

**6TH INTERNATIONAL WORKSHOP-CUM-TRAINING COURSE ON:
MICROELECTRONICS: MICRO- AND NANO-ELECTRONICS AND PHOTONICS
ISLAMABAD (PAKISTAN), APRIL 9-13, 2007**

PARTICIPATING COUNTRIES: 14 (INCLUDING 7 MEMBER COUNTRIES AND 1 INDUSTRY NETWORK MEMBER OF THE NAM S&T CENTRE)

NUMBER OF PARTICIPANTS: 170 SCIENTISTS FROM 14 COUNTRIES

In the last few decades we have witnessed the realization of many new hitherto unbelievable ideas and concepts that were only found in science fiction. Most of this has been made possible through ultra-micro-miniaturization of the components and systems. Microelectronics is almost a generic word and subsumes areas as diverse as communication, information technology, data processing, process control, nanotechnology, nano-electronics, photonics, etc. to automation of a host of industries as well as biological and medical applications. The advancements in microelectronics fabrication technology have resulted in the development and fabrication of an assortment of high quality and high precision micro-sensors and sensors based on micro-electromechanical systems and devices (MEMS). Microelectronics and Information Technology are the two key elements that have led to the high level of technological sophistication achieved by the present day civilization. Successive generations of miniaturization of electronic systems have resulted not only in the improvement of their performance but also in the economics of scale. Further, low production costs achieved due to the application of batch fabrication technology, small size and low power consumption have facilitated the transformation of the manufacturing of microelectronics and micro-systems into a commercially viable industry. Because of its immense economic impact and commercial potential, almost all the developing countries are gradually aspiring to adopt microelectronics R&D and production, but at the same time, they are also desperately in need of quickly comprehending the full implications of the level of microelectronics technology presently required by them within the nation and forecasted for the years ahead in terms of its capabilities, limitations, viability, economics and infrastructural requirements by undertaking a pragmatic analysis in totality.

In this context, the Centre for Science and Technology of the Non-Aligned and other Developing Countries (NAM S&T Centre) with the approval of its Governing Council organised a 5-day international workshop-cum-training course on Microelectronics on the theme 'Micro- and Nano-electronics and Photonics' during 9-13 April 2007 at Islamabad, Pakistan jointly with the Institute of Information Technology (IIT) of the Commission on Science and Technology for Sustainable Development in the South (COMSATS). This was the sixth scientific event of the NAM S&T Centre on Microelectronics, the

earlier ones having been held respectively at Bangkok in association with the Asian Institute of Technology, Thailand in August 2000; at Da Nang, Vietnam in November 2001; in Delhi in association with the Central Electronics Engineering Research Institute, Pilani of the Council of Scientific & Industrial Research (CSIR) of India in December 2002; in Cairo in association with the Electronics Research Institute, Egypt in December 2003; and in Kuala Lumpur in association with MIMOS Berhad of Malaysia in September 2005.

The Islamabad training workshop on Microelectronics was aimed at facilitating the exchange of country specific information on Microelectronics with particular reference to photonics materials and application, power devices, trends in semiconductor process simulation, system architecture and next generation silicon based electronics, and deliberating on North-South and South-South collaboration to develop this sector in the developing countries.

Dr. Ishfaq Ahmad, Special Advisor to the Prime Minister of Pakistan inaugurated the training workshop course after recitation from the Holy Quran, welcome remarks by Dr. Hameed Ahmed Khan, Executive Director, COMSATS; Dr. S.M. Junaid Zaidi, Rector, COMSATS –IIT; Prof. Arshad Saleem Bhatti, Head, Physics Department, COMSATS – IIT; and Prof. Arun P. Kulshreshtha, Director, NAM S&T Centre.

