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NIO transfers AUV Technology to VEA

MAYA AUV cruising on the surface

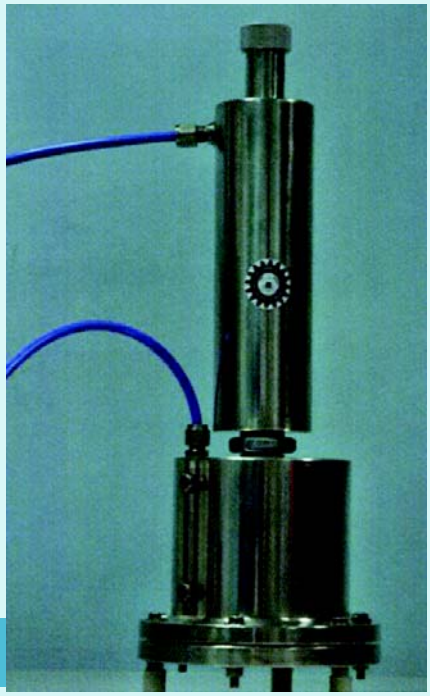
The National Institute of Oceanography (NIO), Goa, has signed a technology commercialization agreement for the transfer of its Autonomous Underwater Vehicle (AUV) technology to VEA Automation and Robotics Pvt. Ltd, Coimbatore, Tamil Nadu. The tenure of the agreement is five years. The agreement was signed by Dr V. Sanil Kumar, Scientist and Head, Business Development Group (BDG), NIO and Shri J. Ravi, Director, VEA, in the presence of NIO and Department of Information Technology (DIT) (Ministry of Communications and Information Technology, Government of India), officials on 4 September 2009 at NIO. The team responsible for development of AUV called *MAYA* was comprised of Elgar Desa, R. Madhan, S. Prabhudesai, Pramod Maurya, Gajanan Navelkar, A. Mascarenhas, R.G. Prabhu Desai, Sanjeev Afzulpurkar, Nitin Dabolkar, S.N. Bandodkar, scientists NIO, and a group of young Project Assistants in the Marine Instrumentation Division of NIO. The funding has been done by NIO and DIT.

The *MAYA* AUV has several applications e.g. it can collect standard oceanographic data in confined areas; can detect phytoplankton blooms, and it can be used as a platform for testing new marine sensor technologies. In its present version, *MAYA* has been used for oceanographic data collection only.

◄ Development team: NIO-BDG, DIT & VEA Team

'Portable Relative Humidity (RH) Generator' technology know-how developed at NPL, licensed to M/s Belz Instruments Pvt. Ltd

The National Physical Laboratory (NPL), New Delhi, has developed a Portable Relative Humidity (RH) Generator, the technology know-how for which has been licensed to M/s Belz Insttuments Pvt. Ltd, Faridabad, on 20 July 2009.The Relative Humidity generator, which utilizes a source of nitrogen gas or air, is based on the two-pressure technique (Dalton law of partial pressures). The system consists of two chambers namely saturator having distilled water and a test chamber. The carrier gas stream at an elevated pressure is supplied to a saturator, which is expanded to a lower pressure into a test chamber through an expansion device (valve). The ratio of the two absolute pressures and the measurement of dry bulb temperature in the test chamber provide the desired relative humidity. The apparatus can generate RH in as fast a time as one minute in the range 15 %RH to 95 %RH, with an accuracy of ± 1 %RH and stability of at least 20 minutes. In fact the accuracy of RH solely depends on how accurate the measurements of two absolute pressures and temperatures in the saturator and test chambers are made. The more is the accuracy in these measurements, more will be the accuracy in RH measurements.



Portable Relative Humidity (RH) Generator developed at NPL

New Technologies developed and released by CECRI

The Central Electrochemical Research Institute (CECRI), Karaikudi, has developed and released following new technologies during January-June 2009:

Tetra Ethyl Ammonium Hydroxide {TEAH} and Tetra Propyl Ammonium Hydroxide {TPAH}

Tetra alkyl ammonium hydroxides are currently used industrially as stabilizers or solubilisers for organic compounds in aqueous solutions, as micro biocides or template agents in the synthesis of numerous zeolites, washing and etching of the surface of semiconductor substrates, lubricant oil – fuel mixture in combustion engine and as organic base for making pharmaceuticals.

Hither to, they are being prepared by chemical [ion exchange] method where concentration beyond 100 gpl can not be achieved; impurities levels are exceptionally high and the rate of production is extremely low. M/s Tatva Chintan Pharma Chem Private Limited, Ankleshwar, Gujarat, had sponsored a project in August 2008 for the development of electrochemical technology for the production of Tetra Ethyl Ammonium Hydroxide {TEAH} Tetra Propyl Ammonium Hydroxide {TPAH} and Tetra Butyl Ammonium Hydroxide {TBAH} for Rs 6.75 lakh and supplied all the raw materials.

At the instance of M/s Tatva Chintan Pharma Chem Private Limited, Chlor – Alkali Division of CECRI has developed an electrolyser with noble metal oxide coated titanium anode, performated titanium cathode and Nafion cation exchange membrane to produce tetra alkyl ammonium hydroxides of

very high concentration [250-550 gpl] with exceptionally high production rates and ultra pure levels.

The TEAH and TPAH technologies were released to M/s Tatva Chintan Pharma Chem Private Limited on the following terms:

Lump sum Premium : Rs 2 lakh for each technology; Recurring Royality: nil; Nature of License: Exclusive; and Period of License: 5 years.

They have plans to set up production facility at Ankleshwar for a capacity of one tonne/day of each of these quarternary ammonium hydroxides.

Electrochemical Activation of Electrodes for Hydrogen Generation

Water electrolysis is an important technique for hydrogen production. The hydrogen evolution reaction is certainly one of the most intensively studied electrochemical reactions owing to its importance in the field of alternative hydrogen based energy production. Hydrogen has been produced commercially by alkaline water electrolysis for over several decades. At present, its large scale application is restrained by higher over voltage of Hydrogen and Oxygen evolution reaction. Stable and reliable performance is a major requirement for industrial conditions. The increase in over potential results in raising the cell voltage and hence a decrease in energy efficiency by 15% over a period of one to two years. Efforts are made by various researchers worldwide, to improve the current and voltage efficiencies of the electrolyser through different approaches, such as improved cell designs, modified/new separator materials, introduction of new electrolysis concepts and several electrode materials etc.

