He discussed the importance of catalytic effect aluminophosphate molecular sieve and enhancement of catalytic effect by addition of zirconium to it. The confirmation was done by phenol hydroxylation reaction in comparison to Zr-aluminophosphate and aluminophosphate.

Tutorial sessions

Three tutorial lectures were delivered. The first lecture was delivered by Sanchez on 'Synthesis and preparation of hybrid materials'. The second was on 'Applications of hybrids', by Popall and the third was on 'From biogenic silica biotechnology' by L. Livage (France).

In his lecture, Sanchez summarized about hybrid materials, their synthesis and classifications. Since 1980, explosive growth of hybrid nanocomposite research has taken place. It was possible because of expansion of soft inorganic chemistry (avoids excessive energy inputs during reaction and preferably water-based synthesis) and sol-gel process. These synthesis routes provide enough opportunities for controlling the composition and structure of the materials in the nano range. Therefore, a good structure–property relationship is maintained with enough opportunities for tailoring/fine tuning properties such as, mechanical, optical, electronic thermal properties of the materials. He showed how hybrid materials can be processed as gels, monoliths, thin films, fibre, particles and powders.

Sanchez also mentioned the classification of hybrid materials. Based on the nature of linking and interactions existing at the interface of organic and inorganic materials, hybrid materials can be classified mainly into two classes: (i) Class-I hybrid, deals with systems where there are no covalent or iono-covalent bond. Therefore, this class dominantly has van-der Waals, hydrogen bonding or electrostatic forces; (ii) Class-II hybrid, where organic–inorganic components are linked through strong covalent or iono-covalent bonds. Sanchez also mentioned the following routes for tailor-made synthesis of hybrid organic–inorganic materials: (i) Route A: Combination of sol-gel techniques and polymerization; (ii) Route B: Using separators or polymerization of nano building blocks; (iii) Route C: Combination of sol-gel and self-assembly techniques; (iv) Route D: Integrative pathway, i.e. combination of control in phase segregation, interactions and morphosynthesis to sol-gel/self-assembly.

Popall stressed upon new approaches that allow hierarchical well-organized, low cost technologies for complex hybrid structures. He also showed promising applications of nano hybrid materials in many areas such as, optics, electronics, mechanics, energy, environment, biology, medicine, functional smart coatings, solar cells, catalysts, sensors. His material research includes organic–inorganic hybrids – ORMOCER® (registered trademark of Fraunhofer, Germany) for optical, dielectric and electrochemical applications.

Livage delivered a lecture with thrust on application of silica in biotechnology. He showed the example of porous silica outer shell of algae, where only a small amount of silica gel is dissolved. He stressed upon silica research in the field of biotechnology and medicine.

In addition to these lectures, invited speakers elucidated the latest developments in the nanohybrid field excellently.

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MEETING REPORT

Environment and disasters: resources, systems and management*

Disasters based in geo-hydro-climatic systems and associated human environment are on the rise in frequency, intensity and level of impact to human life, resources and economies. These are mainly flood (flash, urban, riverine), slope erosion/landslide/debris-mud flow/waste-dump failure, drought, desertification, forest-fire, extreme weather events, cyclone, thunderstorms, dust-storms, etc. Environmental provisions of the constitution of India along with the National Environment Policy 2006, Natural Resources Data Management System and Policy Statements on Water, Agriculture, Climate Change and Land Use give way to manage the disasters by adopting environmental strategies and programmes at various levels. A workshop on disaster management was organized to analyse the implications of natural resource management, system tools and environmental information and eco-technologies in disaster risk management, and also the response for these disasters that rise in the environment. Senior functionaries from sectors like forests, geology, agriculture, livestock, water and land, environment, meteorology, information and district administration, from across the nation attended the workshop.

Inaugurating the programme, K. J. Ramesh (Advisor, Ministry of Earth Sciences) emphasized the relevance of earth-environmental resources in disaster mitigation by curbing the alteration of geo-morphological processes that may otherwise result in hazards causing environmental disasters like flooding, landslide, drought, etc. Environmental engineering and restoration science has adequate potential in managing all types of disasters for which the models of application have to be developed by the scientific community. Ramesh mentioned that prevention is possible only with the

*A report on the one week national workshop on 'Environmental Resources, Systems and Disaster Management' organised at the National Institute of Disaster Management, New Delhi, during 12–16 January 2006, under its mandate under the Disaster Management Act 2005.