The training workshop was conducted in eight technical, country report and training sessions as well as a day trip to Ghulam Ishaq Khan Institute of Engineering Sciences and Technology (GIKI), a Center of Excellence in Pakistan for the Natural Sciences and Computing located near Topi to acquaint and train the participants with the state-of-the-art techniques in Microelectronics. Several researchers also displayed posters of their research work during the course of the workshop. The overall technical programme of the training workshop was coordinated by Dr. Ahmed Shuja and Dr. Muhammad Asif Malik of COMSATS-IIT and was attended by ~170 scientists from 14 countries. The overseas participants were from Austria [Dr. Gerald Kada, Agilent Technologies, Nanotechnology Measurements Division]; India [Dr. Krishan Lal, INSA Senior Scientist and Former Director, National Physical Laboratory; and Prof. Kasturi Lal Chopra, Former Director, Indian Institute of Technology, Kharagpur], Indonesia [Dr. Siti Amini Ika from the Center for Nuclear Fuel Technology, National Nuclear Energy Agency], Malaysia [Prof Dr. Masuri Bin Othman, Director of MEMS and Microsystems, MIMOS Berhad], Myanmar [Dr. Win Win Maw, Department of Electronics, Mandalay Technological University, Ministry of Science and Technology], Nepal [Mr. Nara Raj Giri , Senior Technical Officer, Nepal Academy of Science and Technology], Netherlands [Prof. Aly Aamer Syed, NXP Semiconductors, Holland], Sri Lanka [Mr. B.A. Indunil, Research Officer, Electro Technology Laboratory, Industrial Technology Institute (ITI)], Sweden [Prof. Magnus Willander of Linköpings and Göteborg universities and Prof. Qamar ul Wahab of Linköping University, Sweden], Turkey [Mr. Sedat Soydan from The National Research Institute of Electronics and Cryptology], Uganda [Mr. R. Tushemereirwe, Assistant Private Secretary to H.E The President on Science and Technology], UK [Prof. Saeed Ur Rehman,

Founder Director, Fiber Logix, Watford, Herts], and USA [Prof. Dean Aslam, Michigan State University, USA; Prof. Taher Saif, UIUC, USA and Dr. Ahmer Naweed of Kansas University], who made their presentation during the event.

The participants from Pakistan, who made scientific presentation during the workshop, were Prof. Arshad S. Bhatti (on ‘Self-Organised Growth Nanostructures for Photonic Applications’), Dr. Ahmed Shuja (on ‘Next Generation Ion Implantation for Micro- and Nano-Electronics and Photonics’), Dr. Shafaat Bazaaz (on Microsystems: Electron, Pressure and Fluid on the Same Chip’), Dr. Sadia Manzoor (on ‘Thin Films for Magneto-Electronic Applications: Tuning Magnetic Properties via Grain Size Control’), Dr. Zafar Iqbal (on ‘Nanoscience and Technology – The Dawn of a New Era in Electronics’), Dr. Asghar Hashmi (on ‘Growth and Characterization of SiC grown on Porous Si(100) by Chemical Vapour Deposition using Trimethylsilane’), Dr. Arbab Ali Khan (on ‘Optical Bases Neural Network Pattern Recognition and Generation System’), and Dr. Umair Manzoor (on ‘Semiconductor oxide Nanostructures and Their Applications’).

Among the overseas speakers Prof. Magnus Willander delivered scientific talks on ‘Materials and Scaling Issues in Electronics, Photonics and Electromechanical Systems’ and ‘Nano-Electromechanical Systems and Their Influence on Micro-Nanoelectronics: Fundamentals and Applications’; Prof. Dean Aslam on ‘Carbon based Micro- and Nano-Technologies: Materials, Devices and Systems’ and ‘Microsystems RFID Technology and supply Chain Management: Research and Education’; Prof. Qamar ul Wahab on ‘Large Signal TCAD Modeling of Microwave Transistor for Power Amplifiers’; Prof. Kasturi Lal Chopra on ‘Tailored Thin Films and Nanomaterials’; Prof. Taher Saif on ‘A Voyage through the World of Small’ and ‘MEMS – A New Paradigm in Research Labs – from Biology to Materials Sciences’; Prof. Aly Aamer Syed on ‘A Vision on Future of Consumer Electronics: System Architecture and Technology Consequences’ (3 presentations); Dr. Krishan Lal on ‘Recent Advances in Structural Characterization of Single Crystals by High Resolution X-Ray Diffraction’, ‘Structural Characterization and Long Term Reliability of Micro-machined Sensors and high resolution X-Ray Reflectometry of Solid Surfaces’ and ‘Fascinating World of Crystals’; Mr. B.A. Indunil on ‘SMS-Based Data Transmission System for Automated Rain Gauge’; Dr. Gerald Kada on ‘The Eyes of Nanotechnology: Advances in Scanning Probe Microscopy for Biology and Nanostructuring’; Dr. Saeed Ur Rehman on ‘Optical Fiber Sensors Technology: A Key technology for the Photonics Revolution’; and Dr. Ahmer Naweed on ‘Experimental Realisation of All-Optical EM Induced Transparency in a Dual Whispering Gallery Microresonator System’. The other overseas participants presented their country status reports on Microelectronics and related topics. Prof. Dean Aslam also gave a practical demonstration.