In this effort, Electro inorganic Chemicals Division is involved in the development of producing surface activated Nickel electrode by electrochemical method for hydrogen generation by alkaline water electrolysis process. This new process on Electrochemical Activation of Electrodes for Hydrogen Generation was released to M/s Eastern Electrolyser Limited, New Delhi, who is the leading manufacturer for packaged hydrogen generators in the country, on the following terms:

Lump sum Premium: Rs 2 lakh; Nature of License: Non-Exclusive; Period of License: 7 years; Recurring Royalty: Nil.

CEERI signs MoU with Pohang Accelerator Laboratory (PAL), Pohang University of Science and Technologies, Pohang, Korea

The Central Electronics Engineering Research Institute (CEERI), Pilani, has signed an MoU with Pohang Accelerator Laboratory (PAL), Pohang University of Science and Technology, Pohang, Republic of Korea.

The purpose of the MoU is to establish a general framework of collaboration in the development of Micro-wave Tubes and Related Pulse Power Systems for mutual benefit in advancing the research goals and to promote comprehensive cooperation between the two institutions.

Collaborative activities can be arranged with agreed responsibilities. These activities will be implemented in the following forms:

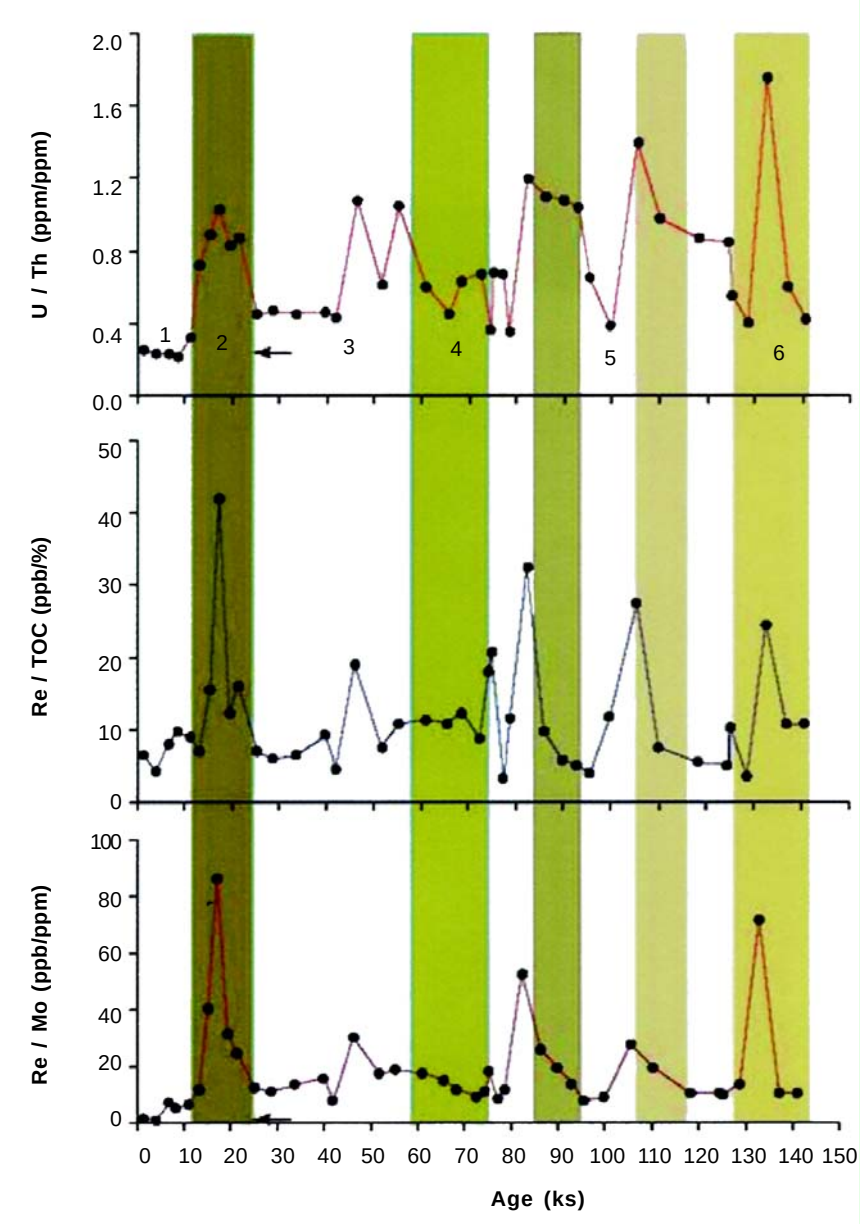
- Exchange of technical information, materials and publications
- Exchange of scientific and technological personnel and co-opted experts
- Technical assistance, training and consultation
- Participation in workshops, conferences and symposia in respective countries
- Implementation of joint research activities
- Facilitating use of scientific equipment, technologies, software and facilities
- Other appropriate activities

The MoU has the validity for a period of five years.

Bottom water oxygenation history in southeastern Arabian Sea during the past 140 ka: Results from redox-sensitive elements

Marine sediments consist of mixture of components derived from continent, weathering of seafloor rocks, biogeneous, hydrogenous, cosmogenic, and hydrothermal and aeolin source. The elemental composition of sediment reflects this admixture of components since all sediments have contribution from more than one source. In the marine system, the depositional environment can be either oxic (marked by presence of O_2 and absence of H_2S), suboxic (dissolved oxygen level ~ 1 — 2 ml/l and absence of H_2S) or anoxic (absence of O_2 and presence of H_2S). Some of the redox-sensitive elements may be either concentrated or depleted relative to average continental crust under varying redox conditions at the time of deposition. Therefore, the distribution of redox-sensitive elements in marine sediments thus has the potential to provide information on redox conditions of the bottom water. Instead of using single redox-sensitive element to understand depositional conditions it is always better to use multiple redox-sensitive elements which respond differently to the redox state.

