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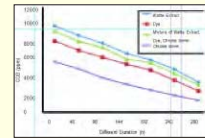
CSIR NEWS

Progress, Promise and Prospects

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C O N T E N T S

Combined Biodegradation and Ozonation for Removal of Tannins and Dyes



Sodium Alginate Based Sprayable Soft Gel



Garden Trees Prospecting Workshop Organized by CSIR-NISCAIR



CSIR-NEIST Organizes Workshops on CSIR's Rural Technologies & Adoption of Schools and Colleges



Technology Day, Foundation Day and Environment Day Celebrations in CSIR Labs





Combined Biodegradation and Ozonation for Removal of Tannins and Dyes

J. Kanagaraj and A.B. Mandal at CLRI

Tannins and dyes, when released into water bodies after industrial processes, cause pollution and pose a major threat to the environment. Tannery waste is a complex mixture that makes the design of effluent treatment challenging. Three significant pollutants in tannery effluent are wattle extract (vegetable based tanning dye), chrome tannin (residual tanning broth containing chromium) and chemical dye compounds. Except chrome tannin, all other compounds were organic compounds that are toxic and xenobiotic. The residual amount of phenolic compounds is a major criterion of biodegradability for organic compounds. Chromium in the tannery wastes, on the other hand, is more efficiently dealt with through chemical means.

The present investigation aims at achieving better biodegradation rate of complex tannery waste by combining biodegradation with ozone treatment for the removal of dyes and tannins. Biodegradation in combination with ozonation showed better rate of pollutant reduction than chemical methods. The combination process helps to reduce common indicators associated with industrial pollution: Chemical Oxygen Demand (COD), Total Organic Carbon (TOC), Total Dissolved Solids (TDS) and Total Suspended Solids (TSS).

It was possible to verify that ozonation pre-treatment increases the dye degradation efficiency. Ozonation of Remazol Black B dye at pH values of 3–11 was effective even at high concentrations of the dye (500 mg/L). The effluent was partially oxidized and completely decolorized, and colour

removal efficiencies greater than 96% were obtained in all cases. For the biological treatment, an increase in ozonation time increased the reduced dye concentration in hydrolyzed dye synthetic effluent. Toxicological tests with *Daphnia Magna* also showed an increase in toxicity after ozonization.

On subjecting this ozonized effluent to biological treatment with a biofilm, toxicity decreased. Membrane based technologies are frequently used after advanced treatment of the biologically treated wastewater of a textile plant for water reuse. To overcome concentrated stream treatment and membrane fouling problem, a combination pretreatment process including ozonation, Biological Aerated Filter (BAF) and reuse osmosis was developed for textile wastewater treatment.

The optimal ozone dosage in the integrated device was 20-30 mg/L. The ozone-BAF integrated device allowed a higher COD and colour reduction in comparison to other treatments described in the literature. After two-stage BAF treatment, an effluent was obtained with average COD values of 27.4 mg/L, SS of 3.0 mg/L, ammonia nitrogen concentration of 0.7 mg/L and a colour of 2 degrees. The reverse osmosis treatment was preceded by ultrafiltration, conductivity was 50-200 us/cm, total hardness was 2-10 mg/L and total alkalinity was 25-60 mg/L. These indicators suggest that the membrane permeates could be reused for dyeing process water. Through these processes, COD values within discharge standards (~45.7-97.9 mg/L) could be met and the

concentrate water could be discharged directly without additional treatment.

Description of the Treatment

Biodegradation: Biodegradation of wattle extract, chrome tannin, dye and mixture of these compounds by *Aspergillus niger* and *Penicillium sp* strains was studied for a duration of 280 hours. In individual pollutant degradation samples, it is observed that the degradation is initially very rapid and the rate falls as the duration increases. Among all the pollutants tested in the degradation study, wattle extract showed the best degradation rate and chrome tannin showed poorest degradation rate. The rate of biodegradation for wattle extract by *Aspergillus niger* is 71% compared to 78% biodegradation by *Penicillium sp*.

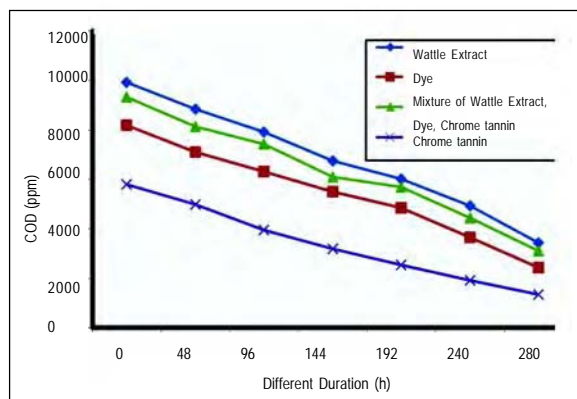
Reports on dye degradation by fungi strains are excellent. Manganese Peroxidase was reported as the main enzyme involved in dye degradation. Some non-white rot fungi that successfully decolourise the dyes have also been reported. The reason for higher amount of biodegradation for the wattle extract, chrome tannin, dye and mixture was due to the enzyme tannase, which was responsible for degradation of tannin, and peroxidase that was responsible for degradation of dyes. It has been found that these enzymes and favorable factors play a crucial role in reducing the pollution problem arising from these chemicals. The selective recovery of chromium by using an environment friendly process of oxidation yielded 96.9% recovery. Sometimes these fungal strains were also



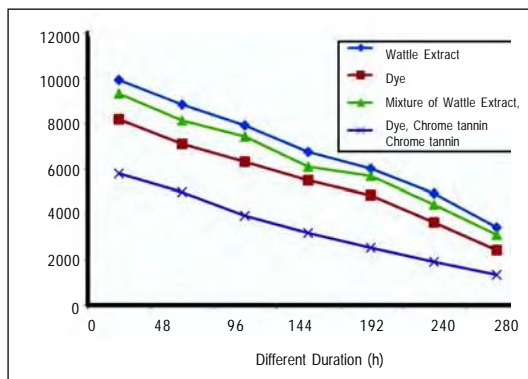
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extensively used for hydrolyzing gallotannin to gallic acid.

Ozone treatment: To enhance the biodegradation rate, ozonation was carried out with the earlier biodegraded samples. Treatment efficiencies for *Aspergillus niger* strain are described for the samples. Percentage reduction of TOC, TDS and TSS for wattle extract sample was 76.4%, 77.7% and 81.3% respectively. Percentage reduction of TOC, TDS and TSS for the chrome sample was 44.2%, 53.7% and 63.2% respectively. Percentage reduction of TOC, TDS and TSS for the dye sample was 52.9%, 33.2% and 74.3% respectively. Percentage reduction of TOC, TDS and TSS for the mixture of the compounds was 64.3%, 69.1% and 74.5% respectively for the sample treated with *Penicillium* sp. More or less similar results were obtained for the *Penicillium* sp. treated sample (after carrying out ozonation). The reduction in biodegradation rate was more in case of *Penicillium* sp. compared to that of *Aspergillus niger*. The reason for this enhanced degradation was formation of a free radical by ozone, which oxidizes the organic compounds more efficiently.

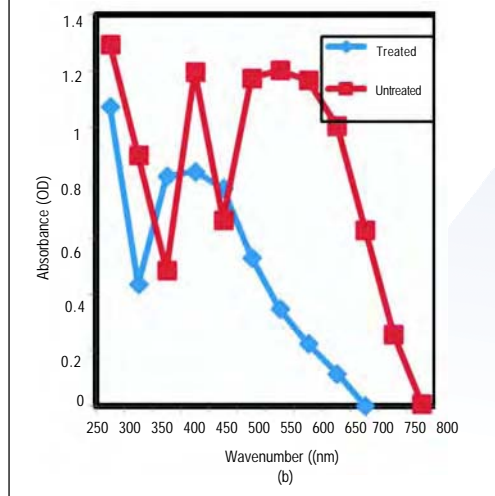
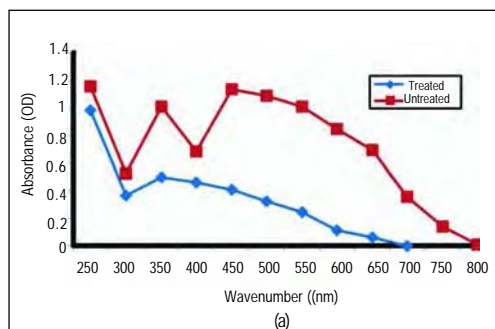


Biodegradation of various chemicals by *Aspergillus niger*



Biodegradation of various chemicals by *Penicillium* sp. (b)

UV-visible analysis of tannins, dyes and mixtures of the compound: The UV-Visible spectra show two peaks at 350-400 nm and 450-600 nm for untreated sample. In the experimental