The concluding ceremony was chaired by Dr. Noor Mohammed Butt, Chairman, Pakistan Science Foundation; Prof. Farid A. Khwaja, Director General, National Institute of Electronics, Islamabad; and Prof. Arun P. Kulshreshtha, Director, NAM S&T Centre, before which an Informal Group Discussion was held with Dr. Zafar Iqbal, Mrs. Dr. Naseem Zafar, Prof. Kasturi Lal Chopra, Dr. Krishan Lal, Dr. Noor

Mohammed Butt, Prof. Arun P. Kulshreshtha and

Prof. Dean Aslam as the panelists. Dr. Ahmed Shuja moderated the panel discussion and recommendations. An 'Islamabad Recommendations on Microelectronics' was adopted, a copy of which is **appended** to this Report. This was followed by the distribution of certificates and shields to the participants.

The participants thanked the organizers of the Workshop-cum-Training Course, particularly Dr. S.M. Junaid Zaidi, Dr. Ahmed Shuja, Prof. Arshad Saleem Bhatti, Muhammad Asif Malik and Mrs. Asif and unanimously hoped that more similar events will be held in future with a focus on young and youth aimed at research and capacity building in the developing countries.



Islamabad Recommendations on Microelectronics

13 April 2007

The Sixth International Workshop-cum-Training Course on Microelectronics has been very successfully organized by the NAM S&T Centre jointly with COMSATS-IIT at Islamabad, Pakistan during 9-13 April 2007. The event had outstanding invited speakers from all over the globe, who covered latest developments in various aspects of microelectronics, the trends and future possibilities. Very enthusiastic participation of delegates from NAM countries has contributed significantly. Delegates were also imparted a brief training. The Workshop has been organized in a highly professional manner. The participants enjoyed excellent hospitality and high level of personal care. The participants of the training workshop put on record their highest appreciation of all the members of the Organizing Committee.

The following recommendations have emerged from the Training Workshop:

1. It will be most desirable to start an electronic Newsletter, which may be quarterly in periodicity. Dr. Mohammed Asif and Dr. Ahmed Shuja have kindly accepted to edit and produce this Newsletter with the facilitations of the NAM S&T Centre.
2. As a follow up on the Training Workshop, the Proceedings of the Workshop may be brought out by the NAM S&T Centre. These may be in two parts. The first part will contain Invited Contributions of the Workshop and the second part will put together all the Country Reports. Prof Krishan Lal, New Delhi and Prof. Ahmed Shuja of COMSATS-IIT have kindly agreed to edit the first part. Dr. Mohammad Asif has kindly consented to edit the second part.
3. It is recommended that possibilities of training of scientists in the Centres of Excellence in the NAM Countries, like MEMOS Berhad, in the field of Microelectronics may be explored. NAM countries may later identify their scientists and depute them for training.
4. Microelectronics is truly a multidisciplinary area and high quality expertise in different fields is required. Therefore, to develop this field in NAM countries, it is recommended that networks of experts and laboratories may be established. Bilateral arrangements like the one being planned between COMSATS and MEMOS, Malaysia may also be encouraged.