Recently, the scientists of National Institute of Oceanography (NIO), Goa, have measured concentration of number of redox-sensitive elements (Re, U, Mo, Cd, V, Sb and Tl) in a sediment core from southeastern Arabian Sea to understand the bottom water oxygenation history throughout the past 140 ka. The enrichment of redox-sensitive elements (Re, U, Cd and Sb) above crustal abundance suggests that Last Glacial Maxima (17.48 ka), stadials of Marine Isotope Stage (MIS) -5 (5b & 5d) and Glacial Termination (GT)-II (~133 ka) were all associated with suboxic bottom water conditions. Sediments deposited under this suboxic conditions show highest Re up to 54 ppb (parts per billion) on carbonate free basis and U up to 16 ppm (parts per million) which are



highly enriched compared to their average crustal abundance of 0.4 ppb and 0.91 ppm respectively. This suggests that Re is enriched nearly 135 times compared to average crust and appears to be the major sink for global mass balance estimation. The high ratio of Re/Mo (ppb/ppm), Re/TOC (ppb/%) and U/Th (ppm/ppm) are also indicative of suboxic conditions (see Fig.). Marine Isotope Stages 1, 3, 4 and inter-stadials of MIS-5 (5a, 5c & 5e) were all associated with near-oxic conditions. It can be inferred that the sediments of southeastern Arabian Sea never attained anoxic condition during the entire 140 ka evidenced by lack of enrichment of Mo and V above crustal abundance and high Re/Mo ratio (average 18.2 $\times 10^{-3}$). The above study shows that the changes in bottom water oxygen content can be related to the oceanic circulation pattern during this time.

Use of Polypropylene Random Copolymer as a Piping Material

The use of polymers for pressure pipe systems has been a significant area of industrial research in recent years. In plumbing application, selection of polymers depends on an understanding of deformation and failure processes that operated over a wide range of temperatures and environment conditions. Studies were carried out at the Central Building Research Institute, (CBRI), Roorkee, in which Polypropylene random copolymer (PPR) was selected for hot and cold water distribution systems because of its low temperature impact response and high softening point. The internal morphology of PPR granules seems to be soft and fluffy. Under AFM, a clear difference between the phases of PPR is observed showing their surface roughness of ~28.81 nm. The melt flow index of granules is ~0.42g /10 min when tested at 190^{0}C and 5 Kg load which is below the specified limit mentioned in European Standard pr EN 12202-2. The tensile properties of injection moulded sheets were examined as a function of strain rate. The improvement in tensile yield and breaking strength is ~18.23% and ~13.68% respectively when speed was increased from 5 mm/min to 50 mm/min. The toughness is increased in the order of ~47.75%. It was found that during charpy impact, the unnotched samples do not break whereas, the notched samples exhibited impact energy to a level of ~164 KJ/m^2. Under DMA scanning, cross-over points between storage modulus and the loss modulus were noticed at 45^{0}C in the glassy region and ~ 110 ^{0}C in the terminal zone were noticed showing adequate visco-elasticity in PPR. The high value of storage modulus (3400 MPa) and low Tan delta (0.12) indicate that PPR has sufficient stiffness to maintain its rigidity under use condition (Table 1) .

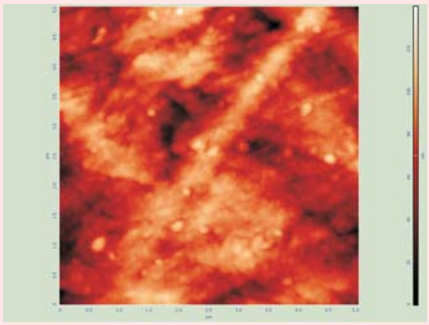
The scientists also studied the effect of chlorine disinfection, chemicals, weathering and leaching of additives on the properties of PPR (Fig. 1). Under chlorine exposure test (320 ppm), ~ 16% reduction in burst strength was noticed. Tensile modulus of exposed samples was increased by 56% over the unexposed ones. On surface examination, the difference in the fresh and exposed samples was noticed in terms of haziness. The chemicals exposure on PPR samples were carried out at RT and 60^{0}C for 30 days. The selection of chemicals and their concentration was taken from the list mentioned in IS: 13360 (part 8). The weight gain in the samples at 60^{0}C is more than the weight gain at RT. After 30 days, the weight loss observed in the samples exposed to NaOH and sodium hypochlorite was maximum (0.12%). Under 12 months natural weathering exposure, the increase in yield strength of exposed samples was ~ 12% while elongation at break decreases to a level of ~ 30% over the control samples. The exposed surface shows more exposition of particles than the control samples. The increased number of grains is indicative of eroded soft resinous layer from the surface. The overall migration of leachable additives from PPR was also studied as a function of temperature and

Table 1: Physico- mechanical properties of PP random copolymer moulding and pipes

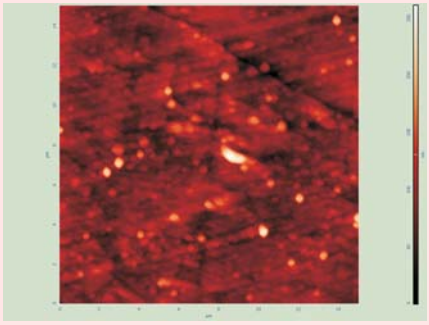
Property	Value
Density (g/cm^3)	0.902
Water absorption (%), 24 hrs	0.0038
Melt flow rate of pipe (gm/ 10 min) (190^0 C/ 5 kg)	0.48
Overall migration (mg/l) 24 h/40^0	3.81
Softening point (^{0} C) (DMA method)	131.69
Co-efficient of thermal expansion (/^{0} C) DMA method	1.54 x 10^{-4}
Tensile yield strength (MPa)	
• Fresh	21.73
• Exposed to chlorine (240 hrs)	25.10
• Exposed to natural weathering (12 months)	24.43
Storage modulus (MPa) (Dual cantilever)	3400
Loss modulus (MPa) (Dual cantilever)	225
Heat reversion of pipes (%)	0.41
Creep Strength of pipes	
Burst pressure (MPa)	9.80
Sustained pressure (MPa)	
20^{0}C (16MPa) for 1 hr	No burst/ leak during stressing
95^{0}C (4.2MPa) for 22 hr	No burst/ leak during stressing
Impact strength	
0^{0}C	No shattering / crack/ split
27^{0}C	(No fracture through wall thickness)

storage durations using water as a simulating solvent (Fig. 2). It is observed that increasing temperature of extraction increases the amount of leachable additives from 3.81 mg/l at 40^{0}C to 13 mg/l at 90^{0}C. After 10 days extraction duration and at 90^{0}C, the total leachants from the PPR is ~18 mg/l, which is well below the permissible limit mentioned in IS: 10910. The water extract of PPR was also examined for biological growth by plate and multiple tube method. Under plate method, colony counts appeared in the extract is equivalent to the colony count appeared in the control tap water sample, whereas the extract imparted the most probable numbers to a level of 6. This indicates that PPR do not support any kind of biological growth in contact with water.