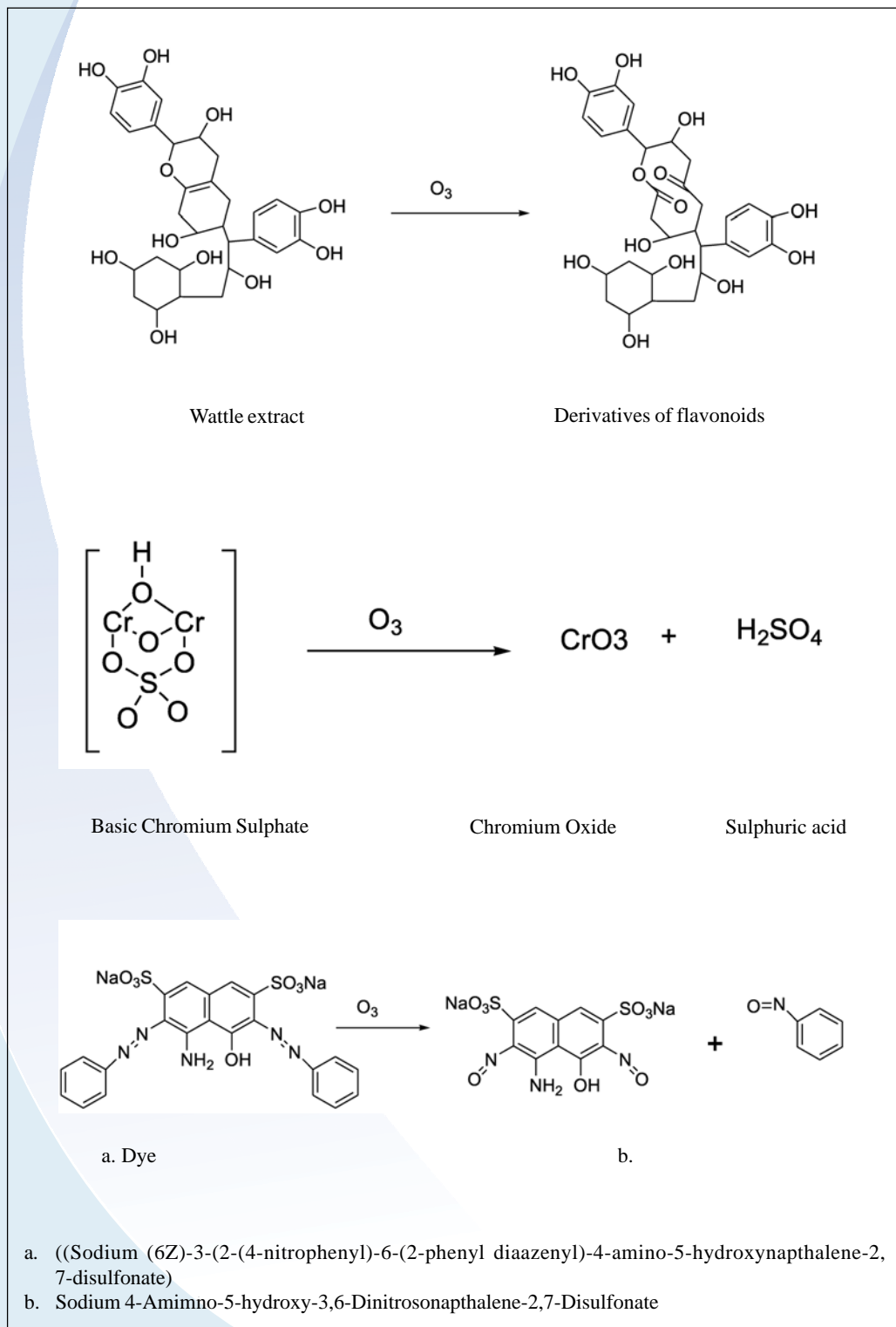


UV-visible spectrum of treated sample of wattle extract (a) and dye (b) by *Aspergillus niger*

samples absorbance peaks in the visible region disappeared, indicating complete biodegradation of the samples. Similar spectra are obtained for samples that are treated with *Aspergillus niger* and *Penicillium* sp. In the case of wattle extract sample, there are two peaks observed at 400-450 and 550-600 nm for untreated dye samples and one decreased peak observed at 400-450 nm for the treated dye samples.

Biodegradation plus ozonation versus chemical methods: Treatment of tannery waste by chemical methods also plays significant role in reducing pollution problems. Tannins and dyes treated with chemical methods show poor rate of degradation as compared to biodegradation and subsequent ozonation of the samples. However, the precipitation of chromium by chemical methods showed higher removal rate than biodegradation methods. The precipitation of chrome tannin using magnesium oxide showed pollution reduction of 95.4% against 85.6% and 87.5% while biodegrading by *Aspergillus niger* and *Penicillium* sp. respectively. Biodegradation with subsequent ozonation showed a chromium degradation rate of more than 90% in all the experimental samples as compared to 89.2%, 65.1% and 70.1% for wattle extract, dye and mixture of the compounds by chemical methods respectively.

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Mechanism of Ozone degradation for the samples of wattle extract, chromium and dye

The wattle extract sample showed higher reduction of TOC, TDS and TSS in comparison with other samples. Chrome is an inorganic compound and the dye is an azo compound, which is slightly difficult to degrade as compared to wattle extract (a phenolic compound).

Prospects of the Treatment

The present investigation was carried out to assess the efficiency of pollutant reduction achieved by means of combined biodegradation and ozonation. The combined method of biodegradation with ozonation is an effective method for the removal of dyes and tannins in liquid wastes.

Biodegradation is always effective if the fungal or bacterial strain chosen is efficient for the waste to be remediated. Wattle extract, dyes and chromium showed degradation efficiency of 92-95%, 94-95% and 85-87% respectively for the combined treatment.

This treatment not only treats complex tannery waste to prescribed standards, but can also be used to recycle the treated water and chromium to the tanning process. This will help the leather industry in solving the above pollution problems and also pave the way for recycling the treated water for leather processing operations in future.

Sodium Alginate Based Sprayable Soft Gel

M. U. Chattbar, K. Prasad, D.R. Chejara, A.K. Siddhanta at CSMCRI

Summarized by A.K. Siddhantha and Kamlesh Prasad

Preparation of biologically based new materials with tailor-made barrier properties is a frontier research field. Sodium alginate (sodium salt of alginic acid; Na-Alg), a common food stabilizer, is a seaweed-based polysaccharide that is extracted from brown seaweeds, e.g., *Sargassum tenerrimum* (Figure 1). This seaweed grows luxuriantly on the west coast of India. Chemically, alginic acid is

a linear co-polymer of b-D-mannuronic acid (M) and α -L-guluronic (G) acid.

In an attempt to prepare derivatives with new functionalities, sodium alginate was allowed to react with *o*-aminobenzoic acid (OABA) and *m*-aminobenzoic acid (MABA) in the presence of 1-ethyl-3-[3-(dimethylamino) propyl]-carbodiimide hydrochloride. The reaction afforded amide derivatives of sodium alginate capable of forming viscous hydrogels (Na-Alg/OABA and Na-Alg/MABA). This amide derivative mixture became a low viscosity fluid upon gentle shaking and regained its viscous behaviour upon standing at room temperature (Figure 2). Such behaviour of a viscous material is known as thixotropy, which combines the Greek words *thixis* (stirring or shaking) and *trepo* (turning or changing).

Thixotropy is the property of certain materials that are thick and viscous under normal conditions, but flow when shaken, agitated, or otherwise stressed. On being subjected to such stresses, thixotropic fluids take a fixed time to return to a more viscous state. In terms

of physics, some non-Newtonian fluids (pseudoplastic fluids) show a time-dependent change in viscosity; the longer the fluid undergoes shear stress, the lower its viscosity. A thixotropic fluid is a material that takes a finite time to attain equilibrium viscosity when introduced to a step change in shear rate. Some thixotropic fluids return to a gel state almost instantly, such as ketchup, and are called pseudoplastic fluids. Others such as yogurt take much longer and can become nearly solid. Many gels and colloids are thixotropic materials, exhibiting a stable form at rest but becoming fluid when agitated.

This interesting property of the alginic acid amide based soft gel turning into a flowing liquid on gentle stirring makes it suitable for possible application as a delivery system or sprayable gel material for transporting small active molecules onto the targeted locations in health and personal care formulations. Non-toxicity of alginic acid amide based substrates would be an advantage for such applications (Figure 3).

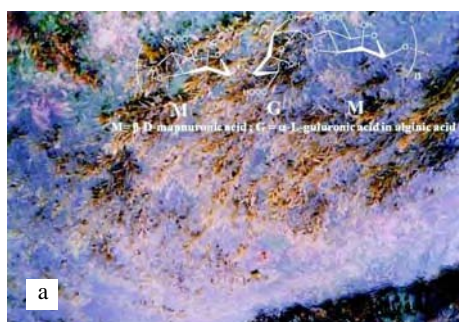


Fig 1. The seaweed species *Sargassum tenerrimum*, (a) under the Arabian Sea at Porbandar, Gujarat (21°37.926' N, 69°36.479' E); (b) image of the herbarium of the seaweed species

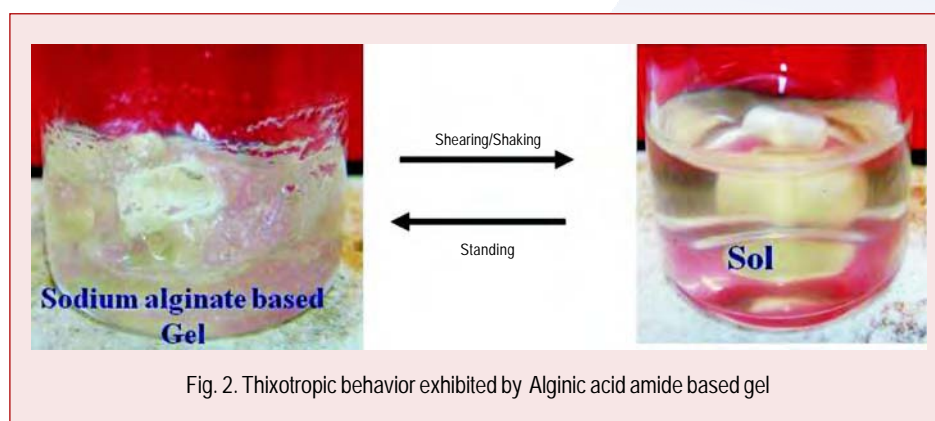


Fig. 2. Thixotropic behavior exhibited by Alginic acid amide based gel

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Fig. 3. Schematic representation of the alginate acid amide based sprayable gel delivering active molecules

The physicochemical properties of the thixotropic gel of sodium alginate prepared with *o*-amino benzoic (OABA) acid and *p*-amino benzoic acid (PABA) are presented in Table 1.

