

Centre Organised

International Workshop on
NANOTECHNOLOGY
In the Edge of Convergence
 Malaysia, 24-27 November 2011

Nanotechnology, the study of manipulating matter on atomic and molecular scales, involves developing materials or devices possessing at least one dimension sized from 1 to 100 nanometers. This field of science has gathered enormous significance in recent years and tremendous advancements have been made with a variety of applications in almost all spheres of life. Nanotechnology has the potential to create many new materials and devices and possibly holds solutions to world's problems related to water, agriculture, nutrition, health and energy.

With a view to providing a forum for the academicians, scientists and researchers active in the fields of nano-science and nano-technology to deliberate upon the aforementioned issues and to create awareness of this field's significance, the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), New Delhi, India in collaboration with the Commission on Science and Technology for Sustainable Development in the South (COMSATS), Islamabad, Pakistan and the Institute of Microengineering and Nanoelectronics (IMEN), Universiti Kebangsaan Malaysia (UKM), Malaysia organised a 4-days International Workshop titled 'Nanotechnology in the Edge of Convergence' at Puri Pujangga, Universiti Kebangsaan Malaysia (UKM), Bangi, Selangor, Malaysia during 24-27 November 2011. The United Nations Educational, Scientific and Cultural Organization (UNESCO) was among the major sponsors of this scientific event.

The Inaugural Ceremony was opened with the Welcoming Remarks by Prof. Dato' Dr. Burhanuddin Yeop Majlis, Director, Institute of Microengineering and Nanoelectronics (IMEN), UKM. Prof. Arun P. Kulshreshtha, Director & Executive Head, NAM S&T Centre presented the genesis of the event and also briefly described the activities of the Centre. This was followed by a message of Dr. Imtinan Elahi Qureshi, Executive Director, COMSATS read by Prof. Arshad Saleem Bhatti, Dean, Faculty of Science, COMSATS Institute of Information Technology (CIIT), Islamabad, Pakistan. After brief remarks of Mr. Mohd. Zulkifli Hashim, Executive Secretary, Malaysian National Commission of UNESCO, the opening speech was given by Prof. Datuk Dr. Noor Azlan Ghazali, Deputy Vice Chancellor, UKM. The Opening Session concluded with a Keynote Address on 'Nano Malaysia Programme and Way Forward' by Prof. Dr. Halimatun Hamdan, Undersecretary, National Nanotechnology Directorate, Ministry of Science, Technology and Innovation, Malaysia.



