Kaul* to honour Late Prof. K. N. Kaul, the Founder Director, NBRI, Lucknow. The hybrid has been raised after crossing chrysanthemum cultivar *Lal Pari* by *Vijay*. The plant has been raised by seeds obtained from the parent hybrid. The selection was made in the year 2008 and plants were propagated vegetatively in 2009 by cuttings and suckers. DUS testing was conducted in 2009-10.

This new variety of chrysanthemum attains a height of 56 cm with good spread of 35 cm (N-S) and 37 cm (E-W). It has a well-developed branch

system and blooms in the last week of November. The plant has floriferous blooming habit with 88 flowers per plant. The average size of the flower across is 5.0 cm and the central disc is 1.50 cm. The beauty of this cultivar can be enjoyed at full bloom stage. The main attraction is purple coloured flower head where ray florets and disc florets are arranged in a very systematic pattern.

The flower is single Korean type with central disc floret, which are arranged in pin-cushion fashion. The ray florets are emerging out side and have purple colour (Red-Purple Group 58A, Fan-2). The colour of disc florets is



NBRI Kaul

yellow (Yellow Group 13A, Fan-1), which gives additional beauty to the flower. The uniqueness of this cultivar is that it has rare flower colour combination of ray and disc florets, and secondly, it shows early blooming as flowering starts in mid-October.

NBRI Khoshoo

This cultivar of chrysanthemum is also evolved by hybridization and named *NBRI Khoshoo* to honour Late Dr. T. N. Khoshoo, the Former Director, NBRI, Lucknow. The hybrid has also been raised after crossing chrysanthemum cultivar *Lal Pari* by *Vijay*. The new cultivar is a seedling selection. The plant has been raised by seeds obtained from the parent hybrid. The selection was made in the year 2008 and plants were propagated vegetatively in 2009 by cuttings and suckers. DUS testing was conducted in 2009-10.

This new variety of chrysanthemum attains a height of 56 cm with good

spread of 56 cm (N-S) and 44 cm (E-W). It has a well-developed branch system. It blooms in the last week of November. The plant has floriferous blooming habit with 63 flowers per plant. The average size of the flower across is 4.6 cm and the central disc is 1.40 cm. The beauty of this cultivar can be enjoyed at full bloom stage. The main attraction of this cultivar lies in grayed-red coloured flower head where ray florets and disc florets are arranged in a very systematic pattern.

The flower is single Korean types with central disc floret are arranged in pin-cushion fashion. Four to six tiers of ray florets are emerging outside and



NBRI Khoshoo

have gray-red colour (Gray-Red Group 180A, Fan-4). The colour of disc florets is yellow (Yellow Group 9A, Fan-1) which gives additional beauty to the flower. The uniqueness of this cultivar is early blooming (Last week of October).



Asmon – CSIR's Gift to Alleviate Asthma

Dr. P. Cheena Chawla

It is only at death that the breath and the body separate. While in conscious state, we remain oblivious of the rhythmic flow of breath going in and out of our body. The fact remains that this constant alternate breathing in of oxygen and breathing out of carbon dioxide keeps us alive. Unfortunately, this process of breathing is compromised in about 300 million people worldwide who suffer from asthma, as the flow of air through their lungs is obstructed. Coming to the rescue of such people, CSIR has played a nodal role for developing a herbal medicine to treat asthma.

Called *Asmon*, this drug is gifted to the Nation by CSIR scientists working at the Indian Institute of Chemical Biology (IICB), Kolkata. Thanks to the wide-ranging research activities undertaken by CSIR scientists to understand this disease at cellular and molecular levels, we are today aware of the allergic proteins that cause asthma, and also know about a few candidate genes for asthma where single nucleotide polymorphisms (SNPs) have been identified. About 100 genes have been associated with asthma in different populations, and most of these genes are related to the immune system or those which modulate inflammation.

When we inhale oxygen, it reaches the lungs through the windpipe/trachea, which divides into two large tubes or bronchi, one for each lung. Each bronchi further divides into millions of thin, tiny air passages called 'bronchial

tubes' through which the inhaled oxygen passes before it reaches the round structures, present at their tips, called the air sacs or alveoli. These airways become smaller and narrower as they get deeper into the lungs, just like the branches of a tree that are smaller and narrower than the tree trunk. It is in the alveoli that the exchange of gases occurs, as the inhaled oxygen gets into our bloodstream through the rich capillary network surrounding the alveoli, while carbon dioxide — a by-product of cellular metabolism — passes into the air passages, through the capillary network around alveoli, to be exhaled out through the nostrils.

This wonderful in-built process continuously replenishes the oxygen in our bloodstream and removes the waste gas. The airways are blocked in people with asthma, which is why they suffer from laboured breathing that is often accompanied by coughing, chest tightness and wheezing during an asthma attack. It is unfortunate that many victims of asthma are children and young adults. The blocking of airways primarily occurs due to swelling of the airways, called 'inflammation'; squeezing of the airways causing tightness in the chest called 'bronchoconstriction' and plugging up of the airways with mucus that makes breathing very difficult. If uncontrolled, the symptoms of severe asthma can become life-threatening, leading to respiratory arrest and death.



The basic abnormality that causes asthma is the hyper responsive reaction of the body to specific and non-specific stimuli called the triggering factors. Environmental pollution caused by industrial emissions and automobile exhaust can cause an asthma attack. Environmental tobacco smoke, also called 'second-hand smoke' is another common allergen that may trigger an asthma attack. Various allergy-causing agents like pollen, dust, mites, cockroaches and their droppings may trigger an asthma attack. Some people may also be allergic to their pet's fur. Strenuous physical exercise, weather conditions such as thunderstorms, high humidity and freezing temperatures besides some foods, food additives as well as some medicines can also trigger an asthma attack. Hormonal changes in adolescent girls and adult women associated with their menstrual cycle can aggravate asthma. Psychological stress is also a trigger to asthma attack as there may be increased inflammatory



response to allergens under stressful conditions.

Based on patient history and symptoms, different patients are given different medicines. Besides, some medicines are inhaled, while others are taken as a pill. Inhaled 'corticosteroids' help to suppress inflammation and reduce the swelling of the lining of the airways. However, long-term use of corticosteroids can have many side effects including the redistribution of fat, increased appetite, blood glucose imbalance and weight gain. High doses of steroids may also cause osteoporosis. Similarly, there are drugs called 'mast cell stabilizers', which help to prevent the initiation of the allergy reaction. Drugs called 'anticholinergics' relieve spasm and reduce the formation of mucus. 'Methylxanthines' comprise drugs that act as bronchodilators with minimal anti-inflammatory effect.

In contrast to the wide range of

synthetic drugs, *Asmon* is a herbal medicine that provides relief from the distressing symptoms of asthma. The herbs used in developing *Asmon* have been known to people over the centuries, and are hence safe. The technology for developing *Asmon* has been transferred to M/s Herbochem Remedies India Pvt. Ltd., Kolkata. This Company has got the Drug License for manufacturing and marketing *Asmon* as a traditional medicine.