It was observed that the percent yield of the Na-Alg/OABA and Na-Alg/MABA increased with increasing OABA or MABA molar ratio up to 1.1 mmol. It should be noted that the derivatives prepared with OABA and MABA were soluble under ambient conditions. Na-Alg (1% w/v) showed apparent viscosities of 120 ± 4.30 cP at 25 °C, the apparent viscosities measured for the derivatives under identical experimental conditions showed much higher values (Na-Alg/OABA = 822 ± 5.5 , cP ; Na-Alg /MABA = 315 ± 5.0

cP). The increase in viscosities may be due to the formation of the stronger double helical structures through the participation of –COOH group of OABA and MABA in the formation of hydrogen bonding subsequently increasing the number of junction zones in the gel-network system.

The thixotropic properties of the alginate acid amide gels were evaluated by rheometry, which is the science of studying flow behavior of materials. The dynamic viscosity (ζ) was found to decrease with increasing shear rate ($\dot{\alpha}$), corresponding to a shear thinning behaviour for all the samples. It can be seen that the rate of decrement of viscosity for Na-Alg/OABA was lowest in the lot indicating improved stability or slower

flow of the sample under applied shear conditions proving thereby the formation of stronger gel networks in the sample (Figure 4). Nevertheless, these amide derivatives endowed with desired viscosity under certain shear value (highlighted with dotted oval in the graph) may be suitable to find applications in sprayable formulation deliverable through an appropriate spraying device (Figure 4).

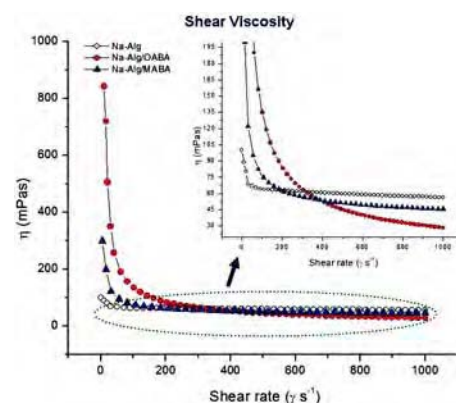


Fig. 4. Variation of shear viscosities of alginate acid amide hydrogels with shear rate

For the evaluation of thixotropic behavior by hysteresis loop test, which provides a quantitative assessment of thixotropy, the samples were subjected for thinning under increasing shear rate (upward curve) immediately followed by

Table 1. Physicochemical properties of the derivatives

Samples	% yield ^a (± SD)	Total nitrogen ^a % (± SD)	Apparent viscosities (cP)	M_w^b (kDa)	PDI ^c (M_w/M_n)
Na-Alg	NA	0.05 ± 0.001	120 ± 4.5	225	1.23
Na-Alg/OABA	74.0 ± 0.5	4.61 ± 0.05	822 ± 5.5	560	3.58
Na-Alg/MABA	60.0 ± 0.5	4.73 ± 0.07	315 ± 5.0	345	3.03

^aData presented are mean of triplicate measurements (± SD); ^b M_w = Wt Average mol wt; ^cPDI = polydispersity index, the value nearing 1.0 signifies homogeneity of the polymeric structure, where M_n is No. average mol wt; NA = Not applicable

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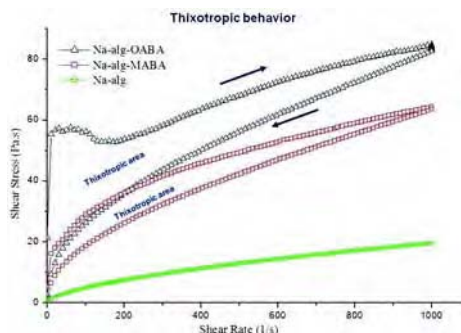


Fig. 5. Evaluation of thixotropic by hysteresis loop experiment

dropping the applied shear rate (downward curve) (Figure 5). The larger

the area of the loop, greater is the thixotropicity. Na-Alg / OABA (15 upward-downward cycles) was found to have higher thixotropicity in comparison to Na-Alg / MABA (9 cycles). Beyond the indicated cycles, the samples lost thixotropicity.

Amide derivatives of sodium alginate capable of forming thixotropic hydrogels have been synthesized by reaction with aminobenzoic acids (*o*- and *m*-) using carbodiimide chemistry. It may be noted that *p*-aminobenzoic acid did not produce the expected amide derivative under the same reaction conditions. Given the

importance of natural polymer-based thixotropic materials in pharmaceutical and personal care applications, these alginic acid amide based hydrogels endowed with desired viscosity under certain shear value, are predisposed to find applications in sprayable formulations. Discovering new lead thixotropic molecules opens up opportunities for engineering such molecular systems with various degrees of thixotropicity suited to newer applications.

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Collaborative MoU in Strategic Area

CSIR-National Aerospace Laboratories (NAL) and M/s Kadet Defence Systems Private Limited, Kolkata signed an MoU on 27 March 2012 for undertaking collaborative work in areas of mutual interest. These include development of a tactical UAV, heavy fuel systems, converting NAL's HANSA optionally for unmanned application and utilization of expertise and facilities on both sides.

Mr Avdhesh Khaitan, Director, M/s Kadet Defence Systems represented the company for signing of MoU and had discussions with Director, NAL and CSIR-NAL team on the future course of action for making the collaboration fruitful and useful.



MoU between CSIR-NAL and M/s Kadet Defence Systems Pvt Ltd signed

MoU between CSIR-NIO and National Institute of Technology, Goa

Directors of the CSIR-National Institute of Oceanography (NIO), Dr Satish R. Shetye, and the National Institute of Technology-Goa, Prof G.R.C. Reddy, signed an MoU on 31 May 2012 facilitating collaboration in marine instrumentation, particularly the development of sensors for marine applications using optics and photonics. The term of this maiden collaboration between NIO and NITG is five years with scope for renewal.



MoU signed between CSIR-NIO and NIT-Goa

This is the first-ever partnership of NIO with a NIT anywhere in the country. The objective of this collaboration, besides producing publications and patents, is to undertake joint research projects whose outcomes would be transferred to industry. CSIR-NIO has offered to take about ten students per year, ranging for a period of two to six months, to work on programmes related to their thesis under the joint supervision of NITG and CSIR-NIO staff. Similarly, NITG will allow the few nominated staff of NIO to participate in its special lectures and classes.

The NIO team comprises Sanjeev Afzulpurkar (Chairperson), Gajanan Navelkar (Co-convenor), Elgar Desa, Antonio Mascarenhas and R. Madhan. The NITG team consists of Prof G.R.C. Reddy (co-Chairperson) and P. Saidi Reddy (Convenor).

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Garden Trees Prospecting Workshop Organized by CSIR-NISCAIR

On the occasion of the World Environment Day (5th June 2012), The Wealth of India Division of CSIR-National Institute of Science Communication and Information Resources (NISCAIR), New Delhi conducted a three-day workshop on *Garden Trees Prospecting* for Post Graduates during 5-7 June 2012. The objective of the workshop was to sensitize the youngsters, particularly students of botany, about the importance and uses of garden trees. About ten students from the NCR region, Delhi University in particular, and the Research Interns of The Wealth of India division attended the workshop.

The programme started with the Director planting a sapling of *Nyctanthes arbor-tristis* L. (Night-flowering Jasmine) in the NISCAIR Lawns. Thereafter, Dr. Sunita Garg, Chief Scientist & Head of the division welcomed the participants highlighting the importance of plants in our life. Dr. Gangan Prathap, Director, NISCAIR in his inaugural address recollected Hendrik van Rheedee's *Hortus Malabaricus*, on ethnomedicinal plants of the Malabar region, the first and foremost encyclopaedic publication in that subject.

During the next three days, the participants attended sessions comprising lectures on the subject including "Essence

of Writing Encyclopaedia like Wealth of India", hands-on training, visit to Indian Agriculture Research Institute, New Delhi to gather information on organic manure and vermicompost facility, and also NISCAIR's Nursery, Herbarium Cell and Printing Units. The participants were also taken to NISCAIR's S V Marg campus to acquaint them with various activities and services such as document supply, translation of scientific documents, etc.

During the workshop, different applied aspects like garden development, related requirements, selection of planting materials, seasonal maintenance of garden, equipments, etc., were





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introduced to the participants. The team visited the Agronomy Division of IARI, New Delhi to observe and learn how to utilize garden wastes, including leaf litter, wood, fruits, etc. for making useful manure and vermicompost from rotten, unused vegetables and kitchen waste. Dr. Shiva Dhar Mishra, Senior Scientist, briefed about the type of soil nutrients and their availability in Indian soil. Dr. Mishra and his team gave a live demo on collection of waste material, processing and maintenance of final products. He also shared the economics of these products and their marketing potential.

The contents of *The Wealth of India* were explained by Dr. Garg. The index given in some volumes encouraged the students to develop updated inventories that could lead to the development of various value-added products and new drug discoveries.

Students were also taken to the Raw Materials Herbarium Delhi (RHMD), which is a recognised herbarium and museum, maintained by NISCAIR since 1978 when it was created by The Wealth of India Division for the collection of plant, animal and mineral specimen. The

students took interest and raised various queries related to guidelines for introduction of plants from other countries, collection, identification and preservation of plant specimens. Dr. H.B. Singh, Chief Scientist & Head RHMD, attended to all queries raised by the students.

There were also interactive hands-on sessions wherein the students were taken to the NISCAIR garden to collect specimens and identify trees *in situ*. Students were apprised of the botanical and common names, key characters and main medicinal and other uses of ornamental trees, viz. *Artocarpus lakoocha* Roxb., (Monkey Jack fruit), *Bahera* and *Harra* (*Terminalia bellirica* Roxb. and *T. chebula* Retz.), *Bixa orellana* Linn., *Ravenala madagascariensis* Sonnerat and *Crescentia cujete* Linn. Mr P.R. Bhagwat, Principal Technical Officer, Wealth of India and Horticulture Division, informed that in the CSIR-NISCAIR campus garden *Crescentia cujete* Linn. (Calabash tree, *Bilayati bel*, Family–Bignoniaceae) is also available.