Inauguration of Nanotechnology Workshop, Malaysia

19 countries, namely Bangladesh, Bulgaria, Cambodia, Egypt, India, Indonesia, Iraq, Kenya, Malawi, Mauritius, Morocco, Myanmar, Nepal, Pakistan, Sudan, Tunisia, Uganda, Vietnam and the host country Malaysia participated in this Workshop. The overseas participants were from Bangladesh [Mr. M. L. Palash, Lecturer, Dept. of Applied Physics, Electronics and Communication Engineering, University of Dhaka], Bulgaria [Prof. Kostadin Grozev Kostadinov, Associate Professor on Robotics and Automation, SM IEEE, Sofia and Scientific Secretary of Bulgarian Academy of Sciences], Cambodia [Mr. Seng Silong, Lecturer, Electrical and Power Engineering, Institute of Technology of Cambodia (ITC), Phnom Penh], Egypt [Dr. Hany Hussein Abdel Ghafar, Researcher, Water Pollution Research Department, Environmental Research Division, National Research Center (NRC), Dokki], India [Dr. Madhulika Bhati, Scientist, National Institute of Science, Technology and Development Studies, (CSIR-NISTADS), New Delhi; and Ms. Bidisha Pal, Research Assistant, NAM S&T Centre], Indonesia [Dr. Silvester Tursiloadi, Senior Researcher of Applied Chemistry, Research Centre for Chemistry, Indonesian Institute of Sciences (LIPI), Tangerang], Iraq [Dr. Sabeeha Abdul Jabbar Beden, Scientific Researcher, Directorate of Materials, Ceramic Centre, Ministry of Science and Technology, Baghdad], Kenya [Dr. Erastus Gatebe, Senior Lecturer, Department of Chemistry, Jomo Kenyatta University of Agriculture and Technology, Nairobi], Malawi [Dr. Timothy Tiwonge Biswick, Senior Lecturer, Chancellor College, University of Malawi, Zomba], Mauritius [Mr. Hemraj Ramsurrun, Resource Officer, Rajiv Gandhi Science Centre Trust Fund], Morocco [Prof. Ismail Mekkaoui Alaoui, Physics Department, Faculty of Sciences, Cadi Ayyad University, Marrakech], Myanmar [Dr. Aung Kyaw Myo, Assistant Director, Nanotechnology Research Department, Metallurgical Research and Development Center, Nay Pyi Taw], Nepal [Dr. Deba Bahadur Khadka, Vice President, Nepal Chemical Society, Tribhuvan University, Kirtipur], Pakistan [Prof. Arshad Saleem Bhatti, Dean, Faculty of Science, Department of Physics; Mr. Jibrán Ahmed Abbasi, Research Associate, Department of Physics; Mr. Muhammad Fahad Bhopal, Research Associate, Department of Physics; and Mr. Muhammad Rizwan Khan, Researcher, Department of Physics of the COMSATS Institute of Information Technology (CIIT), Islamabad; and Dr. Shamsa Kanwal, Assistant Professor, HEJ Research Institute of Chemistry, Karachi University, Karachi], Sudan [Mr. Nazar Shawgi Abdellateef Ahmed, Director, Materials and Electronics Research Institute (MERI), National Centre for Research, Ministry of Science and Technology, Khartoum], Tunisia [Ms. Ben Yahya Sonia, Researcher, High Institute of Technological Studies, ISET, Gabes; and Ms. Nouri Hanen, Researcher, Research Laboratory: Chemical Reactor and

Process Control, National School of Engineering, Gabès University], Uganda [Ms. Philippa Ngaju, Instrumentation Engineer, Uganda Industrial Research Institute, Kampala] and Vietnam [Mr. Nguyen Ngoc Thinh, Principal Investigator, Department of Inorganic and General Chemistry, Hanoi University of Science and Technology, Hanoi]. From the NAM S&T Centre, Prof. Arun P. Kulshreshtha, Director & Executive Head had attended the event.

The overall programme of the Workshop was conducted in six technical sessions, respectively co-chaired by (1) Prof. Halimatun Hamdan (Malaysia) and Prof. Mekkaoui Alaoui Ismail (Morocco); (2) Dr. Hany Hussein Abdel Ghafar (Egypt) and Prof. Kostadin Grozev Kostadinov (Bulgaria); (3) Prof. Ille Christine Gebeshuber (Department of Physics, Nanotechnology and Biomimetics, IMEN, UKM) and Mr. Nazar Shawgi Abdellateef Ahmed (Sudan); (4) Prof. Mohamad Deraman (School of Applied Physics, Faculty of Science and Technology, IMEN, UKM) and Dr. Silvester Tursiloadi (Indonesia); (5) Assoc. Prof. Mohd. Yusri Abd. Rahman (Dept. of Sciences, Mathematics and Computing, College of Foundation and General Studies, Universiti Tenaga Nasional, Kajang, Malaysia) and Dr. Deba Bahadur Khadka (Nepal); and (6) Prof. Pankaj Kumar Choudhury (IMEN, UKM) and Dr. Madhulika Bhati (India).