Inflammation of the main air passage of the lungs is the hallmark of asthma. This is caused by the production of biologically active compound called leukotrienes. These molecules contribute to the inflammation, swelling (edema), bronchoconstriction (tightening of muscles around the airways) and mucous secretion seen in the airways of patients with asthma. Therefore, prevention of the production of

leukotrienes by blocking of the oxidation of Arachidonic Acid (AA) by 5-lipoxygenase is considered to be the best treatment. The new class of drugs namely, anti-leukotrienes, have thus opened up a new direction in the treatment of asthma. This is exactly what the herbal formulation of *Asmon* does, as it inhibits the arachidonic acid oxidation, and thus has an anti-leukotriene function. Bronchial asthma patients of all ages can take this medicine safely. No doubt, *Asmon* users have shown improved airway function with gradual elimination of the currently used medication.

Staying away from stimuli that trigger an asthma attack, knowing the warning signs and timely medication are indeed crucial to control asthma. *Asmon*, a CSIR product, can help alleviate the suffering of asthma and bring relief to many of its distressing symptoms.

CBRI Transfers Two Technologies to M/s Navin Fluorine International Limited, Mumbai

The Central Building Research Institute (CBRI), Roorkee has taken an initiative of joining hands with a Private Company named M/s Navin Fluorine International Limited, Mumbai for transfer of Technology. The process know-how of the following two technologies has been recently taken by M/s Navin Fluorine International Limited, Mumbai:

1. Formulation of High Strength Plaster from Fluorogypsum

2. Formulation of Flooring Tiles from Fluorogypsum.

One Research Project entitled, *Development of Light Weight Bricks/Blocks from Fluorogypsum* has been sponsored to translate R&D efforts into useful venture. This Programme would lead to exchange of R&D efforts between CBRI, Roorkee and M/s Navin Fluorine International Limited, Mumbai. In consideration of the work to be carried in the Project, M/s Navin Fluorine

International Limited, Mumbai shall pay to CBRI Rs. Twenty lakhs only. A Memorandum of Understanding (MoU) has been already signed between Prof. S. K. Bhattacharyya, Director, CBRI, Roorkee and Shri Shekhar Khanolkar, Managing Director, M/s Navin Fluorine International Limited, Mumbai at CBRI.

The know-how for above two technologies was recently transferred to M/s Navin Fluorine International Limited,



Mumbai. On this occasion Prof. S. K. Bhattacharyya highlighted the salient features of CBRI activities in the recent past and also mentioned about the different on-going Projects of the Institute. Dr. (Mrs.) Mridul Garg informed that CBRI, Roorkee has taken this activity and started a new era of collaboration with M/s Navin Fluorine International Limited, Mumbai under the guidance of Prof. S. K. Bhattacharyya. Dr. A. K. Minocha, Sr. Scientist informed that M/s Navin Fluorine International Limited, Mumbai is also interested to undertake further collaborative projects. Shri Partha Roy Chowdhary, Vice President (Finance) of M/s Navin Fluorine International Limited, Mumbai visited different laboratories of the Institute and expressed happiness over the high quality R&D work being pursued at the Institute.



Transfer of Technologies in progress

NML, Jamshedpur Signs Agreement with Essar Steel Ltd., Mumbai

National Metallurgical Laboratory (NML), Jamshedpur signed an Agreement with Essar Steel Ltd, Mumbai for carrying out collaborative work in the areas of Mineral Beneficiation, Iron and Steel Making, Corrosion Engineering, Alloy Development, Advanced High Strength/Special Steels and Component Integrity. Mr. A. Das, Sr. Vice President, Essar Steel Ltd, signed the Agreement on behalf of Essar Steel and Dr. S. Srikanth, Director, NML, signed the Agreement on behalf of NML.

Mr. Das expressed his pleasure and described this as a memorable event for Essar Steel Ltd. as this Agreement would result in cementing relations between the two organizations. Dr. Srikanth also expressed his joy in reaching this Agreement with Essar Steel and hoped that this would only be a beginning to a long-term professional relationship with Essar Steel Ltd.



Signing of the MoU in progress: Mr A Das, Sr. Vice President Essar Steel Ltd. (left) and Dr. S Srikanth, Director, NML

Sharing a pleasant moment after the signing of the MoU





Shri Vilasrao Deshmukh, the Hon'ble Minister of Science & Technology and Earth Sciences, and Vice President, CSIR Visits TKDL Unit at HRDC, Ghaziabad

Shri Vilasrao Deshmukh, the Hon'ble Minister of S&T and Earth Sciences, and Vice President, CSIR visited the TKDL Unit at HRDC, Ghaziabad on 12 October 2011. The Minister was welcomed by Team-TKDL. In his Welcome Address, Shri V. K. Gupta, Sr. Advisor & Director, TKDL delivered a presentation on Traditional Knowledge Digital Library and also briefed the Minister on the activities of Human Resource Development Centre.

While addressing the gathering, the Honorable Minister expressed his happiness that TKDL has given global leadership position to India in the area of TK protection. He advised Team-TKDL to take the strategic advantage of WIPO's interest in internationalization of TKDL. He also offered his support in creating affordable drugs through TKDL by making TKDL accessible to National Research Institutions. He complimented CSIR and Team-TKDL

for taking this initiative and urged to take other areas of Traditional Knowledge under TKDL umbrella.

The Hon'ble Minister was taken around the TKDL facility. Before leaving, he penned the following remarks on the Visitor's Book of TKDL Unit: *"Very much impressed by the work done. Congratulations & Best Wishes."*



Glimpses of the Visit





Address by Shri Vilasrao Deshmukh, the Hon'ble Minister of S&T and Earth Sciences, and Vice President, CSIR

Mr. V. K. Gupta, Director, TKDL; Scientists and Members of TKDL team, I am happy to be amongst all of you. I am indeed impressed that TKDL has given Global leadership position to India in the field of Traditional Knowledge and Intellectual Property Rights.

I do recall that when United States granted patent on the wound healing properties of turmeric, it did cause enormous National distress, since it was not acceptable that how United States can grant patent on turmeric when Indian housewives are widely using turmeric for its wound healing properties. It was Dr. Mashelkar who fought the patent and got it cancelled.

I could see that misappropriation of our Traditional Knowledge did not happen only for turmeric but Multi-National Companies have been taking away our knowledge of Ayurveda, Siddha and Unani systems of Medicine for their personal profit. In fact, all the developing countries in the world are struggling to protect their Genetic Resources & Traditional Knowledge and due to the vested interests of Multi-national Companies, not much progress has been achieved at forums such as World Trade Organization and World Intellectual Property Organization (WIPO). It is in this background that TKDL is proving to be a successful tool in protecting our Traditional Knowledge very effectively.

I understand that WIPO wishes to set up a 'TKDL Developmental Center' in collaboration with CSIR in New Delhi for the benefit of other developing countries. We, therefore, need to take

the strategic advantage of this initiative. TKDL Project has proved that today Indian Scientists and Engineers are making 21st century India's presence felt and recognized at global level.