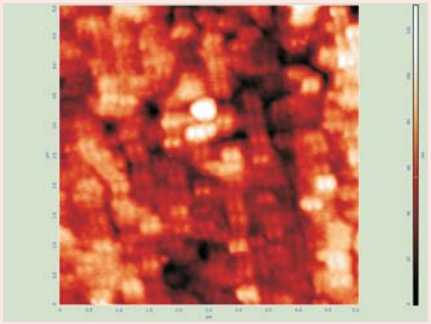
On the basis of materials performance, PPR pipes were extruded and characterized for use in hot and cold water supply. Under reversion test, the change in length of pipes at 135^{0}C is ~0.4 % only. During impact at 0^0 C and 27^{0}C, the pipe was intact and free from cracks/ splitting in the wall. The creep strength of pipes was tested at room temperature, 20^{0}C and 95^{0}C for various periods. At 20^{0}C, there is no sign of localized swelling or leakage when 16 MPa proof stress is applied for 1 hour. The sample was further



Control



Chlorine exposed



Weathering exposed

Outdoor exposed PP random copolymer in rack as per ASTM D 1435

Fig. 1 : Atomic Force Micrographs of fresh and exposed PP random copolymer

subjected to 95^{0}C for 22 hours under hydrostatic stress of 4.2 MPa. At the end of test, sample is dimensionally stable and there is no localized swelling or leakage. The sample was further subjected for 1000 hours testing at 90^{0}C under hydraulic stress of 3.5 MPa. The sample is intact and no defect is noticed after completion of test. Based on these results, it is found that the PPR pipe sample meets the requirements specified in DIN 8078.

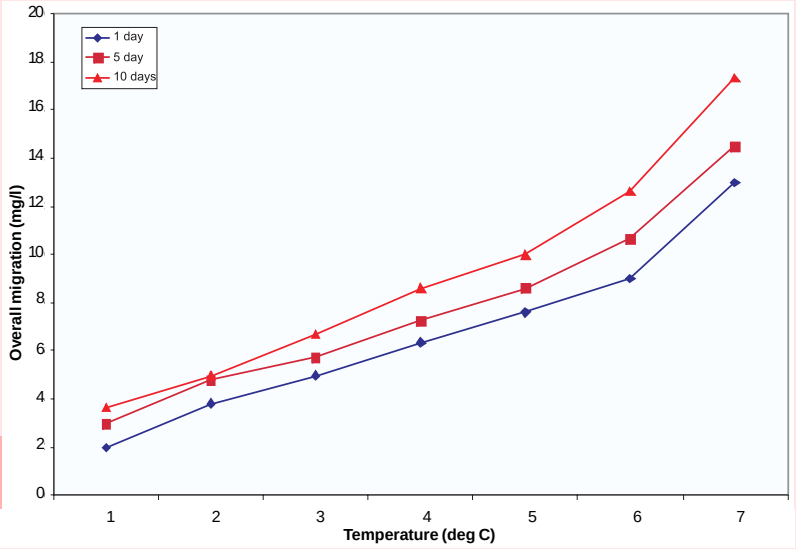


Fig. 2: Overall migration of leachable additives of PP random copolymer as a function of temperatures and storage durations

Studies made by CBRI on Vulnerability Assessment of Buildings & Structures due to Natural Disaster in Hilly Regions

Under CSIR Network Project on Engineering of Structures against Natural and Other Disasters, the Scientists of Central Building Research Institute (CBRI), Roorkee, observed and found that the Rishikesh-Uttarkashi-Gangotri National Highway has many unstable slopes and landslides. These landslides are a constant threat to human lives and properties, which include buildings, bridges, power transmission line etc. One such unstable slope near Agrakhal, on way to Uttarkashi, is causing road subsidence and damage to several houses situated on down hill slopes (Fig.1). The slope has many houses which have shown distress. The building of Garhwal Mandal Vikas Nigam Guest house has been considerably damaged (Fig. 2). CBRI has undertaken the geological and geotechnical study of this unstable slope.

Topographic survey of the slope was carried out and a contour map prepared on 1:1,000 scale with 2 meter contour interval (Fig. 3). From the contour map Digital Elevation Model (DEM) was generated in GIS (Fig. 4). A slope map of the slope was also derived from the DEM.

The geological data collected to prepare the geological map of the area (Fig. 5) shows that rocks present in the area are shale and Phyllites, which are highly weathered, fractured and thinly bedded. The rock beds dip 50° towards NW and there are two major joint sets, out of which one joint dipping towards NE is outward dipping favouring slope instability (Fig. 6). The soil cover on the slope is about 2-5 m thick. There are three major drains on the slope. The houses situated on either side of the central drain have shown sign of distress. From the field investigation it is inferred that continuous water flow in the central drain is contributing to slope instability in the area.