24 scientific papers presented during the Workshop by the foreign participants were on 'Nanotechnology and Governance: Bangladesh Perspective' by Mr. M. L. Palash of Bangladesh; 'Hydro-Mint Robot Technology in Hybrid Assembly for Precise Manufacturing of Microproducts' by Prof. Kostadin Grozev Kostadinov of Bulgaria; 'The Starting of Nanotechnology in Cambodia' by Mr. Seng Silong of Cambodia; 'Preparation and Characterization of Nano-Sized Hybrid Photocatalyst of WO_x and TiO₂' by Dr. Hany Hussein Abdel Ghafar of Egypt; 'Emerging Risk Issue, Debates and Silences about Nanotechnology: A Case Study of India' by Dr. Madhulika Bhati of India; 'Therapeutically Engineered Nanoparticles and Their Targeted Delivery' by Ms. Bidisha Pal of India; 'Nano - Catalyst Sulfated TiO₂, ZrO₂ and TiO₂-ZrO₂ Prepared by Supercritical Extraction and Modified Gel.' by Dr. Silvester Tursiloadi of Indonesia; 'Nano-Colloidal Silver Impregnated Ceramic Candle Filter for Drinking Water' by Dr. Sabeeha Abdul Jabbar Beden of Iraq; 'Controlled Release of Fertilizer using Mesoporous Silica Nanoparticles' by Dr. Erastus Gatebe of Kenya; 'Controlled Release and Antioxidant Activities of Zinc Basic Salt (ZBS) - Phenolic Acid Nanohybrids' by Dr. Timothy Tiwonge Biswick of Malawi; 'Nanotechnology for Mauritius Awareness on Potential Applications and the Need for Capacity Building' by Mr. Hemraj Ramsurrun of Mauritius; 'Nanocrystalline CdSe Quantum Dots and Applications for Finger Mark Visualization' by Prof. Mekkaoui Alaoui Ismail of Morocco; 'Process Study on Titanium Dioxide Nanotubes, TNT from TiCl₄ and Fabrications of Dye Sensitized Solar Cell by using TiO₂ Nanopowder and TiO₂ Nanotubes' by Dr. Aung Kyaw Myo of Myanmar; 'Measurement of Deexcitation Cross Sections of Ne(3P1) by N₂ using a Pulse Radiolysis Method' by Dr. Deba Bahadur Khadka of Nepal; 'Facile One-Pot Synthesis of Gold Nanoparticles and their Sensing Protocol' by Dr. Shamsa Kanwal of Pakistan; 'Bonding Energy Dependence of Solubility of Catalysts in the VLS Synthesized ZnS Nanostructures' by Dr. Arshad Saleem Bhatti of Pakistan; 'Optimized SACM-Avalanche Photodiode Structure' by Mr. Muhammad Rizwan Khan of Pakistan; 'Temperature Tuned Simulation of InAlAs-InGaAs-InAlAs DHBT' by Mr. Muhammad Fahad Bhopal of Pakistan; 'Effect of Absorption Region Thickness on the Performance of Planner InP/InGaAs/InP PiN Photodiode' by Mr. Jibrán Ahmed Abbasi of Pakistan; 'Pure Methane Storage on Olive Stones based Microporous Activated Carbon for Vehicular Applications' by Ms. Ben Yahia Sonia of Tunisia; 'Design of the Microreactor for the Heterogeneous Catalysis' by Ms. Nouri Hanen of Tunisia; 'Emergence And Development Of Nanotechnology In Uganda, East Africa' by Ms. Philippa Ngaju of Uganda; and 'Some Biomedical Applications of Chitosan Based Hybrid Nanoparticles' by Mr. Nguyen Ngoc Thinh of Vietnam.