In the hands-on training, students identified specimens collected from the

garden and noted down the names and vernacular names. In the session on Future Prospects of Knowledge on Trees, Dr Garg shared her views on how a student can become a small or large-scale entrepreneur. The participants were provided with a certificate of participation, literature on about 20 trees from *The Wealth of India*, copies of *Science Reporter*, *Vigyan Pragati*, Bulletin on Precious Minerals in Everyday Life, bulletin on Killer plants for dengue mosquito, etc. for further reading.

In their feedback the students revealed that earlier they could identify only about 10-12 trees but after attending the workshop they could identify at least 30-35 plants along with common/ vernacular names and major medicinal and other uses of these trees. They said that the three-day programme had triggered in them a passion for garden trees prospecting.

The students further desired to have summer training on collection and collation of information on various plants for getting hands-on experience of literature collection and analysis of available information on particular plant genera and species.

CSIR-NEIST and TSCST Organize *Demonstration cum Workshop on Rural Technologies Developed by CSIR*

The CSIR-North East Institute of Science & Technology (NEIST), Jorhat, organized a two-day *Demonstration cum workshop on rural technologies developed by CSIR* in collaboration with Tripura State Council for Science & Technology (TSCST), Govt. of Tripura. The workshop was held during 2-3 February 2012 at State Institute of Public Administration and Rural Development (SIPARD), Agartala. CSIR-Institute of

Materials and Minerals Technology (IMMT), Bhubaneswar; CSIR-Central Leather Research Institute (CLRI), Chennai and CSIR-Central Mechanical Engineering Research Institute (CMERI), Durgapur participated in this two-day workshop.

The workshop was aimed at creating awareness about rural technologies developed by CSIR and disseminating these technologies to unemployed youth

and women self help groups (SHGs) through exhibition and demonstration. About 74 participants from various SHGs, NGOs, unemployed youths and local entrepreneurs from different districts of Tripura participated in the workshop.

The workshop began with opening remarks by Dr P.G. Rao, Director, CSIR-NEIST. Dr Rao briefed the participants about the objective of the workshop and gave an insight into some CSIR rural

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technologies that have the potential to augment the income of rural people. He also mentioned about the CSIR 800 programme that is aimed at improving the lives of 800 million people of India through Science & Technology interventions. Later, lectures were delivered by personnel from CMERI and IMMT wherein the speakers described the societal impacts of their rural technologies.

Later in the day, the workshop was formally inaugurated by Chief Guest Shri Joy Gobinda Debroy, Honourable Minister of Science & Technology, Govt. of Tripura. Notable dignitaries present at the function were Shri Banmali Sinha, Principal Secretary, Science, Technology & Environment, Govt. of Tripura, Shri P. Biswas, Director, Science, Technology & Environment, Govt. of Tripura, and Shri M.L. Roy, Member Deputy Secretary, TSCST.

In his welcome address, Shri P. Biswas stressed on the need for such programmes not only for awareness but also to bring the benefits of science and technology to the common man. Shri M.L. Roy spoke about the genesis of the workshop. Speaking at the function, Mr Debroy urged the participants to take full advantage of the workshop. He further



(Left) Shri Joy Gobinda Debroy, Hon'ble Minister of Science & Technology, Govt. of Tripura, speaking at the inaugural function. Also seen seated on the dais (from right) are, Dr P.G. Rao, Director, CSIR-NEIST and Shri M.L. Roy, Member Deputy Secretary, TSCST. (Right) Demonstration on mushroom cultivation to the participants.



requested the Director of CSIR-NEIST to set up an outreach centre at Tripura so as to benefit the people at large.

Dr P.G. Rao in his address expressed gratitude to TSCST, Govt. of Tripura for joining hands with CSIR-NEIST to organize this special workshop. He further appealed to the government to lay more emphasis on entrepreneurship development to benefit the unemployed youth and women. He also said that CSIR-NEIST is ready to extend all assistance in organizing such workshops in future and may even coordinate to set up an outreach centre in Tripura as appealed by the Chief Guest.

On the second day, Dr P.G. Rao gave a detailed presentation on some rural technologies developed by CSIR-NEIST, including banana fibre extraction process, liquid deodorant cleaner, low dust chalk pencil, pulse storage structure etc. Dr A.K. Bordoloi, Principal Technical Officer, CSIR-NEIST spoke on mushroom cultivation technique.

The hectic two-day workshop covered technical sessions and practical demonstrations by personnel from the participating CSIR laboratories on biomass

drier, energy efficient low cost bakery oven, Terafil water filter, hand pump attachable iron removal plant, hand bags from leather, low dust chalk pencil, extraction of fibre from banana pseudo stem and mushroom cultivation. The participants made a note of the important steps of these technologies and actively participated in the various demonstrations of the same.

In the valedictory function participants shared their experiences of the workshop and its activities. One of the participants and an entrepreneur of Banana fibre, Mr Ashutosh Pal, was given suggestion to market his products in various government emporium outlets. Shri P. Biswas acknowledged the various important CSIR technologies developed, transferred and available for transfer and requested the entrepreneurs to utilize the available technologies. Shri M.L. Roy appreciated the active participation and involvement of the participants in the workshop.

A total of 74 participants comprising of various SHGs, NGOs, unemployed youths and local entrepreneurs showed keen interest and enthusiasm in learning about the technologies. The participants also gave their feedback about the programme in a feedback form.



Demonstration on biomass drier by CSIR-IMMT personnel



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Workshop on *Faculty Training and Motivation and Adoption of Schools and Colleges* at CSIR-NEIST

CSIR-North East Institute of Science & Technology (CSIR-NEIST), Jorhat, organized a two-day workshop on *Faculty training and motivation and adoption of schools and colleges* during 14-15 February 2012 at its premises.

The workshop was inaugurated at a short inaugural session on 14 February 2012, which was presided over by Dr R.C. Boruah, Outstanding Scientist & Director-in-charge. About 27 teachers comprising of 12 teachers of Botany and 15 teachers of Zoology participated in the programme. The participants belonged to Bahona College, Jorhat, Darrang College, Tezpur, North Lakhimpur College, Lakhimpur, Lakhimpur Girls College, Lakhimpur and Kendriya Vidyalaya, NEIST-Jorhat.

In the inaugural session, Dr L. Nath, Chief Scientist & Coordinator of the programme, articulated the genesis and objectives of the programme. Dr R.C. Boruah in his presidential address



Participating faculty teachers with Dr P.G. Rao (*First row, third from left*), Director, CSIR-NEIST and the organizing team

encouraged the teachers to take up research in basic sciences and also urged them to motivate their students to take up basic science as their career.

The workshop was conducted in a series of technical sessions separately for the two participants groups viz., Botany and Zoology. This included various lecture sessions given by eminent scientists of NEIST and invited resource persons along with hands-on experiment session and laboratory visit for trainee

teachers. The resource persons included Prof. B.K. Konwar, Vice-Chancellor, Nagaland University; Prof. R. Sarma, Professor, Assam Agricultural University; Prof. R.K. Bhola, Professor, Gauhati University; Prof. S.C. Biswas, Dept. of Life Sciences, Dibrugarh University; Dr B.G. Unni, Chief Scientist, CSIR-NEIST; Dr S.C. Nath, Chief Scientist, CSIR-NEIST; Dr S.P. Saikia, Scientist, CSIR-NEIST and Dr M. Bhuyan, Scientist, CSIR-NEIST.

The workshop concluded with a short valedictory session held on 15 February 2012, which was presided over by Dr P.G. Rao, while Prof. B.K. Konwar graced the session as the Chief Guest. A participating teacher from each college was given the opportunity to share experiences and give feedback on the programme. The workshop was highly appreciated by the participating teachers. Certificates were distributed by the President and Chief Guest to the participating teachers.

Technical Workshop on *National Knowledge Network* at CSIR-NIIST

CSIR-National Institute for Interdisciplinary Science & Technology (NIIST) hosted a two-day workshop on *National Knowledge Network (NKN)* during 9-10 May 2012. The workshop was organized by the National Informatics Centre (NIC) to educate the participants about the National Knowledge Network, a state-of-the-art multi-gigabit-pan-India network to connect all knowledge-related institutions in the country.

The purpose of NKN is to network quality academic and research institutions and create a pool of highly trained persons. The workshop was meant to illustrate the methodology for integration of NKN with internal network of institutions and discuss other network related topics. The NKN project uses a high bandwidth network to link 1500 knowledge and research institutions in science, technology, higher education,

healthcare, agriculture and governance across India and facilitates the flow of information and knowledge. Currently thirty-three institutes in Kerala are connected to the NKN.

The workshop was inaugurated by Shri P.H. Kurian IAS, Principal Secretary, IT Department, Govt. of Kerala and former Controller General of Patents, India. Shri Kurian said India needed a much better knowledge ecosystem to



WORKSHOPS/FOUNDATION DAY CELEBRATIONS

move up the global innovation ladder. He pointed out that according to the Global Innovation Index in 2011, India occupied the 56th position, while a small country like Qatar was ranked at the 29th position. "A suitable mechanism to disseminate the knowledge generated in academic and research institutions in the country is the need of the hour," remarked Shri Kurian and hoped that the National Knowledge Network (NKN) would fill that gap. Mr Kurian stated that the limited dissemination of patent information in India was one of the reasons limiting the innovation potential of scientists, researchers and the

academic community in the country.