Fig.I Study area

Fig. 2: Road subsidence and damaged houses

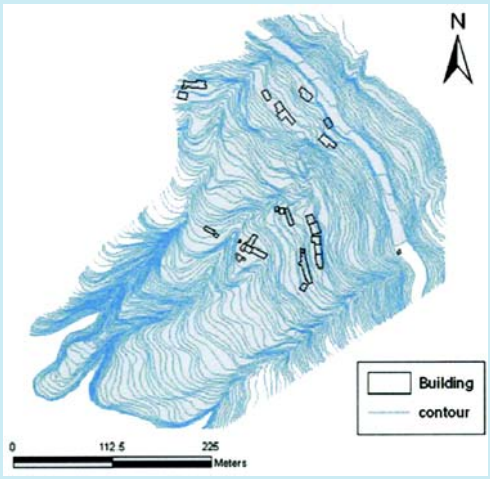


Fig. 3: Contour map

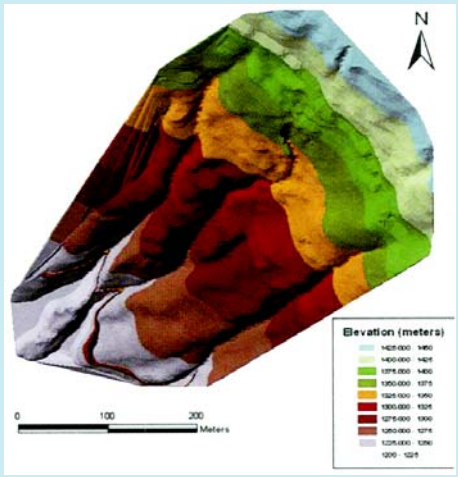


Fig. 4: Digital elevation model

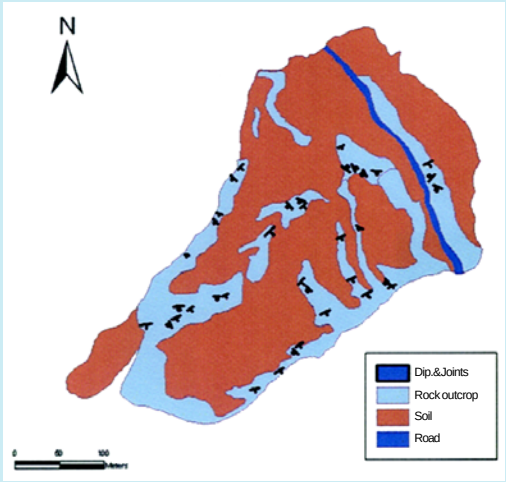


Fig. 5: Geological map

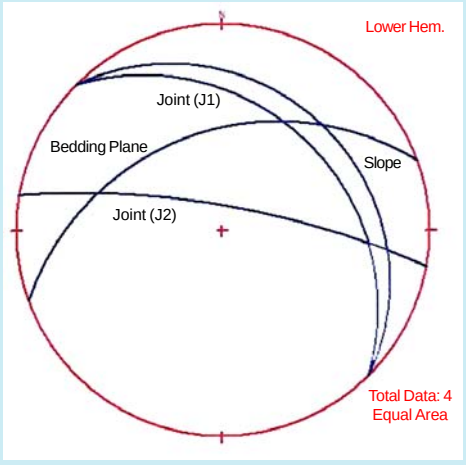
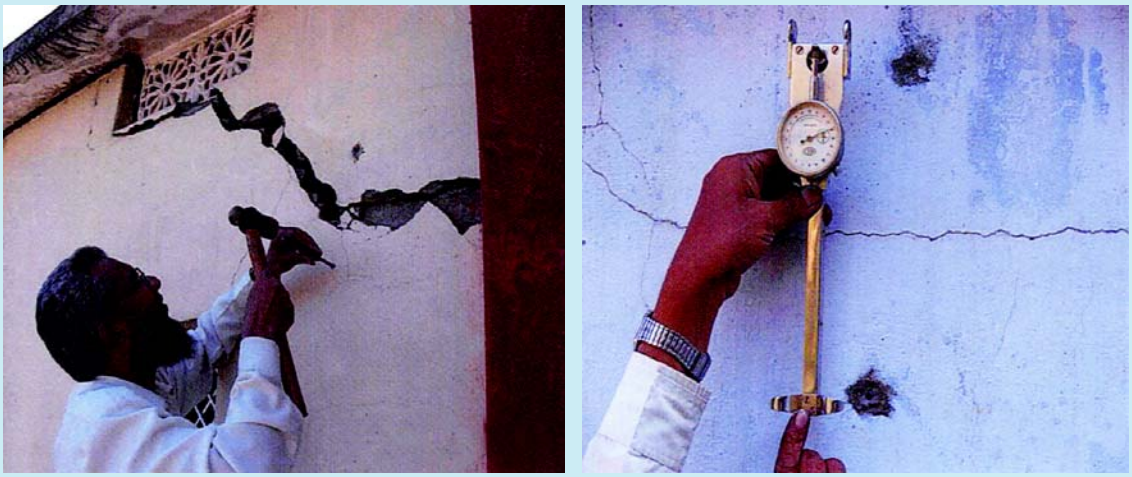


Fig. 6: Stereo plot of structural data



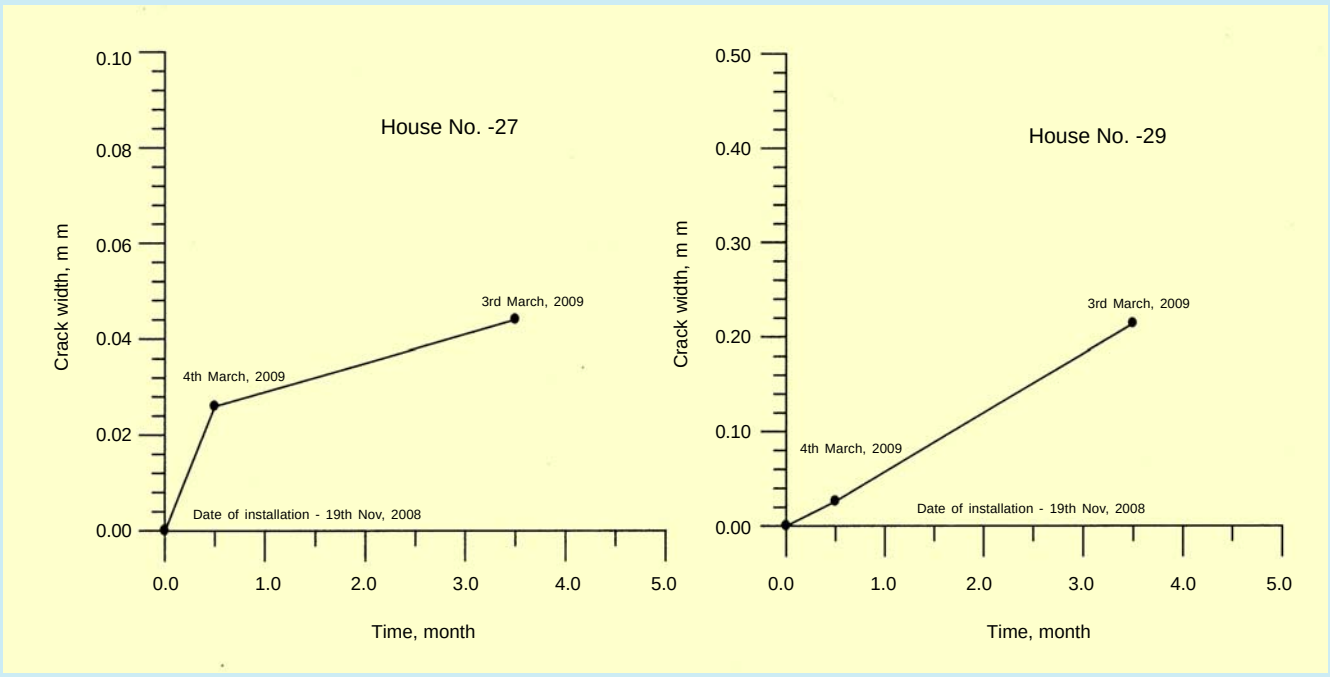


Fig. 7: Monitoring of cracks in buildings situated on the slope

Soil samples collected from different horizons were tested for their geotechnical engineering properties such as grain size, proctor density, direct shear etc. The soil comprises of gravel 34%, sand 35%, silt 29% and clay 2%. It is a less cohesive soil with cohesion ranging from 0.02 – 0.11 Kg/cm^2 and friction angle 40 - 46^0.