Palash
Bangladesh



Kostadinov
Bulgaria



Silong
Cambodia



Ghafar
Egypt



Bhati
India



Pal
India



Tursiloadi
Indonesia



Beden
Iraq



Gatebe
Kenya



Biswick
Malawi



Ramsurrin
Mauritius



Alaoui
Morocco



Myo
Myanmar



Khadka
Nepal



Bhatti
Pakistan



Abbasi
Pakistan



Bhopal
Pakistan



Khan
Pakistan



Kanwal
Pakistan



Shawgi
Sudan



Hanen
Tunisia



Sonia
Tunisia



Ngaju
Uganda



Thinh
Vietnam

Foreign Co-Chairs and Speakers of Nanotechnology Workshop, Malaysia

12 scientific papers presented by Malaysian scientists were on 'Synthesis of ZnO Nanoparticles via the Sol gel Technique and their Use in Solar Photo Catalytic Degradation' by Prof. Dr. Abdul Amir Hassan Kadhum of the Department of Chemical Engineering, UKM; 'Improvement of Pressure Driven Membrane Performance Through Nanotechnology ' by Prof. Abdul Wahab Mohammad of the Department of Chemical and Process Engineering, UKM; 'Nanocellulose from Mengkuang for Biocomposite Application' by Prof. Ibrahim Abdullah, Professor of Physical / Polymer Chemistry, School of Chemical Sciences and Food Technology, UKM; 'Metal Oxide Nanoparticle Synthesis Using Microwave Technique' by Prof. Shahidan Radiman, Deputy Dean, Undergraduate and Alumni, Faculty of Science and Technology, UKM; 'Role of Nanoparticles in Modifying Contact Performance between Electrode and Current Collector of a Supercapacitor' by Prof. Dr. Mohammad Deraman; 'Properties of M Fe₂O₄ (M= Mn and Zn) Ferrite Nanoparticles Synthesized Via Thermal Treatment Method' by Prof. Abd Halim Shaari, Department of Physics, Universiti Putra Malaysia (UPM), Serdang; 'Metal Oxide Nanostructure for Photoelectrochemical Cell' by Associate Prof. Mohd. Yusri Abd. Rahman; 'Nanobioconvergence' by Prof. Ille Christine Gebeshuber; 'Towards a Strategic Nanotechnology Action Plan in OIC Countries' by Prof. Emeritus Muhammad Yahaya, School of Applied Physics, UKM; 'Fuel Cell' by Prof. Ir. Dr. Wan Ramli Bin Wan Daud, Director, Fuel Cell Institute, UKM; 'Localized Surface Plasmon Resonance (LSPR) of Gold Nanoparticles to Detect Formaldehyde' by Prof. Muhamad Mat Salleh, IMEN, UKM; and 'Low-Temperature Catalyst-Free Formation of Carbon Nitride Nanostructures using Plasma Enhanced Chemical Vapour Deposition' by Prof. Datin Saadah Abdul Rahman, Leader, Low Dimensional Materials Research Centre, Department of Physics, Universiti Malaya, Kuala Lumpur.



At the end of the Technical Sessions, Prof. Arun P. Kulshreshtha, Director, NAM S&T Centre made a presentation on 'The Role of the NAM S&T Centre for South South Cooperation in Science & Technology'. Subsequently, there was considerable deliberation and debate on generating a set of recommendations titled 'Bangi Recommendations on Nanotechnology in the Edge of Convergence', which was adopted during the Closing Session.



A Poster Session was also organised concurrently with the workshop presentations at which nine posters were displayed by Malaysian scholars.

The Workshop ended with the handing over of the Participation and Sponsorship Certificates to the participants and sponsors of the Workshop, concluding remarks and the Vote of Thanks.

The participants thanked the organisers for the successful and fruitful organisation of the Workshop and for excellent hospitality and arrangements made for the delegates, and unanimously hoped that more similar events will be held in future with a focus on South-South cooperation.

BANGI RECOMMENDATIONS

On Nanotechnology

We, the scientists, academics, professionals, engineers, scientific managers and policy makers of the non-aligned and other developing countries from Bangladesh, Bulgaria, Cambodia, Egypt, India, Indonesia, Iraq, Kenya, Malaysia, Malawi, Mauritius, Morocco, Myanmar, Nepal, Pakistan, Sudan, Tunisia, Uganda and Vietnam;

THANK:

- The Centre for Science and Technology of the Non-aligned and Other Developing Countries (NAM S&T Centre), Commission on Science and Technology for Sustainable Development in the South (COMSATS), Islamabad, Pakistan and the Institute of Microengineering and Nanoelectronics (IMEN), Universiti Kebangsaan Malaysia (UKM), Malaysia, the joint hosts of the International Workshop on 'Nanotechnology in the Edge of Convergence' held at Puri Pujangga, UKM, Malaysia on 24-27 November 2011;
- Our respective governments, United Nations Educational, Scientific and Cultural Organization (UNESCO) and other sponsors who have made our participation at this

very important meeting possible;