Connecting over a video conference network from New Delhi, Dr R. Chidambaram, Principal Scientific Advisor to the Government of India and Chairman, high level committee on NKN, said NKN was designed to provide a platform for knowledge exchange and collaboration between scientists within the country and abroad. Collaborative research, sharing of scientific databases and remote access to advanced research facilities were other major areas that the network could bring in its revolution. Prof. S.V. Raghavan, chairman of the

technical advisory committee, NKN, Dr. B.K. Gairola, Director General, National Informatics Centre (NIC), Dr. Suresh Das, Director, National Institute for Interdisciplinary Science and Technology (NIIST) and Dr. K.S. Raman, State Informatics Officer, NIC also spoke in the inaugural function.

There were two technical sessions held on the opening day of the workshop and another two technical sessions on the following day. The workshop was brought to a close with a Question and Answer session.

48th Foundation Day of CSIR-IMMT

CSIR-Institute of Minerals and Materials Technology (IMMT), Bhubaneswar observed its 48th Foundation Day on 13 April 2012. A large number of visitors, retired employees of CSIR and professionals from industries in the state visited IMMT and interacted with the scientists. Research scholars of IMMT set up an exhibition and poster presentation to explain the ongoing activities to the visiting guests.

Prof. Barada Kanta Mishra, Director-IMMT, described the annual activities of the institute for 2011-12 at the Foundation Day Function. Prof. Mishra said that IMMT has created a number of unique facilities this year for advanced research, including mineral processing pilot plant, fly ash brick making pilot plant and plasma processing of iron ore. He informed that IMMT's interaction with the industry and academia in the country and abroad has been fruitful in advancing R&D work. Prof. Mishra



Dignitaries on the dais at the function

further said that IMMT has taken the decision to waive off technology license fee for some of its technologies so that it has direct impact on the society and environment and is to attract more investments by MSMEs in the country. IMMT has resolved to reach out to the weaker sections of the society through the CSIR-800. IMMT will further use the Public Private Partnership (PPP) mode to assist development of new technologies for Indian and foreign industries in the areas of iron ore, coal, bauxite-aluminium, manganese, nickel, copper etc.

Chief Guest Dr P.K. Mohanty, Vice Chairman-cum-Managing Director, Orissa Sponge Iron and Steel Limited delivered the foundation lecture titled *Experience of a developer in iron and steel making*. Dr Mohanty said that with his experience as an entrepreneur throughout his life, he could see that IMMT has made significant progress in the fields of mineral processing and material extraction. He offered to take some of the technologies, specially the rural technologies, to propagate them as part of their corporate activity.

IMMT released its Annual Report for the year 2011-12 and bi-annual Hindi magazine *Abhivyakti*. Two of IMMT's senior colleagues, Dr. Srikant Sharma, Scientist, R&D Planning and Dr. D.B. Ramesh, Principal Technical Officer, Library were awarded certificates of appreciation for their sincere, dedicated and committed services to the scientific community and enhancing the image of the institute.



TECHNOLOGY DAY CELEBRATIONS

CSIR-National Metallurgical Laboratory Celebrates National Technology Day 2012

National Technology Day 2012 was celebrated at the CSIR-National Metallurgical Laboratory (NML), Jamshedpur with about 350 students from institutes like NTTF, R D Tata Technical Education Centre, Karim City College, Aditya Institute of Technology and Graduate College visiting the laboratory and participating in the function. The students were delighted to see the furnace operations, tapping of molten metals, functioning of scanning electron microscopy, creep testing experimentation, metal formation studies, NML Museum, etc.

Shri M. Narayana Rao, Chairman and Managing Director, Mishra Dhatu Nigam Limited (MIDHANI), under the Ministry of Defence, Hyderabad was the Chief Guest. He delivered the Technology Day Lecture on *Role of Materials in Growth of Strategic Sectors*. Shri Rao started his lecture with a note from the *USDA Report & News*: “The prosperity of the Indian Middle Class is responsible for the rise in food prices across the globe”. Shri Rao referred to a seminar on global economy in Missouri, where Bush was quoted by the media as saying: “There are 350 million people in India who are classified

as middle class. That’s bigger than America. Their middle class is larger than our entire population. And when you start getting wealth, you start demanding better nutrition and better food, and so demand is high, and that causes the price to go up.” Shri Rao gave an interpretation of the statement and projected how India’s rise as a technological power is becoming an issue of concern among the developed nations.

Shri Rao quoted the modern futurologist Alvin Toffler’s famous statement: “Yesterday ‘violence’ was power, today ‘wealth’ is power and



*Glimpses of the
Technology Day
Function*



TECHNOLOGY & WORLD ENVIRONMENT DAY CELEBRATIONS

tomorrow 'knowledge' will be power." He raised the issue: Can India become an innovation leader particularly in the advanced manufacturing sector? Yes, he felt, provided we have technology foresight (right technology choices) and establish an innovation ecosystem. Shri Rao said the critical technologies for India today were (1) Strategic technologies (nuclear, space and defence related); (2) Advanced manufacturing and process technologies; (3) Advanced materials technologies; (4) Knowledge-intensive technologies – Information Technology (particularly hardware), Biotechnology and Nanotechnology (particularly nano electronics); (5) Technologies used in Small & Medium Enterprises (SME's) and (6) Rural development-related technologies.

Shri Rao also elaborated on titanium alloy and superalloys for nuclear applications; materials for fusion programme; processing of ITER Vacuum Vessel In-Wall Shield alloys; materials for advanced steam boilers and many more. He further added that without the right material, a good engineering design is wasted.

Shri Rao concluded by saying that a strong and vibrant innovation ecosystem requires (1) An education system that nurtures creativity; (2) An R&D culture and value system that supports both basic research and applied research and technology development; (3) An industry culture that is keen to interact with the academia; (4) A bureaucracy that is supportive and (5) A policy framework that encourages young people to enter into

scientific careers.

NML Director Dr S. Srikanth welcomed the gathering and said MIDHANI had made great contributions to the self-reliance in high-tech materials. MIDHANI was born during the Technology Denial Regime when the western world would not let India either access or facilitate development of critical technologies. Today, we can be proud that MIDHANI can challenge the best in the world. The country looks up to MIDHANI for critical materials support to many of our strategic programmes of national importance like manufacture of fighter aircraft, commercial launch of PSLV, GSLV & GSLV Mark II etc. and increase in nuclear power generation beyond 18000 MW by year 2020.

CSIR-NBRI Observes World Environment Day



Some highlights of the World Environment Day Celebrations at NBRI

CSIR-National Botanical Research Institute (NBRI), Lucknow observed the World Environment Day on 5 June 2012. Shri Mahendra Modi, ADG/IG Human Rights, Lucknow graced the occasion as the Chief Guest. Dr S N Singh, Chief Scientist, CSIR-NBRI, in his welcome address, highlighted the importance of

annual celebrations of World Environment Day as a global event. Shri Modi delivered a special talk on *Management of Water and its Conservation*. He presented a self-developed model of water conservation and water recharge in cities and other areas. He pointed out that water conservation by small reservoirs could

help up to 335% recharge of the wells. Shri Modi also cautioned about the excessive use of packed mineral water as mineral water bottles are becoming a source of environmental pollution. He expressed concern over the declining forest cover areas in India from 30% to 14%.



INTERNATIONAL YEAR OF CHEMISTRY

CSIR-CMERI Celebrates International Year of Chemistry

CSIR-Central Mechanical Engineering Research Institute (CSIR-CMERI), Durgapur celebrated the International Year of Chemistry and 150th anniversary of guru of the first research school of chemistry in the country, Acharya Prafulla Chandra Ray, in the recent past.

The dignitaries present on the occasion were Prof Animesh Chakravarty, Indian Association for Cultivation of Science, Kolkata and Chief Guest of the Programme; Prof Sourav Pal, Director, CSIR-NCL, Pune; Prof Sabyasachi Sarkar, IIT Kanpur; Prof Dipak Palit, Bhabha Atomic Research Centre, Mumbai; Prof Chaitali Mukherjee, University of Calcutta, and Prof Tarasankar Pal, IIT Kharagpur. A number of eminent professors, teachers, students and research scholars from various academic, engineering institutions and schools congregated in the MM Suri Hall at CSIR-CMERI to participate in this lecture-cum-interactive programme.

In his inaugural address, Prof. Gautam Biswas, Director, CSIR-CMERI welcomed the august gathering and extended a warm and hearty greeting to dignitaries and the distinguished gathering. Subsequently, Prof. Biswas emphasized the importance of chemistry in the third industrial revolution, which demands a seamless frontier of molecular and materials science by bringing together under a common umbrella chemists, physicists, biologists and mechanical engineers, dovetailing multi-pronged experimental and theoretical probes.

In his lecture, Chief Guest Prof. Animesh Chakravarty illustrated the seminal chemist in Acharya Prafulla Chandra Ray immaculately negating the



Prof. Gautam Biswas, Director CMERI delivering the Inaugural Speech

portrayal of Acharya as philanthropist clad with run-of-the-mill attire. Tracing the evolution of science in India Prof. Chakravarty observed that Chemistry was not just a subject, but also a way of life to the Acharya. While commenting on the impact of the scientific contribution of Acharya Prafulla Chandra Ray on the society, Prof. Chakravarty added that chemistry was instrumental in many societal transformations.

Dr Sourav Pal, Director, CSIR-NCL engrossed the audience with his talk on



Professor Animesh Chakravarty, Indian Association for Cultivation of Science (IACS), Kolkata speaking on the theme *The Times, Life and Work of Acharya Prafulla Chandra*

Chemistry in Shaping Materials for the Future. While narrating the history of evolution of chemistry, he signified chemical science as a central science. He also highlighted the role of chemistry in

materials like opto-electronic materials, hydrogen energy storage materials, fuel cell materials, catalytic materials and solar energy harvesting materials, smart and functional materials with different response characteristics, which will play a significant role in shaping our future. He reiterated that the design and evolution of future materials would be dictated by chemistry along with knowledge of other disciplines.