Today we feel proud that in addition to Information Technology, India is creating global first in other areas also. It is indeed remarkable that with technical tools like TKDL, we are able to get cancelled wrong patents at Patent Offices of the United States and Europe at no cost and within a period of few weeks, whereas other countries take 10-12 years to achieve the same and have to incur costs running into million of US Dollars.

By creating TKDL, CSIR has been able to create global respect for our culture and civilization since Ayurveda, Yoga etc., were created in 2500 BC which today's multi-national corporations are trying to misappropriate and TKDL is able to prevent such attempts.

I am also impressed that CSIR has been able to successfully conclude

TKDL Access Agreements with developed countries such as US, Europe, Japan, Australia, Canada, UK etc. at our terms. I can see the vast potential of TKDL in creating affordable drugs for which TKDL needs to be made accessible to National Research Institutions and I would give all my support for this. I appreciate the TKDL success against the attempt of biopiracy by MNCs. I hope all this good work will continue in future.

I compliment CSIR and TKDL team for this excellent work and would urge them to take other areas of Traditional Knowledge such as traditional food, traditional architecture, handicrafts etc. under the TKDL umbrella. As Minister and Vice President of CSIR, I am always with you and shall support you in your future endeavours. My sincere thanks to Mr. Gupta for a very precise and effective presentation. My Best Wishes to you all.

Thank you.



A group photograph of Team TKDL with the Hon'ble Minister of S&T and Earth Sciences and Vice President, CSIR, Shri Vilasrao Deshmukh



IAGR 2011 Annual Convention and 8th International Symposium on, *Gondwana to Asia – Super Continent Dynamics: India and Gondwana*

As part of the Golden Jubilee Celebrations, National Geophysical Research Institute (NGRI), Hyderabad organized the 2011 Annual Convention of the International Association of Gondwana Research (IAGR), and the 8th International Symposium on, *Gondwana to Asia* under the major theme, *Super Continent Dynamics: India and Gondwana* during 26-28 August 2011. About 110 participants from 6 countries (Australia, Korea, Japan, Sri Lanka, India and Belgium) attended the Conference. The Ministry of Earth Sciences and the Department of Science and Technology, Government of India along with CSIR, India jointly sponsored the Symposium. It was organized by a team of volunteers from the NGRI, Hyderabad led by Y. J. Bhaskar Rao (Convener, and Acting Director of NGRI) and co-conveners, A.P. Singh and E.V.S.S.K. Babu.

The Symposium was inaugurated by Prof. Harsh K. Gupta, President, IUGG and the Geological Society of India and Advisory Committee Member, IAGR. The Technical Sessions were organized into three regular sessions of oral presentations on the following themes: 1. Early History of the Cratons: Structure, Composition and Dynamics, 2. Building and Breaking of Supercontinents with Focus on Gondwana, 3. Orogenic Belts, Sedimentary Basins and Resources. A total of seven Keynote Addresses besides 37 Oral and 33 Poster Presentations were made, which outlined the latest results from

geophysical, geological, geochemical and geochronological studies.

The GR Best Paper Award was presented during the Symposium to Prof. Yukio Isozaki of Japan. The student poster entitled, “*Zone of Detachment at the NW Margin of Kanjamalai Hills, Cauvery Suture Zone: Implications to Accretion Tectonics* (D.P. Mohanty and T.R.K. Chetty) was adjudged the best and was presented with the *IAGR Best Student Poster Award*. The Symposium ended with a Plenary Discussion where all the participants interacted. The latter highly appreciated the merit of the Symposium in terms of the new data and ideas presented and the ensuing fruitful discussions on different themes that spurred ideas for further collaborations.

The Symposium was followed by a two-day field excursion (August 29-30, 2011) where about 30 delegates visited a dozen interesting outcrops that

represented important litho-units of the Archaean granite-greenstone basement and its overlying Meso-proterozoic sedimentary along a 150 km trail, which was across the Eastern Dhawar Craton between Hyderabad and Nagarjunasagar. This was also an opportunity to visit Asia’s largest masonry dam and Buddhist archaeological sites, a page from the ancient Indian culture, nearly 1000 years.



Release of the book on the occasion of NGRI Golden Jubilee Celebrations and IAGR Annual Convention (left to right) Dr.M. Santosh, Secretary General of International Association of Gondwana Research (IAGR); Dr.Harsh K. Gupta, President of IUGG; Dr.Y.J.Bhaskar Rao, Acting Director of NGRI and Dr.T.Harinarayana, Chairman, NGRI Golden Jubilee Celebrations Committee



A group photograph of the participants of the IAGR 2011 Annual Convention and 8th International Symposium on *Gondwana to Asia*

CBRI Organizes Workshop-cum-Training Programme on, *Achieving Quality in Building Construction*

A two-day Workshop cum Training Programme on, *Achieving Quality in Building Construction* was recently organized by Central Building Research Institute (CBRI), Roorkee for engineering staff of *Sarva Shiksha Abhiyan* (SSA), Uttarakhand at CBRI.

The Training Programme was inaugurated by Dr. N. M. Bhandari, Professor, Department of Civil Engineering, Indian Institute of Technology (IIT), Roorkee. He graced this Programme as the Guest of Honour. In the absence of Shri R. K. Sudhanshu, IAS, Secretary, Technical and Higher Education, Govt. of Uttarakhand and Chief Guest of the Function, Dr. A. K. Mittal, Scientist, CBRI and Programme Coordinator read the message of the Chief Guest. The proceedings of the Training Programme were also released in the opening ceremony. Shri S. G. Dave, Chief Scientist, CBRI presided over the Function.

The Workshop was attended by 48 engineers from all the thirteen districts of Uttarakhand. Eminent speakers like Shri. S.G. Dave, Dr. B.K. Rao, Dr. A.K. Mittal, Shri. S.K. Negi, Shri. A.K. Shriarma, Shri. Ajay Choursia, Dr. L.P. Singh, Shri. Rajeev Kumar Sharma, Shri. Jajaj Parashar, Shri. I.A. Siddiqui and Shri. Deepak Dharmshaktu delivered lectures and shared their experience. They discussed on the basics of earthquake engineering, latest construction practices and achieving quality in building construction. A demonstration of reinforcement detailing



Lighting of Lamp by the Dignitaries



Release of Course Proceedings



Demonstration of Concrete Block Construction



Closing Ceremony of the Course

and concreting was a part of the Training Programme. Some of the important lecturers were on the following topics:

- Basics of earthquake engineering and building design
- Special soil and foundation systems
- Precautions and quality control during concreting for small civil works
- A glimpse on CBRI R&D for commercial/ mass applications
- Basic building materials
- Construction practices and vernacular architecture in Uttarakhand
- Inspection & testing plan for construction materials
- Precautions during brick masonry construction
- Achieving quality in construction –

A challenge

- Quality control strategy for *Sarva Shiksha Abhiyan* (SSA) school buildings
- Demonstration of reinforcement detailing and concreting for building construction
- Quality control in building construction using non-destructive testing

The closing ceremony was held on 20 August 2011. Prof. S. K. Bhattacharyya, Director, CBRI, Roorkee, presided over the Function and distributed the certificates to Shri. Manish Mittal, Executive Engineer and his team of AEs and JEs. Dr. A. K. Mittal, Programme Coordinator



proposed the Vote of Thanks to the participants, faculty and the organizing team. A feedback study was carried out by the organizers at the end of the event, from which it clearly came out that the Workshop cum Training Programme was highly appreciated by the participants but they requested more time for demonstrations or practical work.