environmental interventions that will also reduce the load on emergency response systems, but there is a greater challenge in transferring the environmental knowledge to field-level disaster management planning, including risk assessment and mitigation measures. J. K. Garg (GGS Indraprastha University, Delhi) spoke on environmental systems, their processes and in supplying resources to human development and mentioned various international/national concerns, including Agenda-21, IPCC, WSSG, Hyogo Framework, and UNEP, UNDP and WHO initiatives. Space technology and GIS as environmental systems offered facilitation in data organization and mapping of various hazard and risk attributes. A. L. Ramanathan (Jawaharlal Nehru University (JNU), New Delhi) discussed the features of coastal environment that give ways to various hazards. He made special mention of deltaic, estuarine and small-island environments for their hazard risks. R. B. Singh (Delhi University) discussed the disaster risk reduction through management of river basins, bank erosion control, watershed restoration and land-use planning, giving examples of the Yamuna basin and Ganga floodplains.

R. K. Bhandari (Central Building Research Institute, Roorkee) discussed environmental implications of geohazards with reference to mountain and hill environment. He mentioned the role of environmental technologies, citing the example of landslide risk management and flood control. Bharat Desai (JNU) enumerated various laws and policies related to the environment – natural resources, safety, disasters, and discussed the role of environmental laws and litigations in disaster risk reduction perspectives. V. K. Dhar (National Institute of Urban Affairs, New Delhi) spoke on urban environmental challenges giving rise to disaster risks like flooding, drought, dust-storms and epidemics, mentioning the warm-island syndrome and increasing conflicts as a result of increasing vulnerability because of poor environmental supplies and services. Anil K. Gupta (National Institute of Disaster Management, New Delhi) enlisted the applications of environmental technologies and environmental systems, including modelling and mapping, planning instruments, and programmes in disaster risk management, emergency response and impact assessment of disasters.

Akhilesh Gupta (Advisor to the Union Minister for Science & Technology) spoke on 'Environmental degradation, climate change and disaster risks' and the challenges of adaptation. He called for a region-specific 'environmental adaptation' as a response to the likely implications of global change. Niranjan Swarup (Construction Industry Development Council) discussed on how environmental alterations like creation of waste dumps, filling of wetlands with waste, creation or modification of nallahs, waterlogging conditions, contamination, etc. may cause land instability giving rise to risk of damage to buildings and structures in the areas prone to any natural disaster, even in the case of earthquakes. Santosh Kumar (NIDM) spoke on socio-economic vulnerability as a result of environmental degeneration resulting in challenges of livelihood, health and local economies. Chandan Ghosh (NIDM) discussed the loss of environmental supplies and services in built-up areas in the urban and rural context.

A group discussion was also organized on: (1) urban environments and (2) natural resource sectors. The aim of the discussion was to understand the interlinkages between environment and disaster and integrated management. S. P. Sharma (Statistical Advisor, Ministry of Environment & Forests) discussed the role of environmental information – databases, mapping, environmental microzonation, ENVIS and natural resources data management system in various stages of disaster management. Saudamini Das (Institute of Economic Growth, Delhi) discussed the economic evaluation of impacts and costs of environmental losses through a case study on mangrove restoration as protection against cyclonic storms. Anil K. Gupta (NIDM) discussed methodological approach of EIA of disasters as part of the damage assessment process, and also disaster risk assessment as a component in project or strategic EIAs.

A. K. Sengupta (World Health Organization, New Delhi Office) highlighted the environmental health implications of disaster and aspects in environmental epidemiology to be put into practice in a preventive and pro-active mode for reducing the impacts. Group panel discussions were organized on the role of environmental management. Major findings of the group work were: (i) need to focus on environmental resources and supplies – natural resources management integration to disaster management; (ii) environmental modelling and systems approach for prediction and forecasting, e.g. slope risks, stream discharge/flow, hydrogynamic, atmospheric dispersion, wetland/lake models, windstorms and application of related software like GIS, HAZUS, WHAZAN, ESC, etc. to be explored; (iii) programmes on land and water – soil, wetland, wasteland, command areas, alternative cropping/agroforestry, land use, renewable energy, forestry, grasslands, public health engineering, water resources, irrigation, water supply to be integrated with disaster risk reduction; (iv) climate-change adaptation need and climate-risk management to be viewed and operationalized in the context of regional/local environments; (iv) need to conduct 'training of trainer' courses for these sectors for mainstreaming multi-disciplinary actions for sustainable disaster management; (v) training modules needed on application of environmental systems, planning, information and policies in disaster management, and (vi) disaster management to be made a compulsory stream in environmental science or management at university or college-level education. The programme was coordinated by Gupta with design support from Sreeja S. Nair (NIDM) and review inputs from the officials of the Ministries of Environment & Forests, Earth Sciences and Science & Technology, the Planning Commission and Space Application Centre.

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