

**International Workshop on:
Nanotechnology – Present Status and Future Prospects in Developing
Countries
18-20 May 2009, Kashan, Iran**

PARTICIPATING COUNTRIES: 16 Countries (Including 13 Member Countries and 1 S&T-Industry Network Members of the NAM S&T Centre)

NUMBER OF PARTICIPANTS: The Workshop was attended by 37 experts and senior professionals from 16 countries including the host country Islamic Republic of Iran

Nanotechnology involves the manipulation of matter on the nanoscale to develop new materials and devices and is hailed by many as the next industrial revolution, promising to change everything from the cars we drive to the clothes we wear, from the medical treatments our doctors can offer to our energy sources and workplaces, from new cancer therapies to pollution-eating compounds, from more durable consumer products to detectors for biohazards like anthrax, from novel foods to more efficient solar cells. Nanotechnologies are changing the way people think about the future. The global nanotechnology market could top \$2.7 trillion by 2012. Nanoparticles are already being used in developed countries in items such as cosmetics, sunscreens, surface coatings, printing, water treatments and kitchenware. Internationally, more than 100 foods have been manufactured, processed or packaged using nanoparticles.

Nanoparticles are more chemically reactive than larger particles. They can get inside cells more easily, even into the nucleus. Some, called nanotubes, can behave like asbestos fibres and may possibly cause mesothelioma in animals. Nature is already working at the nanoscale. But in so far as the manufactured nanostructures are concerned, these have special composition, reactivity and uniformity that may substantially increase the health and environmental risks. One must recognize that free nanoparticles do pose a hazard and this must be investigated from the beginning. As is said, ostriches hide their heads in the foolish hope that if they cannot see a threat, the threat cannot see them. There has to be balance between benefits and risks and one must quickly address the social and ethical issues concerning this fast emerging scientific field.

Although nanotechnology is in its infancy, this is the right time for the developing countries to invest in this new arena and explore cooperative ventures between developed and developing countries and between public and private institutions. Individual developing countries should take their own policy decision to identify the facet of advancements in nanotechnology which can address their unique economic, social and environmental needs. And then these countries will benefit through South-South and North-South cooperation to make them prosperous.

In order to deliberate on the growing awareness of the importance of nanotechnology and its role in sustainable development, the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) organized a 3-days International Workshop on Nanotechnology: Present Status and Future Prospects in Developing Countries from 18-20 May 2009 at Kashan, Iran jointly with the Iranian Research Organization for Science & Technology (IROST), Iranian Nanotechnology Initiative Council (INIC), Kashan and IOR-ARC Regional Centre for Science and Technology Transfer (RCSTT), Tehran.

The Opening Session was held in Tehran in Laleh Hotel on 17th May 2009, after which the participants were transported to Kashan, ~260 km South of Tehran in Esphahan Province, for the technical sessions.

The Inaugural Ceremony commenced with the traditional recitation of Holy Quran and National Anthem of the Islamic Republic of Iran, which was followed by the welcome address by Dr. Saeed Sarkar, Director, Iranian Nanotechnology Initiative Council (INIC). After the opening remarks by Dr. M. Molanejad, Director, Iranian Research Organization for Science & Technology (IROST), Prof. Arun P. Kulshreshtha, Director, NAM S&T Centre gave introductory address highlighting the background of the Workshop. This was followed by the remarks by Dr. Abbas Sadri, Director of ISESCO Regional Office in Tehran. Dr. Entezari, Vice President, IROST made the Inaugural Speech. H.E. Engr. H. Amirinia, Chairman, Technology Cooperation Office, Presidency, Islamic Republic of Iran was also present at the podium during the Inaugural ceremony. Mr. Ali Reza Roodsaz of INIC presented the Vote of Thanks.

The Technical Sessions of the Workshop were held at the Essence Research Center, Ghamsar in Kashan. Dr. S.J. Sadatinejad, Chancellor and Assistant Professor in Hydrology, University of Kashan inaugurated the Technical Sessions. The Kashan component of the Workshop was conducted in nine technical sessions broadly categorised under the themes 'Characterization and Synthesis of Nano-Materials', 'Applications of Nanotechnology', 'Nanotechnology: Policy, Strategy and Market Development' and 'Nanotechnology: Status and Prospects in Developing Countries'.