A group photograph of course faculty and participants

Training Programme on, *Content Management Using Open Source Tool – 'Drupal'* Organized by NAL

The development of a good number of Internet resources for managing electronic information has come as a boon for library information professionals which was rather a challenge earlier. Well-designed organization portals are needed for dissemination of web resources to the user community effectively and efficiently. Integration of these open source or commercial web resources into a single window enhances the information dissemination through content management tools, such as *Drupal*, *Joomla*, *OpenCMS* and *WordPress*. To share the expertise and vast experience accrued in the use of *Drupal*, ICAST, the National Aerospace Laboratories (NAL), Bangalore organized, in the recent past, a three-day hands-on Training Programme entitled, *Content Management Using Open Source Tool – 'Drupal'*.

Drupal is an open source platform-independent CMS (Content Management Software) tool. It's features are simple, flexible, customizable, multi-platform, multi-

lingual, web 2.0 compliant with web-based administration, having powerful report generation functionality, including well-organized browse and search facilities. Nearly 5000 registered websites are currently using *Drupal* across the globe in various languages – a testimony to its robustness and maturity.

The participants, about 30 in number, were from various CSIR laboratories and other Institutions like ISRO, DRDO, academic Institutions and even corporate sectors from different parts of the country. The Inaugural Function was presided over by Dr. A. R. Upadhyaya, Director, NAL in the presence of Mr. Shyam Chetty, Scientist and Chairman of Library Advisory Committee. The Welcome Address was delivered by Dr. Poornima Narayana, Head, ICAST and Coordinator of the Training Programme.

Mr. Shyam Chetty in his brief address appreciated the ICAST efforts in reaching out to the user community through its invaluable resource collection as well as various value-added initiatives in implementing contemporary library

automation software. He added that the ICAST is quick to adopt the latest tools and technologies to provide effective, versatile and efficient services. Further, he lauded ICAST's efforts to reach NAL scientists through various outreach programmes, especially in uploading documents to NAL's Institutional Repository and its assistance in providing citations, citation analysis, h-index values and journal impact factor for publications in core journals.

The two major ICAST initiatives, the Aerospace Portal *AeroInfo*, and *Union Catalogue of CSIR-DST Aerospace Serial Holdings*, were launched during the Inaugural Function. By deploying *Drupal*, ICAST designed the *AeroInfo* portal, the one-of-its kind portal in the country, which has multiple contents: links to aerospace sources, interactive discussion pages and many others.

The invaluable inputs towards content creation in *AeroInfo* from Dr. L. Venkatakrisnan, Head, EAD, Dr. V. Mudakavi, Head, CTFD and Dr. G. K. Suryanarayana, Dy. Head, NTAF were



duly acknowledged. Also, to meet the growing needs of CSIR scientists, ICAST developed the dynamic *Union Catalogue of Journal Holdings* of 63 CSIR-DST institutions to facilitate resource sharing among its users. This dynamically structured database has browse and search facilities, and has the added feature of on-line request for information from any of these 63 institutions for faster access to the information resource.

Dr. A. R. Upadhyaya in his Presidential Address was appreciative of the advances and developments of tools in library information technology in making available the vast information in a user-friendly environment. However, he opined that with the availability of a large number of open-source tools one has to be cautious in selecting the right

tool for implementation keeping in mind the related issues like their features, adoptability, compatibility and cost. He expressed his happiness about the service-oriented initiatives of ICAST and its continuous strives to initiate innovative services by exploring open source software and CMS.

Dr. Upadhyaya further said, "I feel privileged to state that ICAST has been recognized as one of the most reputed and well-known information centers, both at the National and International levels." He thanked the ICAST leadership and their tireless efforts in reaching to that position. He also thanked them for adopting the Open Access Policies, and had a word of praise for the development of NAL Institutional Repository of its own publications, one of the top ranking repositories in the

world. Mrs. K. P. Sudhalakshmi later proposed the Vote of Thanks.

The three-day Training Programme extensively covered the various aspects of *Drupal* software including its installation and configuration on both Windows and Linux platforms, various modules, themes and views, custom content creation, report generation and backup to name a few. The resource experts, Mr. B.S. Shivaram and Mrs. S. Jayashree along with their team members ensured that the participants, organized in batches, built their representative institutional web portal before the end of the Training Programme. The feedback from the participants was encouraging and had some observations and suggestions for improvement.

Training Programme on, *Quality Production of Biofertilizers at NBRI*

The National Botanical Research Institute (NBRI), Lucknow, in collaboration with Department of Agriculture through *Rashtriya Krishi Vikas Yojana* organized a Training Programme on, *Quality Production of Biofertilizers* for officials and technical staff of 17 Biofertilizer production units, from U.P. State Government.

The Programme was attended by the Chief Guest Dr. Mukesh Gautam, Director Agriculture, U.P. Govt. who talked about the importance of biofertilizers and how NBRI and Agriculture Department can together work on quality production of biofertilizers. The Guest of Honour Dr. A. N. Mukhopadhyaya discussed the role of Central Insecticide Board in checking the quality of biofertilizers.

Dr. C. S. Nautiyal, Director, NBRI assured the support of NBRI to the Agriculture Department, U.P. Govt. by providing best strains for quality production of biofertilizers.

Other distinguished guests from the Agriculture Department were Shri A.K. Singh (Addl. Director, Agriculture) and Shri L.B. Singh (Joint Director, Agriculture) who discussed the importance of biofertilizers for sustainable agriculture. Dr. C. P. Srivastava (Deputy Director) also addressed the gathering. Dr. Dr. A. K. Goel, Dr. R.K. Roy and Dr. R.S. Chaurasia gave lectures to the officials and technical staff on quality



Discussion on the importance of biofertilizers in Agriculture in progress

production of biofertilizers in agriculture. Practical demonstrations on quality production of biofertilizer were also given to the participants. Mother cultures of *Rhizobium* and Phosphate Solubilizing Bacteria (PSB) were distributed to the participants.



Two New Books Released by CSIR-NISCAIR

Two of NISCAIR's most recently published books were released on 11 October 2011 at a function organized at the Shanti Swarup Sabhagar in the CSIR Headquarters. The National Institute of Science Communication And Information Resources (NISCAIR) has carved out a niche for itself in the area of dissemination of scientific information to the scientific community through its 19 scientific journals; it has also been taking science to the people through its three popular science magazines (*Science Reporter*, *Vigyan Pragati* & *Science ki Duniya*), and also publishing books on various topics of science & technology.