There are numerous cracks in several houses, some of which are being monitored through simple devices (Fig. 7). For this two studs are fixed at both side of the crack and an extensometer having the accuracy of 0.002 mm is used.

The study shows that the slope is still in unstable state and to quantify its stability analysis is being carried out. The instability in the slope is mainly due to water seepage through jointed and fractured shale beds. Rock joint analysis shows an outwardly dipping joint in relation to slope which is also favouring slope instability. Adequate remedial measures will be suggested after completion of the study.

On-Going Projects at NBRI during 2009-2010

Some of the projects being pursued at the National Botanical Research Institute (NBRI), Lucknow, during 2009-2010 include:

Project	Code	Title of the Project	PI	Funding Agency	Start date	Completion date	Total Cost (Lakhs)
MLP	0006	Rural school health education program: Integrating with diverse inputs- Reaching the unreached	Dr A.K.S. Rawat	CSIR	Mar-08	Feb-12	25.060
NWP	003	Transgenic crop plant and genes for resistance to insect pests	Dr D.V. Amla	CSIR	Apr-07	Mar-12	775.00
RSP	0031	Rural development programmes: (i) Sustainable development and utilization of sodic wastelands, adopting green technologies, using schools as knowledge dissemination centres (ii) Dissemination of dry flower/cut flower technologies	Dr S.K. Tewari	CSIR	Apr-07	Mar-12	350.000
SIP	005	Biodiversity assessment, prospection and conservation of plant resources of India	Dr K.N. Nair	CSIR	Apr-07	Mar-12	1729.000
NWP	006	Exploitation of India's rich microbial diversity	Dr C.S. Nautiyal	CSIR	Apr-07	Mar-12	150.000
NWP	008	Pathway engineering and system biology approach towards homologous and heterologous expression of high value phytoceuticals (artemisinin, picrosides, morphine, withanolides podophyllotoxin)	Dr P.K. Trivedi	CSIR	Apr-07	Mar-12	271.000
SIP	009	Enhancing water utilization efficiency in crop plants: prospecting plant diversity for genes and systems biology for drought tolerance	Dr U.V. Pathre	CSIR	Apr-07	Mar-12	1000.00
NWP	017	Environmental contaminants - New screening technologies and effect on human health	Dr R.D. Tripathi	CSIR	Apr-07	Mar-12	227.000

NWP	019	Remediation, eco-restoration and clean-up of contaminated ground and water resources	Dr R.D. Tripathi	CSIR	Apr-07	Mar-12	345.000
NWP	020	Exploratory studies on climate change and adaptation of species complexes	Dr Soumit K. Behera	CSIR	Apr-08	Mar-12	601.00
NWP	037	Discovery and preclinical studies of new bioactive molecules (natural and semi-synthetic) and traditional preparations	Dr A.K.S. Rawat	CSIR	Apr-08	Mar-12	6.00
NWP	045	Advancement in Metrology	Dr Alok Lehri	CSIR	Apr-08	Mar-12	15.000
GAP	2150	Molecular systematics of the genus *Sapindus* L. (Sapindaceae) in India using PCR based techniques	Dr T.S. Rana	DST, New Delhi	Dec-06	Nov-09	17.520
GAP	2151	Studies on diversity and distribution of pteridophytic flora of Pachmarhi Biosphere Reserve	Dr P.B. Khare	MnE&F, New Delhi	Apr-08	Mar-11	13.338
GAP	2152	Lichen diversity of Rewa and adjacent areas of Vindhyanchal in relation to biomonitoring studies	Dr D.K. Upreti	MP State Biodiversity Board, Bhopal	Oct-08	Sep-10	5.968
GAP	2153	Assessment of bryodiversity in Meghalaya and Manipur (North Eastern Hills)	Dr Virendra Nath	MnE&F, New Delhi	Jan-09	Dec-11	25.826
GAP	2223	Analysis of ecological implications of invasion by alien plant species with particular reference to biodiversity and ecosystem processes	Dr K. Kulshreshtha/ Prof. R.S. Tripathi	INSA, New Delhi	Feb-05	Jan-10	7.25
GAP	2231	Genetic improvement of *Canna* by induced mutation and development of core collections	Dr R.K. Roy	DAE, BRNS, Mumbai	Dec-07	Nov-10	9.11675
GAP	2235	Preparation and publication of educational material on *Cycads* for the motivation of student with a bright spark in plant science teaching/research	Dr J.K. Johri	DST, New Delhi	Mar-09	Feb-10	2.300

New Projects at CEERI

The new projects taken up by the Central Electronics Engineering Research Institute (CEERI), Pilani, include:

Design of Mixed Signal Circuits for Instrumentation Applications

Sponsor: MCIT/DIT; Sanctioned Amount : Rs 2.33 crore; Duration: Five years

Brief Description

- Digital design, because of its inherent high noise margin, could garner maximum benefit of planar technology. MOS based analog circuits are a late starter in this regard. Because of the complexity of the MOS transistor's model for analog use, there has not been much development on analog EDA tool side so as to accelerate the spread of analog design activity. Recently, there has been a lot of investment in the areas like embedded systems design and in sensors development. Progress in latter will ultimately lead to the demand for smart sensors.

Objectives

- To carry out research and development of analog and mixed signal (AMS) circuits with focus on low-medium speed (up to MHz), medium resolution (10 - 12 bits) data converters required in low power instrumentation application.
- To attempt co-designing of MEMS and conditioning circuits on the same chip.
- To design and fabricate three ADC chips and a DAC chip in the above domain for instrumentation applications.

Development of NIR Based On-line Instrument for Quality Assessment in Edible Oil Industry

Sponsor: DST; Participating Institutes: CEERI Chennai Centre, CFTRI and M/s Kaleesuwari Refinery Pvt. Ltd, Chennai; Sanctioned Amount : Rs 23 lakh (DST) + Rs 3 lakh (Oil Industry); Duration: Five years

Brief Description

- Capturing of Spectral Data for selective edible oils, in selective process segment area
- Chemical analysis of selective edible oil of Peroxide Value (PV), Free Fatty Acids (FFA) and chemical marker compound composition
- Application of chemometric techniques for pre-processing methods, model building, prediction and validation for PV, FFA and marker compound composition

The product developed will be installed at the user industry M/s Kaleesuwari Refinery Pvt. Ltd, Chennai, and measurement and calibration methods would be tailored to suit the oil sample analysis for PV and FFA. The system will be commissioned for continuous trials and necessary modifications/ improvements will be carried out.