AND

PLACE ON RECORD our appreciation to the Ministry of Higher Education (MOHE), Ministry of Science, Technology & Innovation (MOSTI) of Malaysia and the Institute of Microengineering and Nanoelectronics (IMEN), Universiti Kebangsaan Malaysia (UKM) for providing the interactive platform, excellent ambience for the meeting, fine arrangements and kind hospitality;

REALISING THAT the promotion of Nanoscience and Nanotechnology and their applications is presently becoming a major conduit to achieve the technical and economic prosperity of all the countries, including the Non Aligned Member States and other developing nations. Besides, there is a great need to educate younger generations about the science and engineering at nanoscale.

HAVING RECOGNISED that Nanoscience and Nanotechnology cut across almost all the disciplines such as agriculture and food technology, biotechnology, health, medicine, new materials, energy, water and air purification, among others. It is a new perspective with which the developing countries can create wealth to enhance the quality of life.

HAVING EXTENSIVELY DELIBERATED ON the issues related to the Nanoscience and Nanotechnology in the developing countries, the specific issues encompassing:

1. Status and prospects of Nanoscience and Nanotechnology in developing countries,
2. Nanotechnology policy, governance, strategy, human resource and market development,
3. Implications of Nanotechnology to the health and environmental risks,
4. Implications of Nanotechnology to the ethical, legal and social issues,
5. Necessary infrastructure to support R&D on Nanoscience and Nanotechnology,
6. Applications of Nanotechnology,
7. Developing standards for analysis/quality control of nanoproducts, and
8. Enhancing the regional and global networking in Nanoscience and Nanotechnology activities.

UNANIMOUSLY RECOMMEND THAT:

- Nanoscience and Nanotechnology should be made a major area of development to achieve the technical and economical progress.
- Developing countries should be convinced to exhibit commitment (political will, financial and human resources) towards research, development, application and commercialisation of nanoproducts with the involvement of concerned stakeholders.
- Developing countries should adopt a holistic approach to provide adequate resources for training and creating awareness amongst policy makers, industry partners and the public at large about the importance of Nanotechnology, not just for its inherent value, but also for its role in alleviating poverty and wealth creation.
- The Governments need to prepare vision document for the advancement of Nanoscience and Nanotechnology covering all aspects like education, R&D applications and implication of this technology. In this regard, scientific papers, reports or documents etc. should be shared with developing countries (for example, via internet or other means).
- Regulatory bodies should be established to ensure the safe use and applications of nano-containing products to avoid health and environmental hazards. Since products have already come in the market, it is the need of the hour.
- Safety and precautionary measures for scientists and engineers working in the development of Nanoscience and Nanotechnology in private and public sectors, R&D institutions and universities should be defined and followed strictly.
- Nanotechnology based curriculum should be developed and integrated from high school to university to facilitate the transformation of research to innovation in this emerging area.

Web portals may be designed for developing countries serving purposes like education

- web portals may be designed for developing countries serving purposes like education and awareness.
- Advantage may be taken from established Centres of Excellence in developed countries as well as in developing countries for short term training, channelizing and enhancing knowledge and learning capacity.
 - Nanotechnology expert teams should be formed with the involvement of scientists, industrialists and policy makers for the formulation of new plans and policies and governance.
 - There is a pressing need of public engagement in formulation of regulation to ensure transparent, inclusive and equitable development of nanotechnology and to avoid the previously made mistakes with biotechnology, e.g. in the case of GM crops.
 - Short, medium and long term plans should be prepared to create continuous innovative capacity in Nanotechnology.
 - Multilateral and bilateral collaborations should be encouraged to enhance global partnerships.

Thus, resolved and adopted on the 27th November 2011 at Bangi, Malaysia.