The books were released by Prof. S.K. Sopory, Vice Chancellor of the Jawaharlal Nehru University and Prof. Mridula Mukherjee, noted historian and former Director of the Nehru Memorial Museum and Library. Former President of NASSCOM, Dr Kiran Karnik and Mr Ge Songxue, Counsellor of Science & Technology Office, Embassy of China in India, were the guests of honour.

The first book, *Constructing Culture of Science: Communication of Science in India & China*, is an effort to put a wide range of issues related to communication of science and public understanding of science in India and China on the anvil of a serious debate. The book attempts to narrate the story of science communication in the two most populous and also the fastest



A view of the dignitaries on the dais

emerging economies of the world. There is no book that compares science communication efforts being made in two cultures, in such detail.

The second book, *Quality Education & Excellence in Science Research in Indian Universities* gives a bird's eye view of the significant deliberations at the 98th Indian Science Congress held at Chennai in January 2011. The volume records the debates, deliberations and discourses in the 14 Sectional Sessions and the 17 Plenary Sessions addressing key issues such as science policy agenda for the next five years, challenges of maintaining quality education, enhancing academia-industry interaction, addressing challenging science issues of climate change, threat to fragile coastal ecosystems, food and nutrition security and so on.

While releasing the book *Constructing Culture of Science: Communication of Science in India & China*, Prof. Mridula Mukherjee said that Pandit Jawaharlal Nehru would have been the most happiest person, not only because the book talks about his

favourite topic of science and scientific temper, but also because the book reflected the kind of cooperation and coordination between India and China that he always yearned for. Prof. Mukherjee also said that Nehru was fascinated by scientific phenomena and science for him was a vehicle for giving people a better life. She was happy

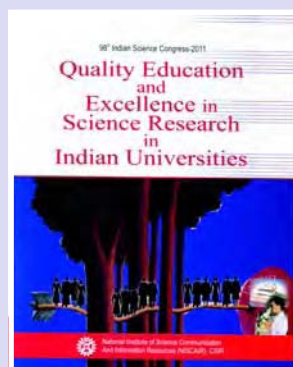
that NISCAIR was working towards making that Nehruvian framework a reality.

Dr Karnik congratulated NISCAIR and the China Research Institute for Science Popularisation (CRISP), Beijing for having documented science communication in the two countries in such an excellent fashion. Dr Kiran Karnik said that the challenge for science communication was creating an excitement in children about science by looking at the method of science.

Prof. S.K. Sopory, VC-JNU, who released the book *Quality Education & Excellence in Science Research in Indian Universities*, congratulated the NISCAIR team for having done an excellent job of recording what transpired at the 98th Indian Science Congress, preserving it for future generations. He said that quality education has been the key concern of the Planning Commission and excellence was where the country was lacking. He also said that it was not only necessary to reach science to students but also to those who were not aware of science.



Prof. Mridula Mukherjee releasing the book on science communication in India and China



Prof. S.K. Sopory releasing the book on the 98th Indian Science Congress

And it was here that Institutes like NISCAIR could play a big role by communicating science to the masses. He also commended NISCAIR's scientific journals that were making scientific information available to the people of the country at an affordable cost.

Mr Ge Songxue, Counsellor of Science & Technology Office, Embassy of China in India, said that the book should be seen as a landmark collaborative effort in the field of science and technology between two of the world's fastest emerging economies that were facing similar challenges. He said it was good to exchange experiences and learn from each other.

Earlier, delivering his Welcome address, Dr Gangan Prathap, Director, CSIR-NISCAIR, said that the book *Constructing Culture of Science* had emerged out of the joint efforts of two leading Institutes on science communication, one from India and the

other from China. "It is welcome," he said, "that for the first time, the wisdom of China and the wisdom of India, at least in the specialized field of science communication, had joined to put together this book."

Hasan Jawaid Khan

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Foundation Day Celebrations at National Aerospace Laboratories (NAL), Bangalore

“The Aerospace industry in India to my mind is one of the most exciting businesses in the world. I am outrageously ambitious to see Indian aerospace to take its rightful place in the world because I see great opportunities out there. The question we should be asking ourselves is that, how do CSIR, NAL as well as industries must collectively reach out and grab the opportunities?” This is how Mr Anand Mahindra started his talk on the 25th NAL Foundation Day lecture at NAL on 18 August 2011.

He went to say that, “Institutions like NAL have so far focused on self sufficiency which is of course important especially in the defense arena. But global competitiveness today is the weapon of both offence and defense especially for a young and energetic country like ours, particularly in civilian aerospace. As the world’s largest democracy with strong economic fundamentals and long tradition of excellence in science and mathematics, it is appropriate that India should seek a place at the high table of high technology. It is time for us to reach out and embrace the possibility that a very vibrant Indian aerospace industry can offer to our own people and world at large. This is the core of my talk today.”

Mr Mahindra enumerated some key trends in the global aerospace industries. The first being the growing demand for products and services in developing Nations. It is projected that the civilian airliners requirement of India

exceeds that of Australia and Japan combined. The second trend deals with the industry that provides those products and services. Today “do-it-all-ourselves” monolithic aerospace providers have been replaced by a widely distributed network of suppliers and partners. This is truly a global network, with goods and services flowing both ways between countries and continents. “What can we jointly contribute to this global network?” he exclaimed.

Mr Mahindra further said that the third trend is a happy marriage between developing Nation’s aspirations to be more than just consumers, and the necessity for the producers to be closer to their key markets. Current cost structures in developing economies make it inevitable that the OEMs increase their sourcing from the very countries that want to buy their

products. “So there is a life and business beyond offsets – and we should be looking for opportunities in this space,” he added.

The fourth trend – one which the Mahindra Group embraces wholeheartedly – is the global realization that inefficiency contributes to rapid deterioration in our quality of life. Hence there is pressure to look beyond conventional business metrics to sustainability and green technologies. “Can we work together to create green technologies that are relevant and also outrageously affordable?” he asked.

Mr Mahindra stressed the importance of Public Private Partnerships to cater to the projected increasing demand for air travel for education, health and pilgrimage. Towards this he mentioned about the commitment made by the Mahindra





group for the development and marketing of light aircraft in the 2-20 seat range. The NAL-MAPL joint development, the NM5 (5-seater), is one initiative in this direction. Later, Mr Mahindra released the CSIR-NAL's Director's Report 2010-11. Dr. G. Ramesh, Jt. Head, EAD presented the 12th NAL Technology Lecture on Challenges and Opportunities of MAV Development Programme.

Dr. Ramesh narrated NAL's adventure with MAV on this occasion. He spoke at length about the MAV Development Programme undertaken at

NAL. He mentioned that some of the MAV's developed at NAL are under field trials for surveillance applications.

The Function opened with a Welcome Address by Mr. Shyam Chetty, Scientist H & Head, FMCD. Mr Chetty introduced the Chief Guest Mr Anand Mahindra, Vice Chairman and Managing Director Mahindra & Mahindra Ltd., Mumbai. Mr Chetty applauded Mr Mahindra's novel initiative 'Spark the Rise' multi-media movement. He elaborated on Mr Mahindra's career mentioning that it is under Mr. Mahindra's tenure that Mahindra group has grown

inorganically, seizing opportunities across the globe.