The Workshop was attended by 37 experts and senior professionals from 16 countries, including Armenia, Cuba, India, Indonesia, Iraq, Kenya, Libya, Malaysia, Mauritius, Myanmar, Nigeria, South Africa, Sri Lanka, Syria and Uganda, and the host country Iran. The overseas participants were from Armenia [Prof. Vladimir Aroutiounian, Head, Department of Physics of Semiconductors and Microelectronics, Yerevan State University, Yerevan]; Cuba [Dr. Ariel M. Felipe Gómez, Program Manager, Scientific Advisor Office, Council of State, Havana]; India [Dr. Harish Padh, Director, B. V. Patel Pharmaceutical Education & Research Development (PERD) Centre, and Project Director, National Institute of Pharmaceutical Education and Research (NIPER), Ahmedabad ; Dr. Vinod Kumar Jain, Director, Amity Institute of Advance Research and Studies, Amity University, Noida; Dr. Uma Shanker Tandon, Scientist 'F', Council of Scientific and Industrial Research (CSIR), New Delhi]; Indonesia [Dr. Silvester Tursiloadi, Head, Division of Process and Catalysis Technology, Research Centre for Chemistry, Indonesian Institute of Sciences, Tangerang]; Iraq [Ms. Ndhall N. Hosain, Chief of Technical Observers, Central Organization for Standardization and Quality Control (COSQC), Baghdad]; Kenya [Prof. Bernard Odhiambo Aduda, Professor, Department of Physics, University of Nairobi, Nairobi; Dr. Erastus Gatika Gatebe,

Lecturer, Department of Chemistry, Jomo Kenyatta University of Agriculture and Technology, Nairobi; Dr. Lutta W. Muhammad, Senior Research Officer, Kenya Agricultural Research Institute (KARI), Nairobi]; Libya [Dr. Nagib Ali Elmarzugi, Lecturer, Faculty of Pharmacy, Alfateh University, Researcher, Biotechnology Research Centre, Tripoli]; Malaysia [Mr. Radin Zulhazmi Bin Radin Abdul Halim, Principle Assistant Director, Industry Division, Ministry of Science, Technology and Innovation (MOSTI), Wilayah Persekutuan and Mr. Zailani Bin Safari, General Manager, Intelligence and Research Division, Malaysian Industry-Government Group for High Technology (MIGHT), Wilayah Persekutuan]; Mauritius [Mr. Hemraj Ramsurrin, Resource Officer, Rajiv Gandhi Science Centre, Port Louis]; Myanmar [Dr. Moe Zin Win, Researcher, Materials Science and Metallurgical Engineering Research Centre, Ministry of Science & Technology, Nay Pyi Taw]; Nigeria [Dr. (Mrs.) Zainab Hammanga, Deputy Director, Advance Materials Division, Raw Material Research & Development Council (RMRDC), Abuja]; South Africa [Ms. Nontombi Marule, Deputy Director, Emerging Research Areas, Department of Science and Technology, Pretoria]; Sri Lanka [Prof. Ajith P. de Alwis, Professor, Sri Lanka Institute of Nanotechnology, University of Moratuwa, Malwana]; Syria [Dr. Nofal Ibrahim, Assistant Professor and Dr. Mhd. Ali Alsayed Ali, Researcher, Higher Institute for Applied Science and Technology (HIAST), Damascus;]; and Uganda [Mr. Henry Mugisha Bazira, Executive Director, Water Governance Institute, Kampala].

The overall technical programme of the workshop was coordinated by Prof. Arun P. Kulshreshtha, Director, NAM S&T Centre. The sessions were co-chaired by Dr. Saeed Sarkar, Dr. M. Molanejad, Dr. Mohsen Jahanshahi, Dr. Safai, Dr. F. Davar, Dr. Bahram Khoshnevisan and Dr. Abdolhamid Bamoniri from Iran, Dr. Abbas Sadri from ISESCO and Prof. Vladimir Aroutiounian (Armenia), Dr. Ariel M. Felipe Gómez (Cuba), Dr. Harish Padh and Dr. Vinod Kumar Jain (India), Prof. Bernard Odhiambo Aduda and Dr. Lutta W. Muhammad (Kenya), Dr. Nagib Ali Elmarzugi (Libya), Mr. Hemraj Ramsurrin (Mauritius), Dr. (Mrs.) Zainab Hammanga (Nigeria), Prof. Ajith P. de Alwis (Sri Lanka) and Dr. Nofal Ibrahim (Syria) from among overseas participants.