Professor Sourav Pal, Director, CSIR-NCL delivering the lecture on *Chemistry in Shaping Materials for the Future*

Prof. Sabyasachi Sarkar, Indian Institute of Technology Kanpur, delivered a stimulating presentation on the topic *Learning Earth's Aptness in Harvesting Solar Energy*. In his thought provoking



Professor Sabyasachi Sarkar, Department of Chemistry, IIT, Kharagpur enumerating on *Learning Earth's Aptness in Harvesting Solar Energy*



INTERNATIONAL YEAR OF CHEMISTRY/LECTURES

speech, Prof. Sarkar mentioned that nature started photochemical fixation of carbon dioxide to formate, which can be assimilated by acetogens to produce sugar. He also stressed on the necessity of modeling of bacteriochlorophyll and the reaction center of Photosystem-I for understanding their role in the search of a relatively simple cycle to harvest solar energy as chemical energy.

Prof. Chaitali Mukherjee, University of Calcutta, enumerated on the topic *Simulation of the Dynamics of Biomolecules*. In her eloquent presentation, she emphasized on the need



Professor Chaitali Mukhopadhyay, Department of Chemistry, University of Calcutta, Kolkata, during the lecture on *Simulation of the Dynamics of Biomolecules*

for awareness about molecular dynamics, which is used to probe the relationship between molecular structure, movement and function by using numerical methods.

Prof. Dipak Palit, Radiation & Photochemistry Division, Bhabha Atomic Research Centre, Mumbai, deliberated on the use of Ultrafast Dynamics of the Excited States using Time-Resolved Absorption Spectroscopy for the following studies: investigating the fundamental processes in chemistry of breaking and forming chemical bonds, geometrical change or configurational relaxation and transfer of electrons and



Professor Dipak K. Palit, Radiation & Photochemistry Division, Bhabha Atomic Research Centre, Mumbai, speaking on the theme *Ultrafast Dynamics of the Excited States using Time-Resolved Absorption Spectroscopy*

protons in ultrafast time scale by using visible pump-IR probe, IR pump – IR probe and electron pulse pump.

Prof. Tarasankar Pal, Department of Chemistry, Indian Institute of Technology, Kharagpur, delivered the lecture on *Coinage Metal Nanoparticles: Fabrication of Mono- and Bi-Metallic Architecture for Enhanced Raman Signals*. While discussing the amazing chemistry of coinage metals at the nano-domain, he remarked that gold, which has advantages over other coinage metals, is still the best in the nano-regime.



Professor Tarasankar Pal, Department of Chemistry, IIT, Kharagpur, delivering the lecture on *Coinage Metal Nanoparticles: Fabrication of Mono- and Bi-Metallic Architecture for Enhanced Raman Signals*

Social Entrepreneur Dr Harish Hande Delivers Dr Mashelkar Endowment Lecture at CSIR-NCL

Dr Harish Hande delivered the Dr R.A. Mashelkar Endowment Lecture on *Is solar expensive and does it make sense for the poor of our country?* on 1 April 2012 at CSIR-National Chemical Laboratory (CSIR-NCL). The lecture was part of the Dr R.A. Mashelkar Endowment lecture series instituted by the NCL Research Foundation and CSIR-NCL.

Dr Ashish Lele from Polymer Science and Engineering Division welcomed and introduced Dr Harish Hande. Dr. Hande shared his experiences of spreading use of solar power in the country through SELCO India, which he established in 1995. During this period he worked with the poorest people such as beggars and street vendors, educating and informing them about the advantages and

the budget estimates. He also worked with local financial institutes and banks for loans. He demystified the fact that solar energy is expensive than other power sources and that it could be afforded.

Dr Hande said that there are issues related to solar power financing. He also gave examples of how people actually needed less power and hence less investment than they were estimating for.



LECTURES/EXHIBITIONS

He said his technical team visits the site and guides the customers about the power requirement. He gave an example of a customer who needed solar power to run a sewing machine that operates at 110W, but the requirement of the customer was only 30W for the type of job he was planning to do using that machine.

For solar power, Dr. Hande said, there is a need to change the thought process behind the business model. There is a need to have a sustainable ecosystem covering the financial, environment, and social sectors. While concluding, he said that India has immense potential to become an innovation superpower.

Dr Sourav Pal, Director, CSIR-NCL presented a memento to Dr Hande. Dr V. Premnath from NCL Innovations proposed the Vote of Thanks. The lecture was attended by Dr R.A. Mashelkar, National Research Professor, Dr S. Sivaram, CSIR Bhatnagar Fellow and many distinguished personalities from Pune, besides NCL staff.

CSIR-NEERI Participates in Pride of India Expo at 99th Indian Science Congress

CSIR-National Environmental Engineering Research Institute (NEERI) participated in the Pride of India Expo at the 99th Indian Science Congress held during 3-7 January 2012 at KIIT University, Bhubaneswar. The Pride of India Expo serves as a platform to inspire students, academicians and the common man to appreciate the value of science and to cultivate a scientific attitude. Prominent developments, major achievements and the significant contributions to the society are showcased by leading scientific institutions, government departments, national, international, public as well as private agencies. The Pride of India Expo was also an appropriate platform for the corporates to reaffirm their commitment to social responsibility exhibiting their relevant products and schemes.

CSIR-NEERI exhibited its major achievements under CSIR-800 programme in this Expo by displaying charts and live models. The technologies developed by CSIR-NEERI, i.e. NEERI-ZAR (portable instant water filter, domestic iron and fluoride removal units) and know-how related to solar electrolytic defluoridation, were explained and demonstrated in the expo.

On 3 January 2012, Shri Vilasrao Deshmukh, Honourable Minister of Science & Technology & Earth Sciences, Govt. of India inaugurated the Pride of India Expo and spent about an hour at the Expo visiting almost all the major stalls and exhibits, viz. DRDO, CSIR, ICMR, etc. He also had a look at the CSIR-NEERI exhibits and demonstration of the CSIR-NEERI technologies. Shri Deshmukh also had an interaction with CSIR-NEERI scientists. Prof. Samir K. Brahmachari, DG-CSIR was also



Honourable Minister of Science & Technology Shri Vilasrao Deshmukh and DG-CSIR Prof. Samir K. Brahmachari having a look at the CSIR-NEERI exhibits – NEERI-ZAR and electrolytic defluoridation unit -at the Pride of India Expo

present on this occasion. The expo was visited by thousands of students from the school level to the college level and delegates of the Indian Science Congress. Over three lakh people visited during the five days of the Expo.

EXHIBITIONS

CSIR-NAL Projects Showcased at *India Aviation 2012*

The third international exhibition and conference on civil aviation *India Aviation 2012* was flagged off on 14 March 2012 in Hyderabad. Union Civil Aviation Minister Mr Ajit Singh presided over the function. Mr Kiran Kumar Reddy, Chief Minister of Andhra Pradesh, Mr Jaipal Reddy, Union Minister for Petroleum and Natural Gas, Dr Nasim Zaidi, Secretary, Ministry of Civil Aviation and Mr R.V. Kanoria, President of the Federation of the Indian Chamber of Commerce and Industry (FICCI) were the chief guests.

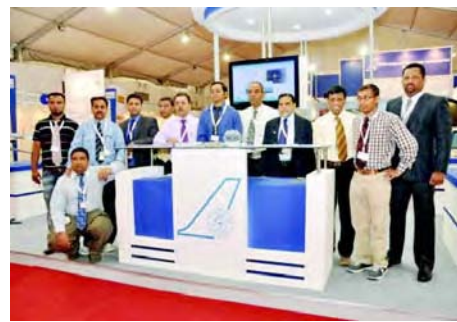
The Indian Aviation 2012 jointly organised by the Ministry of Civil Aviation and FICCI also marked the culmination of the centenary celebrations of Indian Civil Aviation. The function included a release of commemorative postage stamps by Ministry of Communications and IT, Govt. of India and presentation of commemorative coins of centenary celebrations of Civil Aviation in India.

India Aviation 2012 was highlighted by the participation of more than 250 companies. The composition of static display included many international and domestic aircrafts. Bombardier displayed the Learjet 60 XR, Challenger 300 and Global 5000 business jets, as well as the Q400 NextGen turboprop. Boeing 787 Dreamliner was showcased for the first time at *India Aviation 2012*. UAC-SUKHOI showcased their Sukhoi Superjet 100 Aircraft. Embraer underlined their first ever presence in India with their new business jets Phenom 300 and 100. The Russian MC-21 new generation airliner was also presented for the first time at *India Aviation 2012*. A life size

*Glimpses of the India Aviation 2012*

mock-up of the cockpit and cabin was demonstrated at a special hangar.

CSIR-NAL also showcased its growing prowess in the civil aviation sector. The models of HANSA and SARAS and a mock-up of NM5 aircraft were displayed at the exhibition in the NAL stall. The 5-seat NM5 aircraft developed as a private-public partnership venture between NAL and Mahindra Aerospace Technologies attracted a lot of interest among the general public and business visitors in particular. In the NAL stall besides the aircraft models, Drishti, MAV, Wankel engine, Avionics Systems (EICAS), Desktop Flight Simulator and Composite parts were also displayed. The



multimedia presentations about NAL and its History got a fair amount of attention.

Dr Nasim Zaidi, Secretary, Ministry of Civil Aviation and other delegates visited NAL stall and showed keen interest in CSIR-NAL projects. CSIR-NAL also received good media coverage in the official show daily.

An exclusive open-house interactive session was arranged where the Honourable Minister and a congregation of CEOs representing major aviation companies discussed future plans and policy issues in the aviation sector. Mr Shyam Chetty, Acting Director, NAL attended this meet and gave valuable inputs.