Dr A R Upadhy, Director, NAL presided over the Foundation Day Function. He remarked that with leaders like Mr Mahindra in the Aerospace business our country will go very far. He also highlighted the major achievements of NAL in 2010-11. Dr. Upadhy paid rich tribute to the Founder and former Directors of NAL. The Function ended with the distribution of the various Foundation Day Awards by Mr Mahindra, followed by a well-articulated Vote of Thanks by Dr S. Sridhara Murthy, Head, KTMD.

NISCAIR Diamond Jubilee and CSIR Foundation Day Celebrations

The Chief Guest of the Function, Prof Samir K. Brahmachari inaugurated the Function by lighting the lamp, along with Dr Gangan Prathap, Director,

NISCAIR; Mrs Deeksha Bist, Scientist 'G' & Chairperson, Foundation Day Celebration Committee, NISCAIR and Mr Ashok Chawla, Scientist 'G' &

Chairman, Diamond Jubilee Celebration Committee, NISCAIR.

While welcoming the Chief Guest, Dr Gangan Prathap said that, "On this



Glimpses of the Grand Event



DJ&CSIR FOUNDATION DAY CELEBRATIONS

unique occasion we celebrate both the CSIR Foundation Day and the launch of the Diamond Jubilee of two Institutes: PID that was founded in 1951 and INSDOC which followed a year later in 1952.” “Sixty years is a long journey. But we must choose this occasion to reflect on what has been done and what has been left undone. One of the problems of Institutions our country face is that we mark the progress of time without much material progress. This is summed up very nicely in the standard classes in Human Resource Management in most of the Management schools,” he added. Dr Prathap went on to say that there is a great deal of difference between 60 years of experience and one year of experience repeated sixty times. “It is very valuable to have in our country Institutions like ours that have reached the age of 60 – an age you turn into a diamond and are celebrating the Diamond Jubilee. NISCAIR will turn into a diamond and will sparkle for all times to come,” he said with pride.

Mr. Ashok K. Chawla gave introductory remarks on the significance of Diamond Jubilee of NISCAIR and gave an overview of the various products and services of NISCAIR and INSDOC that are meant for not just the scientific community but also for students, corporates, policy makers and the common man. “NISCAIR would be celebrating the Diamond Jubilee year by holding three International Conferences and various lectures and special programmes slated to be organized every month,” Mr. Chawla informed.

Prof. Brahmachari inaugurated the Diamond Jubilee year of NISCAIR and remarked that the Function was being

held at a very auspicious time of the year. He said that both INSDOC and PID have had rich pasts and we must be proud of being a part of NISCAIR. He said that, “*Science Reporter* is a gift of NISCAIR. Similarly, *Wealth of India* is a product of NISCAIR and all know about this documentation. TKDL is also an important achievement of NISCAIR that today has global reach and we are all proud of it.” “Present NISCAIR has been built on the foundation of INSDOC and PID. We must be basking in the glory of this organization that has achieved so much in the last 60 years and given to the Nation remarkable gifts that we must all be proud of,” Prof. Brahmachari said.

Prof. Brahmachari advised that all the members of NISCAIR must resolve with commitment that CSIR has a sense of pride through NISCAIR’s achievements, and must believe that this year shall be a great Diamond Jubilee year of NISCAIR. Prof. Brahmachari praised Dr Gangan Prathap for his scholarly excellence and utmost simplicity while having wonderful leadership qualities and having an attitude of complete socialism. Commenting further, Prof Brahmachari said that, “Diamond is of use only if it is used to cut glass to create machine tools; otherwise it is merely an ornament. Dr Gangan Prathap will remain an ornament if he is not used for the scholarly skills he has in immense measure.”

Prof. Brahmachari further said that, “For NISCAIR to become India’s best-known Multimedia Science Communication Centre, we have to strive hard in this direction. We have already established the Academy of

CSIR.” “You start looking at life positively and I am glad that this positivism is flowing. To implement in the scale and size of the 12th Five Year Plan, we must off-load certain jobs and not indulge in distracting trivial issues,” Prof. Brahmachari added. Science communication experts are in short supply, which is why *Science Communication P.G Diploma* and *Multimedia Studio* for content development must become our important activities. “Can NISCAIR become a hub for Science Communication Management? This is a huge opportunity for NISCAIR to take it up.” Prof Brahmachari remarked. He ended his talk by quoting Vivekananda:

“Stand up, Be bold, Be strong, take the whole responsibility on your own shoulders & know that you are the creator of your own destiny.” “So make sure that CSIR matters to you, Nation matters to you and I look forward to that NISCAIR matters more to CSIR,” Prof. Brahmachari said with great enthusiasm.

The Function ended with the Vote of Thanks presented by Mrs Deeksha Bist who expressed her heartfelt gratitude to the Chief Guest and all present on the occasion.

The occasion was marked by a cultural programme organized by NISCAIR employees. Later, in the Function, certificates and mementoes were given to employees who had completed 25 years of service and those who had retired last year. Prizes and certificates were also distributed to those children of staff who had participated and won in various competitions organized to celebrate the historic occasion of NISCAIR Diamond Jubilee and CSIR Foundation Day.



Convocation address at Visvesvaraya National Institute of Technology, Nagpur

Prof. Samir K. Brahmachari
Director General, CSIR

Transforming Education; Empowering Engineers of Tomorrow

Dr. S. K. Joshi, Chairman of the Board of Directors; Dr. S. S. Gokhale, Director; Dr B.M. Ganveer, Registrar; Dr. Rajesh Gupta, Dean Planning & Development; Dr. Rajendra Patrikar, Dean Academic; Dr. R. K. Ingle, Dean Faculty Welfare; Dr. O. G. Kakde, Dean Research & Consultancy; Dr. A. P. Patil, Dean Students Welfare; Members of the Senate; Members of the Board of Governors; Members of the Academic Council; all faculty members; distinguished invitees; my dear students graduating today; Ladies and Gentlemen.

I am very happy to be here today to address the young engineers graduating today from the Visvesvaraya National Institute of Technology, Nagpur. The VNIT is named in honour of Bharat Ratna Sir Mokshagundam Visvesvaraya: an engineer and scientist who was a legendary personality. The Michelangelo of India who created the extraordinary Krishna Raja Sagara dam near Mysore and who is remembered for his many innovative initiatives that include not just engineering feats but also for facilitating education with a proactive vision for the future! As you may be aware, The University of



Mysore, established in 1916 owes its existence to his vision. He also played a key role in establishing the Mysore Agriculture Residential School at Hebbal as early as in 1913. These were forward-looking Institutes of advanced education in their times.

I am sure that the legacy of this genius engineer, who was also a visionary educationist, will serve as an inspiration to all those graduating today, just as I will be saluting the work and spirit of Sir Visvesvaraya by talking about a new vision for engineering and education.