The foreign participants, who presented their papers, were Prof. Vladimir Aroutiounian (Armenia) on 'Nanotechnology – Present Status and Future Prospects in Armenia'; Dr. Ariel M. Felipe Gómez (Cuba) on 'The Cuban Approach towards Nano Biotechnology: A New Step on Scientific Development of the Country'; Dr. Harish Padh (India) on 'Drug Delivery and Drug Targeting using Therapeutic Nanoparticles'; Dr. Vinod Kumar Jain (India) on 'Applications of Micro and Nanotechnology in Biomedical Engineering' and 'MEMS & Nanotechnology Based Explosive Detector'; Dr. Uma Shanker Tandon (India) on 'Nano-Structures, Nano-Materials and Systems'; Dr. Silvester Tursiloadi (Indonesia) on 'Syntheses of Nano Size Anatase Type of Titania Aerogels by Addition of Silica'; Prof. Bernard Odhiambo Aduda (Kenya) on 'Status of Nanoscience and Nanotechnology in Kenya'; Dr. Lutta W. Muhammad (Kenya) on 'Harnessing Emerging Technologies for Kenya's Vision 2030 Development Strategy: Prospects for Leveraging Advances in Nano-Technology'; Dr. Erastus Gatika Gatebe (Kenya) on 'Development of Nanostructured Smart Delivery Systems for Pesticides & Fertilizers'; Dr. Nagib Ali Elmarzugi (Libya) on 'The Surface Study of Different Architectures of DMAEMA Polymer at Nano Scale for Transfer DNA in Gene Therapy'; Mr. Zailani Bin Safari (Malaysia) on 'Driving Nanotechnology Development in Malaysia'; Mr. Radin Zulhazmi Bin Radin Abdul Halim (Malaysia) on 'Nanotechnology: Present Status and Future Prospect in Malaysia'; Mr. Hemraj Ramsurrin (Mauritius) on 'A Vision for Civic Engagement in

Nanotechnology in Mauritius'; Dr. Moe Zin Win (Myanmar) on 'Present Status of Nanotechnology Research in Myanmar'; Dr. (Mrs.) Zainab Hammanga (Nigeria) on 'Nanotechnology – Present Status and Future Prospects in Nigeria'; Ms. Nontombi Marule (South Africa) on 'South African Nanotechnology Strategy'; Prof. Ajith P. de Alwis (Sri Lanka) on 'Sri Lanka Nanotechnology Initiative'; Dr. Nofal Ibrahim (Syria) on 'Growth and Characterization of PbS Nanocrystalline Thin Films Deposited on Glass Substrates by Chemical Bath Deposition', Dr. Mhd. Ali Alsayed Ali (Syria) on 'Characterization of Carbon Nanoparticles formed in Diluted Environments'; and Mr. Henry Mugisha Bazira (Uganda) on 'Application of Nano-Science and Nanotechnology in Uganda's Economy'. Prof. Arun Kulshreshtha (NAM S&T Centre) made a presentation on 'South – South Cooperation through NAM S&T Centre'.

The participants from Iran, who made presentations during the workshop were Dr. Saeed Sarkar, Director, INIC on 'Iran 'Nano Initiative' Program, Targets and Achievement'; Dr. Mohsen Jahanshahi, Head, Nanobiotechnology Research Centre, Babol University of Technology on 'Nanofiltration Membranes: Preparation, Characterization and Industrial Application in Water / Waste Water Treatments'; and Dr. Bahram Khoshnevisan, Assistant Professor, Institute of Nanoscience and Nanotechnology, University of Kashan, Iran on 'Hydrogen Storage as a Fuel Resource in Future'

The Plenary Concluding Session was led by Dr. M. Molanejad (Director, International Cooperation, IROST), Dr. Mohsen Jahanshahi (Head, Nanobiotechnology Research Centre, Babol University of Technology) and Prof. Arun Kulshreshtha (Director, NAM S&T Centre) when a Kashan Declaration on 'Nanotechnology: Present Status and Future Prospects in Developing Countries' was adopted after considerable deliberations and debate. The workshop ended with the distribution of the Certificate of Participation to the participants.

The participants thanked the organizers of the Workshop and unanimously hoped that more similar events will be held in future with a focus on South-South cooperation for the emerging need and sustainable development of Nanotechnology.