Design and Fabrication of RF MEMS Phase Shifter

Sponsor: Government of India; Sanctioned Amount : Rs 43 lakh; Duration: 9 Months; Expected Output: 50 Nos. of phase shifter devices

Brief Description

- Under this project, CEERI will fabricate RF MEMS Phase Shifter of Ku band frequency range. This is a 5-bit device giving total phase shift of 180°. The first bit will produce 11.25° phase shift and successive bits will double their respective input phase shifts, giving rise to total 180° phase shift. In this connection, RCI has provided mask layout design. The device chip size is 3.5 × 1.2 cm^2. On the basis of design, CEERI has to fabricate the Phase Shifter using UV-LIGA process. In this process, electroforming technique will be employed to make the basic structures of this mini microwave circuit. Chemical Mechanical Polishing planarisation will be carried out invariably after each step of plating in order to achieve uniform and smooth structures. This is necessary because the switching action will produce maximum variation of capacitances, which is not possible in case of rough structures, as desired in the design.

Prof. Barry M. Trost delivers Prof. K. Venkataraman Memorial Lecture at NCL

Prof. Barry M. Trost, Job and Gertrud Tamaki Professor of Chemistry, Stanford University, USA; delivered the eighth Prof. K. Venkataraman Memorial Lecture on 13 August 2009 at the National Chemical Laboratory (NCL), Pune, in honour of Prof. K. Venkataraman, the first Indian Director of NCL. Prof. Trost spoke on "A challenge for Total Synthesis: Atom Economy".

Prof. Trost in his lecture talked about making complex structures in a time-efficient manner depending upon the underlying science and synthetic methodology. He said that the key aspect of organic chemistry is the ability to design structure for function in which the availability of the designed structure becomes crucial. If the structure does not exist or exists but only in incredibly small amounts then synthesis becomes the only avenue. The effectiveness of any synthetic strategy is interdependent with the core synthetic reactions available. Prof. Trost said that the desired selectivity, namely chemo, regio, diastereo and enantio plays a major role in defining synthetic strategies. However, it is also important to ensure maximum economy in the use of raw materials and the minimization of the generation of waste, which is referred to as "atom economy." The ideal synthetic reaction is one of the form A+B=C with anything else only needed catalytically. Thus, his lecture focused on the development of new synthetic atom economical reactions

Prof. Barry Trost delivering Prof. K. Venkataraman Memorial Lecture

and how they impact the design of complex targets.

Prof. Trost through his lecture made the audience understand that chemistry is both a science of enablement and of opportunity. He said the vastness of what one does not know should not be underestimated. The invention of new types of reactivity truly becomes enabling. In pursuing such inventions, one must also be sensitive to making synthetic chemistry environmentally benign by design. In achieving this important goal one must begin by making the very reactions themselves as close to the ideal of being simple additions. The ultimate goal must be to make any molecule only by a series of simple addition reactions (i.e., be chemoselective). Furthermore, each reaction must join the partners with a single orientation (i.e., be regioselective) as well as a single stereoisomer (i.e., be diastereo- and enantioselective). Achieving this goal is the ideal. At this point, it is difficult to anticipate its achievements. He said that efforts hopefully were moving us in this direction with the very satisfying benefit that complex molecule synthesis is indeed being made simpler and more efficient.

Prof. Trost concluded his presentation by saying that 'Synthetic chemistry is a land of opportunities'.

Earlier, Dr S. Sivaram, Director, NCL, welcomed the audience, and guests and presented the credentials of Prof. K. Venkataraman. Dr Sivaram said that Prof. Venkataraman was the first Indian and the third Director of NCL from 1957 to 1966. A reaction called 'Baker-Venkataraman rearrangement' was named after him that has applications in

Dr Sivaram giving welcome remarks

synthetic molecules and that most of his early publications during year 1930s and 1940s are cited even today. Dr Sivaram talked about Prof. Venkataraman's academic and professional career and also welcomed Prof. Barry Trost.

Dr Ganesh Pandey, Head, Organic Chemistry Division, introduced Prof. Barry Trost to the audience with details regarding his academic and professional career. Dr Pandey said that Prof. Barry Trost, a well-known organic chemist, has several awards to his credit like ACS award in pure chemistry, ACS Award for creative work in synthetic organic chemistry, etc., and has over 700 publications. He has delivered a number of plenary lectures, is editor of several books and has been member in the Editorial advisory board for a number of journals. Dr Ganesh Pandey thanked Prof. Trost for his lecture and proposed a vote of thanks.

Scientific Meet on Microwave Tubes and Applications (SMTA) — 2009

A one-day scientific meet on Microwave Tubes and Applications (SMTA) was organized in the recent past at the Central Electronics Engineering Research Institute (CEERI), Pilani. The Chief Guest Dr S.S.S. Agarwala, Former Scientist, CEERI, inaugurated the meet. Dr Chandra Shekhar, Director, CEERI, presided over the inaugural function. Prof. P.K. Maheswari, Mahaveer Vardhaman Open University, Kota; Prof. B.N. Basu, Director, CET, Muradabad; Prof. P.K. Jain, BHU, Varanasi; Dr Lalit Kumar, Director, MTRDC; Dr K.P. Ray, Scientist, SAMEER, Mumbai and others were present on the occasion.

In his inaugural address, Dr Agarwala said that he has been in constant touch with his old colleagues about the activities and developments of the microwave tubes area of the institute. He observed that there is a many folds increase in R&D activities and facilities of this highly specialized area. He appreciated the efforts put in by the Director, Dr Chandra Shekhar, in achieving the all-round progress of this important area. He hoped that under his leadership microwave tubes area would reach even greater heights.

Dr Chandra Shekhar, while welcoming the Chief Guest and other guests, he briefly outlined the ongoing projects in microwave tubes area. He told that a CSIR Network Project is being pursued with the participation of five CSIR Laboratories and an amount of Rs 45 crore was allocated for the project. The institute is also working on sponsored projects from Department of Science and Technology, Department of Atomic Energy, Department of Space, Department of Information Technology and Defence Research & Development Organization. To meet the requirements of these mega projects, a high-ceiling laboratory is being built.