I was happy when I was asked to deliver the Convocation Address here in the city of Nagpur, because this city is associated in my mind with my CSIR laboratory named the National Environmental Engineering Research Institute or NEERI. And when I think of Nagpur I am always reminded of the wonderful oranges that we enjoy in Delhi during winter. And I am proud to say that my scientists at NEERI and

National Geophysical Research Institute (NGRI), have always stood by the orange farmers; helping ameliorate conditions by studying ground water conditions etc., or by introducing them to technologies that can be used to enhance income. This year NEERI has demonstrated to the farmers of the Vidarbha a way to use spoiled oranges, cull fruits and orange peels to recover essential oils. Once adopted, this technology will help improve the socio-economic status of the orange growers.

Nagpur is indeed the centre of India with India now being the centre of the world. The entire world is looking at India's Science and Technology. India is the future. India is perceived to be a geek Nation as it produces a million engineers...albeit highly bookish ones. And herein lies the challenge. How do we transform these bookish engineers into great leader-engineers? *Avant-garde* Leader-engineers who can dream boldly, think unconventionally and who can steer Indian S&T to heights previously unscaled.

It is lucky that we have super role models in contemporary, iconic engineers such as the Metro Man, Mr. E. Sreedharan himself, who has demonstrated that a world-class engineering marvel can be created despite working under less than ideal



conditions. Sreedharan's story is one in which every Indian can take pride. It demonstrates unequivocally that Indian engineers can rise above circumstances, cross hurdles, innovate and succeed just like their counterparts anywhere in the world.

In neighbouring China, for example, a recent engineering marvel is the 42 km long Jiaozhou Bay Bridge. It links China's port city of Qingdao to the offshore island, Huangdao. This engineering feat has been accomplished with indigenous technology, without any foreign expertise. This is just one, a small example of what engineers are doing, worldwide. It is also an inspirational story for all those aspiring to make their mark as engineers. However, to make the dream come true, one must assess reality before taking proactive steps to be ready for future challenges.

Assessing Reality and Anticipating Change

Very often there are reports that the number of Ph.Ds in Engineering is going down. It is often discussed that the quality of human resource is plummeting and that there is a shortage of employable manpower. The scientific leadership sometimes agonizes over the fact that we are perhaps producing only "techno-coolies," not leaders. How do we address this concern? How do we bring about a change?

We, at CSIR, have been thinking about how we can create a new opportunity; about how we can bring in time-appropriate changes in S&T training that can make the engineers of today future-ready. However, before I

speak about that, let me share with you a few key influences in my life that had equipped me to anticipate the future, as a student and thus equipped me for my present role as Scientist. I was very fortunate that I studied Chemistry in the best institutions of India. I was a student during the glory days of Calcutta University; with the legendary Asima Chatterjee as my teacher. It was a privilege indeed. I also had the advantage of working at the Indian Institute of Science under a scientific luminary such as G.N. Ramachandran and his associates.

I recall the sense of intellectual freedom; intellectually challenging assignments, the free rein to experiment; to seek and find answers; the endless debates over cups of coffee at midnight. At IISc, Bangalore I got the opportunity to break new ground and explore emerging areas. As the Institute evolved, so did I. I got the opportunity to explore trans-disciplinary fields and to move to newer areas even as faculty. This helped shape my career as I was empowered to explore the new terrain of Genetic Engineering and Genomics where the central theme is structural understanding of Biological systems. Today the field has exploded and it is my good fortune to be part of this explosive advance. This happened because, even as a young student, I was free and empowered to explore every facet of my dream.

I realize now, from my experience, that what the young generation today has not learnt, perhaps because it has never got the opportunity in their busy

schedule of homework and assignments, is to have time to dream. To dream and to do things differently. Very often we only ape the West... we do not have a dream of our own. I ask myself, where is the future? The future lies in the trends we see today. It can be read if we study these trends and let logic guide our imagination as we take a giant leap...in our minds and dreams.

You will realize that the future is already in your hands...that you have already begun to tread along the trends. The first will be about the evolutions of the paradigms of scientific research. I am sure all of you spend significant amounts of your time on social networking sites such as Facebook and Twitter. Well scientists network too! I will tell you about one aspect of the future where the paths of the Facebook generation and experienced scientists will cross...significantly. This is in cyberspace. The meshing has already begun; science is moving into a new era...although these are early days and whether you realize it or not, we, are the heralds of a new age of science. This is the second aspect of the future of S&T. I call it Science 3.0. But to truly appreciate what science 3.0 is all about we will need to understand the evolution of scientific research.

The Four Paradigms of Scientific Research

There are distinct stages in the evolution of modern Science. It was curiosity-driven in ancient times. This was the First Paradigm of scientific research and relied on observation of natural



use it are limited only by our imagination and foresight.

Crowd Sourcing for Problem Solving

A logical extension of the crowd-sourcing approach for problem solving would be for the Micro, Small, Medium Enterprises or MSMEs of India. As the 4th Census of MSME Sector, this sector employs an estimated 59.7 million persons spread over 26.1 million enterprises. It is estimated that in terms of value, the sector accounts for about 45% of the manufacturing output and around 40% of the total export of the country.

Unfortunately they continue to rely on old technology. They cannot afford to hire engineers like you or IIM graduates to help them. Neither can they buy technology or generate intellectual property of high value. However, they are not lacking in innovation. So we have thought of a project in which we will engage a large number of engineering institutions to identify the most vexing problems and to provide solutions for the following four issues: How to make a specific industry cluster, energy efficient? How to reduce material use for the product? How to minimize the waste generated? Or at least how to better utilize the waste produced? How to develop business and financial models to increase productivity and also, profitability.

We are suggesting that a group of students, as their summer project, pick up a cluster, spend two-months in summer, assessing the situation and

then, submit their report that includes a definition of the problem and its likely solution, on a web-portal to receive academic credit. This is what we have planned in the Academy of Scientific and Innovative Research or AcSIR that we have established.

Academy of Scientific and Innovative Research (AcSIR)

AcSIR, the CSIR Academy represents a paradigm shift in teaching/learning methods through innovation-driven courses. It will be the academic destination of choice, instead of leaving for greener pastures overseas, for those who have a dream; for those who anticipate tomorrow; and for those with the pioneering spirit that forges new paths for others to follow; for those who want to be a part in building a NEW India that will lead, and not follow.

The Academy has access to the infrastructure of all 37 laboratories of CSIR. It includes the services of 2500 Faculty members drawn from 5000 Scientists of CSIR, about 500 Adjunct Faculty drawn from Academia, R&D Institutions and Industry R&D centres. It is expected that an additional 500 International scientists will be involved too. It represents an enormous knowledgebase that is leveraged not only to impart education of higher quality but also in subjects that will be of relevance and great demand in the future.

The Academy has been conceptualized as a one-stop solution to synergize education, research and innovation on cutting-edge trans-

disciplinary areas of science and engineering. It is being developed as a network organization with spoke and hub model. We are in the process of implementing some of the programmes.