Scientific Delegation from University of Liverpool Visits CSIR-IICT

A team of scientists from University of Liverpool, United Kingdom, visited CSIR-Indian Institute of Chemical Technology (IICT), Hyderabad from 21-23 January 2012 in connection with the collaborative project being pursued by CSIR-IICT, CMMACS, Bengaluru and University of Liverpool, U.K. The main purpose of the visit was to strengthen the ties and initiate the project titled *Integrated Disease Prediction with Weather and Climate Model Seamlessly (INDRAAS)* funded by UKIERI (UK-India Education Research Initiative).

The Director of the Institute Dr J.S. Yadav, interacted with the delegation members and expressed his happiness that CSIR-IICT is working with CMMACS Bengaluru and University of Liverpool, U.K. on a collaborative project. He promised all possible help for the project at his end.

Prof. U.S.N. Murty, Chief Scientist and Head Biology Division explained to the delegation about the work being carried out in the Biology Division on vectors and vector-borne diseases with



Research team from University of Liverpool with Prof. U.S.N. Murty and team members of the Biology Division

emphasis on Malaria, Filariasis and Japanese encephalitis.

A scientific lecture by Prof. Andy Morse, Reader, School of Environmental Science, University of Liverpool, U.K. was arranged for the benefit of the researchers working in this area.

The lecture was well attended, followed by healthy interaction during the question answer session. The scientific delegation from U.K. was very impressed with the quality of science being pursued at CSIR-IICT and expressed happiness in collaborating with them.

Valley View School Students Visit CSIR-NML

About 46 students (Standard VIII, IX and X) from Valley View School, Telco, Jamshedpur accompanied by two teachers Dr. C. Pandey and Shri Sanjay Mistri visited the CSIR-National Metallurgical Laboratory (NML), Jamshedpur, on 22 June 2012

The visiting students expressed their excitement and happiness over the laboratory visit as well as interaction with the scientists. Shri Sushil Kumar, a Std. VIII student said, "We loved to know

CSIR-NML's contribution towards our day to day needed materials." Ms. Priya Dutta, a Std. VIII student expressed her enthusiasm after attending the motivating address by the NML Chief Scientist and looking at the screened audio-visuals about CSIR's contributions towards different products and processes used by the industries. Another student Ms. Khushboo Kumari, was excited to learn that Swaraj Tractor used in agricultural farming is based on CSIR Technology and

its contribution towards the green revolution. Ms. Nishi Pandey, a Std. X student said, "Now, I learnt about different ores, metals and how they are extracted and find use." Ms. Sayantee Choudhary, a student added, "I came to know about the preparation of pig iron, deep sea mining, recycling of waste materials, manufacturing of bio-compatible products, commercial use of barites, lime stone, magnesium and many more elements." Shri Mritunjay Sharma, a

VISITS/HONOURS & AWARDS



Glimpses of the student visit to CSIR-NML on 22 June 2012

student expressed satisfaction over the information given about the iron pillar at Delhi which has not rusted so far and the reasons for it. Shri Subham Kumar Mishra, a Std. IX student commented, "The visit taught me to look at things differently and science from a new perspective. I want to pursue science in a more meaningful way." Similar were the feelings of the teacher, Dr. Pandey, who defined the SNIP as "Practical based

activity." Another teacher Shri Sanjay Mistri said that the interactive programme was an eye opener for students in their future ventures in life and that they were thankful to CSIR-NML for their interest in their school curriculum.

It may be mentioned here that National Metallurgical Laboratory (NML), a constituent wing of the Council of Scientific & Industrial Research (CSIR), India launched the School-NML

Interactive Programme (SNIP) in mid-June 2011. Over the last one year 4500 students from 46 schools have already visited CSIR-NML. Under this programme students visit CSIR-NML on every Friday at 10 AM. The programme has been designed to give them an exposure on the modern laboratory working conditions and to develop an interest in science as a career advancement prospect.

CSIR-NEERI Receives DST-Lockheed Martin India Innovation Growth Award

CSIR-National Environmental Engineering Research Institute (NEERI)'s technology on electrolytic defluoridation has received the Innovation Award as it was chosen among 30 successful technologies. A Gold Medal and Certificate were handed over to Dr Subhash Andey and Dr Pawan Labhasetwar, Scientists, Water Technology and Management Division, NEERI, by Dr T. Ramasami, Secretary, DST in a function held in FICCI, New Delhi on 29 March 2012.

Electrolytic defluoridation process is based on the principle of electrocoagulation using aluminium plate electrodes placed in



A view of the award function

the raw water containing excess fluoride. During the electrolysis, anode gets ionized and fluoride is removed by complex formation, adsorption, precipitation,

coagulation and settling. Based on the technology, solar power based electrolytic defluoridation demonstration units were installed at village Usarvara, Balod Block, Durg Dist. (C.G.) and Sargapur village in Seoni District (M.P.) in collaboration with State PHEDs. The plants operated on batch mode have two reactors of 1000 L capacity each. To treat 2000 L of raw water, it takes about 4 hours to complete the process of electro-coagulation and settling.

Thus 4000 L of water can be treated in 8 hours, which is sufficient for a population of 700-800 persons for drinking and cooking purposes.



HONOURS & AWARDS



Dr. Ashalatha Bhaskarabhatla, Senior Principal Scientist (Retired),

CSIR-National Geophysical Research Institute (NGRI) was awarded the National Geoscience Award -2010 for her significant contributions in the field of ocean development. Dr. Bhaskarabhatla is presently working as Project Advisor for Continental Shelf Project (LCS) in NGRI. She was leading a team of scientists for processing and interpretation

CSIR-NGRI Scientist Selected for National Geoscience Award – 2010

of marine geophysical data and has contributed significantly towards preparation of database required for determining the outer limits of continental shelf beyond the present 200 NM Exclusive Economic Zone (EEZ) in the northern Bay of Bengal Region covering the Eastern Continental Margin of India (ECMI) and the Western Andaman Offshore Region. She was a member of the Indian delegation for the presentation of the Indian Extended Continental Shelf Submission in the United Nations

Convention on the Law of the Sea.

Dr. Bhaskarabhatla has also contributed significantly towards geophysical modeling of geological processes and continental margin studies with special focus on the geological evolution of ocean ridges and basins bordering the Indian continental margins and integrated interpretation of geological/geophysical data for characterizing gas hydrate accumulations and their genesis in marine sediments over the Indian continental margins.

CSIR-NGRI Staff selected for National Geoscience Award – 2010

Dr P. Prasad Rao, Principal Technical Officer, CSIR-NGRI has been selected for the National Geoscience Award – 2010 for his significant contribution in the field of ocean development. He received Masters degree in Marine Geophysics and joined as Research Fellow in Deep Seismic Sounding Project of NGRI and continued in the research activities leading to the completion of his doctoral research and was awarded PhD degree during 1994 from Andhra University, Vizag. Dr Prasad Rao's research areas include seismic zonation, risk and hazard estimation, wave propagation, seismic imaging through inverse modeling, seismic data processing and interpretation of MCS and OBS data. He has actively engaged in major R&D activities such as deep continental studies of Bengal Basin, Central India, Saurashtra, Cambay and Southern Granulite Terrain regions of Indian subcontinent. His participation in the Indian Legal Continental Shelf programme has been remarkable. His role in this prestigious programme is to



process and interpret the OBS data to obtain velocity information for delineating the subsurface structure. He also worked on identification and quantification of gas hydrates in the continental margins of the Indian subcontinent. He has recently contributed a chapter in a book entitled *Seismic Imaging of the*

Indian Continental and Oceanic Crust published by Professional Books Publisher, Hyderabad. He was also a participant in the Indo-Russian Long Term Project (ILTP) for gas hydrates exploration studies. Dr Rao visited Moscow several times under ILTP programme for exploring cooperation in the modeling studies for gas hydrates. Dr. Prasad Rao has guided many students from different universities, toward their dissertations. Presently he is working on GPS measurements of fault displacements in specified zones and also on Indian Plate motion. This National Geoscience award is conferred on him mainly due to his contribution of R&D work in the Legal Continental Shelf Program of India.

Literary Award to CSIR-NEIST Staff Member



Shri Ananta Kumar Sharma, Principal Technical Officer, was conferred Literary Award by the Children's Literary Trust of Assam, Guwahati, for his informative fiction *Simahin Sitar Sikhare*. The Award was formally presented at a function held at State Museum Conference Hall, Guwahati on 29 February 2012.



APPOINTMENTS

CSIR-NBRI Director elected as the President of UPASTA

Dr. C.S. Nautiyal, Director, CSIR-NBRI, Lucknow has been elected as the President of the Uttar Pradesh Association for Science and Technology Advancement (UPASTA). Dr. D.K. Dikshit, CSIR-CDRI and Dr. D.V. Amla, CSIR-NBRI are the Vice Presidents while Shri S. Kumar, Head of Regional Science City, Lucknow is the Secretary of UPASTA.

The Uttar Pradesh Association for Science and Technology Advancement (UPASTA) was founded in 1983 by a committed group of scientists like Dr. Nitya Anand, Prof. S.C. Agarwal, Prof.

B.N. Dhawan, Dr. C.M. Gupta, Dr. V.D. Gupta, and Prof. C.P. Sharma. The major objective was promotion of science and technology in the state of Uttar Pradesh and dissemination of knowledge of pure and applied sciences by means of lectures, publications, demonstrations, exhibitions, etc. as well as establishing a network between the scientists and technologists of Uttar Pradesh and the State and Central Governments and the Science Academies and societies. Initially the



association was named as the Uttar Pradesh Association for Advancement of Science and subsequently renamed as Uttar Pradesh Association for Science and Technology Advancement.

UPASTA represents scientists and technologists of all disciplines from almost all the educational, research & development, government and private institutions. Currently, it has more than 320 life members and holds annual meetings regularly.