Earlier, Dr S.N. Joshi, Emeritus Scientist and Chairman Organizing Committee of the SMTA, welcomed the Chief Guest and other invited guests. He informed that Dr Agarwala served this institute for three decades and significantly contributed to the R&D activities of microwave tubes area. He headed the area and laid a strong foundation for its growth. Even now, scientists of this area are following the path laid by him. He felt very happy that scientists have been successfully completing the sponsored project with sincere efforts. The experts delivered the following five invited talks spread over the two technical sessions: Prof. P.K. Jain (BHU, Varanasi): Magnetically Insulated Line Oscillator; Dr L.M. Joshi (CEERI, Pilani): Multi-Beam Klystron; Dr Lalit Kumar (MTRDC, Bangalore): Recent Technological Developments at MTRDC; Prof. K.P. Maheshwari (Mahaveer Vardhaman Open University, Kota): Interaction of Ultra-short, Ultra-intense Laser Radiation with Plasma/Vacuum; and Dr K.P. Ray (SAMEER, Mumbai): Industrial Application of Microwave Technology.

Dr R.K. Sharma, convenor of the scientific meet, coordinated the programme. He expressed that this meet would give a new impetus to our ongoing R&D programmes.

Dr V. Srivastava, Head, Microwave Tubes Division, proposed the vote of thanks.

Ms Tanpreet Kaur attends Lindau Noble Laureates meet

Ms Tanpreet Kaur, a Senior Research Fellow, working for her Ph.D. in Organic Chemistry at National Chemical Laboratory (NCL), Pune, recently visited Lindau, Germany, and participated in the 59th meeting of Nobel Laureates and students. More than 40 Indian students covering three categories namely: undergraduate students, master students and doctoral students, and young post-doctoral scientists in the field of Chemistry attended the 2009 Lindau Meeting which was dedicated to chemistry. About 20 Nobel Laureates and more than 600 young researchers from around the world attended the meet at Lindau. Ms. Tanpreet is working jointly with Prof. K.N. Ganesh, Director, IISER-Pune and Dr Asish Bhattacharya, Scientist, NCL.

The students, during one week attended the discussions and lectures, and visited premier German institutions. The discussions were organized with Prof. Kroto, Prof. Grubbs, Prof. Ernst, Prof. Schrock, Prof. Agre, Prof. Aaron, Prof. Chalfie and Prof. Marcus. Among the lectures, the one by Prof. Kroto influenced her a lot. Prof. Kroto is doing a lot of things to attract young minds towards science. He is also organising workshops and going various places to motivate young minds. He has started the Vega Science Trust with Dr Patrick Reams (a BBC Education Producer) for the children.

Institutional visits were most important thing that German Research Foundation (DFG) provided to the students. They saw various institutes and the laboratories, their working arena and culture during the visit. The visiting students discussed various issues with many of the scientists as well as with the young students.

Ms Tanpreet says that she will cherish this experience for lifetime. She enjoyed the discussions and lectures. The Nobel Laureates are greatest living minds and she wants to take the advantage of this opportunity in a best possible way. The visit has further strengthened her desire towards research. "I have also got some new contacts across the globe which will facilitate my research career," she adds.

Travel, lodging and boarding allowance was provided jointly by DST, German Research Foundation (DFG) and Lindau Committee for the Meeting of Nobel Laureates and Students.

Dr Pawan Dewangan chosen to be Associate of Indian Academy of Sciences

Dr Pawan Dewangan, Scientist, National Institute of Oceanography (NIO), Goa, has been chosen to be an Associate of the Indian Academy of Sciences. The Associates scheme was initiated in 1983 to encourage talented young scientists in the country. Under this scheme recognition is accorded to a small number of talented scientists below the age of 35 years who are then invited to associate themselves with the Academy in its various activities.

Dr D. Balasubramanian, President of the Indian Academy of Sciences (IAS) has invited Dr Pawan Dewangan to attend the Platinum Jubilee II Meeting of the Academy to be held in Bangalore from 12-14 November 2009. His Associateship will continue until 31 December 2012.

Dr G. Parthasarathy selected for the Indian Geophysical Union Decennial Award

Dr Gopalakrishnarao Parthasarathy, Deputy Director, National Geophysical Research Institute (NGRI), has been selected for the most coveted Indian geophysical Union Decennial Award for 2009, for his outstanding contribution to the field of earth sciences as senior geophysicist. The Decennial award consists of gold medal and a citation, which will be conferred upon him on 5 October 2009 at the inaugural function of the 46th Annual Convention of the Indian Geophysical Union (IGU) at Wadia Institute of Himalyan Geology, DehraDun. The Indian Geophysical Union annually awards Decennial Award to a scientist, an outstanding senior geophysicist, who has established a school of geophysics in India with indigeneous resources and talent. From 1993, the recipient is presented with a Gold Medal.

Dr Parthasarathy, a Ph.D. from Department of Physics, Indian Institute of Science, Bangalore, joined NGRI in 1990, to initiate a programme on Mineral Physics Research in India.

His research on high-pressure phase stability studies of natural kyanite, uvarovite, geikielite, synthetic nano-perovskite, phyllosilicates, natural zeolites has improved the understanding of the thermodynamic phase stability of these minerals at Earth's mantle conditions. He has also contributed to the field of environmental mineralogy by developing a novel method of converting carcinogenic hexavalent chromium to less toxic trivalent chromium by using natural saponite from Deccan Trap. His high-pressure experimental findings on the thermodynamic properties of synthetic and natural hydrotalcites proved their potential application in carbon sequestrations management. His findings of osbornite (TiN) from the carbonados established the extraterrestrial impact origin of the diamond aggregates formed during the Precambrian impact. The observations of high-pressure phase of fullerene (C_{60}) in Anjar intertrappean sediments have clearly demonstrated the high-pressure extraterrestrial impact at the K-T- boundary.

Dr Parthasarathy is a recipient of National Mineral Award for the year 2003, by Ministry of Mines, Government of India, in the field of Geology (Mineralogy and Petrology); Hari-Om PRL Award for 2003 by Physical Research laboratory, Department of Space, in Earth and Planetary sciences; MRSI Medal for 2007 by Materials Research Society of India; A.P. Scientist Award for 2007 by Andhra Pradesh Council of Science and Technology in Physical Sciences. He is a life fellow of Geological Society of India; Indian Geophysical Union; Andhra Pradesh Academy of Sciences; Mineralogical Society of India ; and Indian Society of Applied Geochemists and Fellow of the Royal Society of Chemsitry, Cambridge, UK. He is an Editorial member of the International journal *The Open Mineral Processing Journal*, since 2008. He has been granted five International and Indian patents, two PCT patents, two USA patents and one European patent. He has authored about 165 research papers published in peer-reviewed international SCI journals and presented about 150 papers in International and National conferences. His work has been cited about 1400 times by various scientists.

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