In keeping with global trends, CSIR too had felt the acute need to have trained manpower with skills for solving problems rather than bookish staff. In 2009, we launched the two-year Post-graduate Research Programme in Engineering (PGRPE) with the aim to train top B.Tech students in house and to provide advanced education in trans-disciplinary areas such as Mechatronics, Avionics etc. It is designed to provide practical, real-time exposure to projects of significance and to gently inculcate the power of original thinking. The emphasis on trans-disciplinary subjects was deliberate as it is clear that the world has moved beyond the confines of narrow rigidly bound subject domains.

I am delighted to say that the PGRPE Programme has been a resounding success. The fledgling trainees have been groomed into research ready scientists/engineers. The first batch will be inducted into the CSIR system shortly. The story continues; this year we have recruited 110 B.Tech students and look forward to a peak number of 200. Several students have joined AcSIR after completing their B.Tech from various NITs. We are also opening up a Programme under which CSIR will have a portal along with the National Innovation Foundation. The Techpedia has been described as, "A portal of



technology projects by students to link the needs of Industry and grassroots innovators with young minds and to promote collaborative research.” (<http://www.techpedia.in/>) You can actually post the project proposals on this portal and can also pick up problems to which you can provide solutions, which can form part of your thesis/dissertation. CSIR would be too happy to collaborate with the NITs in this matter. This is CSIR’s vision of imparting education to the students in a manner that empowers them to offer practical solutions to long-standing/vexing problems of National importance.

It is clear now, how the principles of social networking and scientific and technological crowd sourcing can be gainfully used to advance the boundaries of science. The problem may be generated at one place, it may be identified by someone and solutions may be offered by many others with all interacting in cyberspace. The Fourth paradigm of Science belongs to India...to Indian Scientists and engineers. Science 3.0 is the future. Make sure you are a part of it.

Thank you.

Dr V. C. Vora Passes Away

Dr. V. C. Vora, a truly iconic personality is no more. Born as Vinay Chhotalal Vora on 10 October 1925, in Baroda (Gujarat), Dr Vora was a true visionary. He joined CSIR family as a Junior Scientific Officer in 1952 at the Central Drug Research Institute (CDRI), Lucknow after completing his Ph.D. from London in Biochemistry of Microorganisms. He was the Founder Director of the Institute of Microbial Technology (IMTECH), Chandigarh, where he served till 1986. He also served as the member of Research Council of IMTECH for several years (1987-1994).

Dr. Vora was actively involved with other CSIR laboratories. It was in 1991 when Dr Vora’s real time association with IGIB, the then Centre for Biochemicals (CFB) began, when he became the Chairman of its Research Advisory Council (RAC). However, Dr Vora’s involvement in the affairs of CFB had started long back in the late 1970’s, when Biochemicals Unit — a Grant-in-Aid Project of CSIR — had grown to a stature to be taken over by CSIR as a Centre of one of its biological laboratories.

On becoming the RAC Chairperson of CFB, Dr. Vora worked with single-minded focus to upgrade CFB to the status of a National Research Laboratory. The solution to this lay in change of name of the institution for which Dr Vora wrote to Dr. S.K. Joshi, the then DG-CSIR requesting him to permit the name change to the Centre for Biochemical Technology (CBT). This was keeping in mind the charter of the Centre for serving the dual purpose of being a preparatory laboratory as well as a research laboratory. Thus CFB was redesignated as CBT in early 1992.

Very soon, the institution established itself as a Centre for excellence in Applied Biochemistry. With this began a new era of Transfer of Technology, when the know-how of Hyaluronic Acid was first transferred to industry. With increase in research activities, CBT created state-of-the-art infrastructure required for large-scale peptide synthesis. When Prof. Samir K. Brahmachari, the present DG-CSIR, took over as Director, CBT in 1997, he gave it a tremendous push in the new field of Functional Genomics and Integrative Biology. Thus, in 2002, CBT was renamed as the Institute of Genomics & Integrative Biology (IGIB). Dr Vora’s contribution to this was again phenomenal.

Thus, when CFB transformed into CBT and subsequently IGIB, Dr. Vora continued as the Research Council (RC), Chairman for five consecutive terms (1991-2006). He was the longest serving member of IGIB’s Research Council.



Prof. Harsh Gupta Elected as the New President of IUGG (2011-2015)



Dr. Harsh Gupta, Pannikar Professor at National Geophysical Research Institute (NGRI), Hyderabad has been elected as the President of the International Union of Geodesy and Geophysics (IUGG) for the period 2011-2015 with a clear majority of votes from the IUGG Council. President and officers of IUGG are elected by IUGG Council consisting of National representatives of about 70 member countries. Earlier, Prof. Gupta served the IUGG as Vice-President for the period 2007-2011.

IUGG is an International scientific

organization promoting inter-disciplinary studies in understanding the Earth System Sciences. Recently, General Assembly of IUGG was held in Melbourne, Australia on the focal theme, *Earth on the Edge: Science for a Sustainable Planet*. Prof. Gupta is also the President of the Geological Society of India and the Asia Oceania Geosciences Society. He is an internationally known geophysicist and seismologist.

Prof. Gupta has held several important scientific positions such as, Secretary to the Department of Ocean

Development (DoD), Government of India; Director, NGRI and Vice Chancellor, Cochin University. Besides his many scientific achievements, he was conferred *Padma Shri* in the year 2007 by the President of India. He has published over 200 papers in reputed journals and authored four books, all published by Elsevier. Recently he has also edited a 1500 + pages publication, *Encyclopedia of Solid Earth Geophysics* published by Springer.

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

HUMAN RESOURCE DEVELOPMENT GROUP

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NOMINATIONS INVITED

CSIR Young Scientist Awards for 2012

The Council of Scientific & Industrial Research (CSIR) invites nominations for the CSIR Young Scientist (YS) Awards for the year 2012. The Awards are to be given for research contributions made primarily in India. The nominee should be a regular employee of CSIR system holding a position of a Scientist in Group IV and he/she should have joined before 26th September 2011. The age of the nominee should not be more than 35 years as on 26th September 2011.

The YS Awards are given annually in the following disciplines: (1) Biological Sciences, (2) Chemical Sciences, (3) Earth, Atmosphere, Ocean and Planetary Sciences, (4) Engineering Sciences, and (5) Physical Sciences (including instrumentation). The YS Award comprises a citation, a cash award of Rs.50,000 (Rupees fifty thousand only), and a plaque.

Nominations addressed to Scientist Incharge, SSB-YSA Unit, Human Resource Development (HRD) Group, CSIR Complex, Library Avenue, Pusa, New Delhi 110 012 should be sent as per the prescribed proforma (original + nine copies) latest by 31st January 2012. Digital photograph (preferably in JPEG), softcopy of duly filled proforma (*preferably in MS-WORD*) and softcopy of significant publications (*preferably in PDF*) of the nominee on a single CD/DVD are also required. The details of the YS Award and the prescribed proforma for nomination may be obtained from above address or may also be downloaded from our website: <http://csirhrdg.res.in>



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