CSIR-NGRI Scientist Appointed Member of ICSU-CSPR

Prof. V.P. Dimri, CSIR-Distinguished Scientist at CSIR-NGRI has been appointed as member of International Council of Scientific Union's (ICSU) Committee for Strategic Planning and Review (CSPR). The Committee is responsible for coordinating the development of proposals for major new scientific initiatives by ICSU and advises ICSU's Executive Board on priorities for such initiatives. The CSPR also reviews the activities carried out by ICSU's interdisciplinary bodies, advises the Executive Board on the future course of these activities, and oversees the ICSU Grant Programme.

Dr. Dimri, former Director of CSIR-NGRI, was conferred with *Padma Shri* by the government of India in 2010. He delivered the prestigious *Sir Axford Lecture* at the Asia Oceania Geosciences Society annual conference 2010.

Dr. Dimri is the first Asian to get the Lorenz Award Lecturer by the American Geophysical Union in the field of non-linear geophysics in December 2007.

Other important awards conferred on him include Prof. G.P. Chatterjee award by the Indian Science Congress, Outstanding Scientist Award by FAPCCI, Department of Ocean Development Award, National Mineral Award by Ministry of Mines, and honorary professorship of Andhra University, Geological Society of India's Dr. Hari Narain Award for Geophysics. Honorable Chief Minister of Uttarakhand also awarded him the S&T Excellence Award for his outstanding contribution in



the field of geophysics.

Dr. Dimri has a number of research publications in refereed journals to his credit. He is author of the book titled *Deconvolution and Inverse Theory* published by Elsevier. Books edited by Dr. Dimri include *Applications of Fractals in Geosciences* and *Fractal Behaviour in Earth Science System*. Recently he, along with two co-authors, published a book on *Fractal Models in Exploration Geophysics* published by Elsevier.

Dr. Dimri is fellow of many prestigious academies and societies including the Third World Academy of Sciences (TWAS), Indian National Science Academy (INSA), and the National Academy of Sciences (NASI). Currently, he is the President of the Indian Geophysical Union and past President of Andhra Pradesh Akademi of Sciences.



OBITUARY

Former CSIR-NCL Director Passes Away

Dr L.K. Doraiswamy, Former Director (1978-89), CSIR-NCL, Pune passed away on 2 June 2012 in USA. LKD (as known to his colleagues at CSIR-NCL and friends) was holding the position of the Anson Marston Distinguished Professor Emeritus at Iowa State University.

Born at Bangalore on 13 May 1927, LKD obtained BSc in Chemistry from University of Madras (1946), M.S. (1950) and PhD (1952) in Chemical Engineering, University of Wisconsin, Madison, USA. LKD joined the National Chemical Laboratory (CSIR-NCL) in 1954 and rose through the positions of Senior Scientist, Assistant Director, Deputy Director, and Director. LKD received Honorary DSc Degree from the University of Wisconsin-Madison, USA and University of Salford, UK. After superannuating from CSIR-NCL, he moved to the Iowa State University.

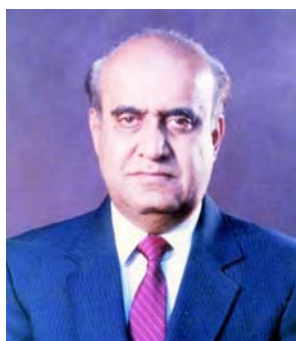
His research accomplishments led to about 180 papers published in international journals. LKD's research efforts led to a total of 76 graduate degrees: 46 from India, 18 from UK and 12 from USA.

LKD was elected as the Fellow of all academies of sciences in India namely, Indian National Science Academy, New Delhi, Indian Academy of Sciences, Bangalore and National Academy of Sciences, Allahabad. He was also an elected fellow of the Indian National Academy of Engineering, New Delhi and Third World Academy of Sciences,

Trieste, Italy. LKD was elected to the United States National Academy of Engineering as a foreign associate in 2010.

LKD received every major scientific and technical award available to chemical engineers. Prominent among them are Padma Bhushan, Diamond Award of the Indian Institute of Chemical Engineers (CHEMCON), Dr. B.P. Godrej Lifetime Achievement Award of the Indian Institute

LKD firmly placed Chemical Engineering research at CSIR-NCL on the world map. His work encompassed the highly theoretical and the extremely practical benefiting the emerging Indian chemical industry.



of Chemical Engineers, M.M. Sharma-Dow Distinguished Visiting Fellow, Institute of Chemical Technology, Mumbai, Om Prakash Bhasin Award for Science and Technology, S.H. Zaheer Medal of Indian National Science Academy, FICCI Award of the Federation of Indian Chambers of Commerce and Industry, Herdillia Prize of Indian Institute of Chemical Engineers, Homi Bhabha Medal of Hari Om Ashram Trust, VASVIK Prize for chemical science, and K.G. Naik Gold Medal of M.S. University of Baroda.

Industrial & Engineering Chemistry Research brought out L.K. Doraiswamy Festschrift in November 1998 on the occasion of his 70th birthday. A special publication *Reactions and Reaction Engineering*, edited by R. Kumar and R.A. Mashelkar, was brought out by the Indian Academy of Sciences on the occasion of LKD's 60th birthday. LKD authored six books, edited three books and contributed ten book chapters. After spending three-and-half decade at CSIR-NCL, LKD had seen the laboratory rising from its initial days and was entrusted to author the volume *Excellence in an overlapping Culture: The Big History of India's National Chemical Laboratory* published in 2010. True to his character, until the very end, he was co-authoring a graduate-level textbook (with Deniz Uner, Chair, Middle East Technical University, USA) on reaction engineering and writing a "non-engineering book" on the nature of time.

LKD was on the Board of Directors of several Indian industries including the Indian Drugs and Pharmaceuticals Ltd., Engineers India Ltd., Hindustan Organic Chemicals Ltd., and Indian Petrochemicals Corporation Ltd.

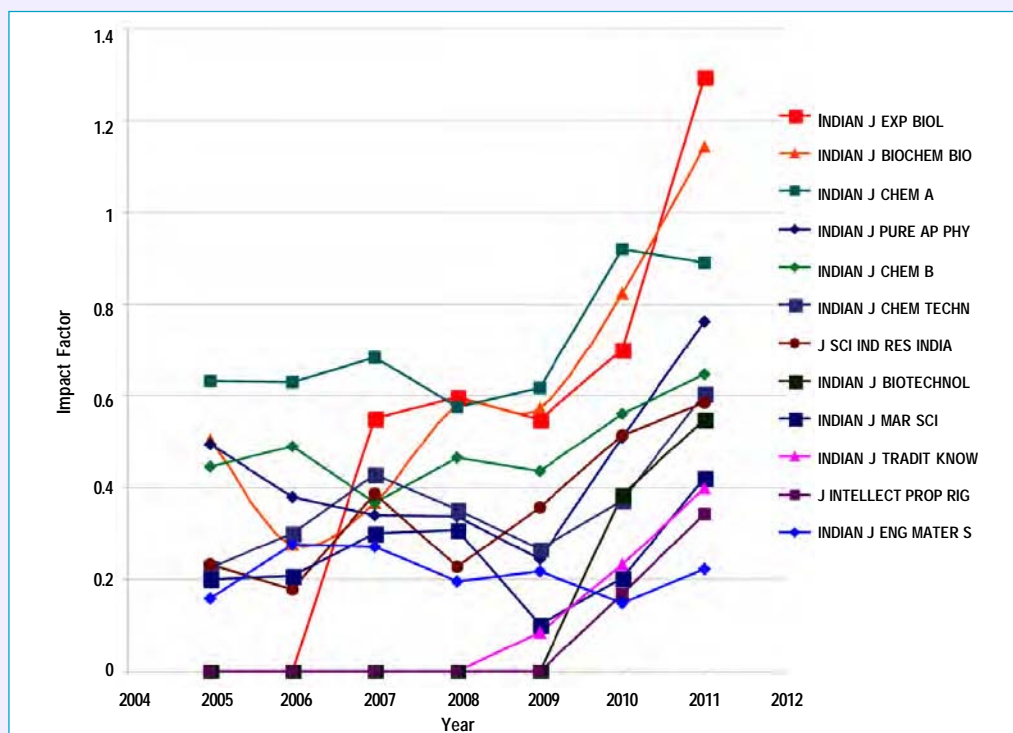
LKD is survived by his son Deepak (and his wife Kelly), daughter Sandhya Raghavan (and her husband Sankar) and three grandchildren Rahul Raghavan, Priya Raghavan and Maya Doraiswamy.



Impact Factor of CSIR-NISCAIR Journals Goes Up

CSIR-NISCAIR journals have notched up an increase of >41% in Impact Factor (IF) over that from the previous year, according to the Journal Citation Reports 2011 (both Science edition and Social Sciences edition) released during the last week of June. Two journals, viz. *Indian Journal of Experimental Biology* and *Indian Journal of Biochemistry & Biophysics* have even crossed an Impact Factor of 1.0 – a rarity for Indian Journals.

The table below depicts the overall increase in the Impact Factor of CSIR-NISCAIR journals in the year 2011.



Trajectory of CSIR-NISCAIR Journals during the past seven years

Abbreviated Journal Title	IF 2010	IF 2011	Increase/Decrease (%)
INDIAN J EXP BIOL	0.702	1.295	84.47
INDIAN J BIOCHEM BIO	0.824	1.142	38.59
INDIAN J CHEM A	0.92	0.891	-3.15
INDIAN J PURE AP PHY	0.511	0.763	49.32
INDIAN J CHEM B	0.562	0.648	15.30
INDIAN J CHEM TECHN	0.373	0.606	62.47
J SCI IND RES INDIA	0.514	0.587	14.20
INDIAN J BIOTECHNOL	0.385	0.55	42.86
INDIAN J MAR SCI	0.204	0.422	106.86
INDIAN J TRADIT KNOW	0.232	0.399	71.98
J INTELLECT PROP RIG	0.17	0.343	101.76
INDIAN J ENG MATER S	0.15	0.223	48.67
Average IF			41.86

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