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## Editorial

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**Biographical notes:** Xiaowei Sun was born in Beijing, China. From 1986 to 1994, he studied at Tianjin University, China, where he received his B.Eng., M.Eng. and PhD Degrees all in Photonics. From 1994 to 1998, he studied at the Hong Kong University of Science and Technology where he received his second PhD Degree in Electrical and Electronic Engineering. He has been with the Division of Microelectronics in the School of Electrical and Electronic Engineering of Nanyang Technological University, as an Assistant Professor from 1998–2005, and Associate Professor since 2005. His research interests focus on ZnO by MOCVD, display devices (organic light-emitting devices etc.) and nanotechnology. He has one edited book and has served as a Guest Editor for *Journal of Society for Information Display* in 2003. He has more than 100 peer-reviewed journal publications, which have been cited more than 500 times by March 2007. He is a senior member of IEEE and Member of Society for Information Display (SID). He is the founding Chair of SID Singapore and Malaysia Chapter. He has served as Chair, Technical Committee Chair, Advisory Committee Member, and Organising Committee Member for about ten conferences. He has also delivered more than a dozen invited talks in international conferences. He is a Guest Research Professor at Southeast University, Nanjing, China. For detail, please see [www.ntu.edu.sg/home/exwsun](http://www.ntu.edu.sg/home/exwsun).

Zhili Dong is an Assistant Professor in School of Materials Science and Engineering, Nanyang Technological University. He received his PhD in Materials Science and Engineering and Bachelor of Engineering from Tsinghua University, China. During his study towards a PhD Degree, he was granted a Japanese Government Scholarship and studied at Osaka University in 1987 and 1988. He completed his PhD work in 1989 under the MOE Joint PhD Program. Prior to joining the School of Materials Science and Engineering of Nanyang Technological University, he worked at the Institute of Environmental Science and Engineering/Environmental Technology Institute of A\*STAR as a senior

research scientist, School of Mechanical and Production Engineering of NTU as a research fellow, University of Barcelona as a Visiting Professor. He was a Lecturer at Tsinghua University before joining the University of Barcelona. He has more than 20 years experience in transmission electron microscopy and powder X-ray diffraction of materials. His research interests include apatite-type ceramics, nanostructured functional materials, advanced coatings and hydrothermal synthesis. He has authored/co-authored over 100 scientific publications.

Yu Lei received his PhD from the University of California-Riverside and spent 18 months as an Assistant Professor at School of Chemical and Biomedical Engineering, Nanyang Technological University, Singapore. He is currently an Assistant Professor in Chemical, Materials and Biomolecular Engineering at University of Connecticut. His research is interdisciplinary and focuses on bionanosensors, bioremediations, and bionanomaterials.

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It was one year ago when one of us (Xiaowei Sun) met the Editor-in-Chief, Dr. Lionel Vayssieres, who asked Xiaowei to consider a special issue in IJNT to reflect the current development of nanotechnology research in Singapore. Xiaowei came back and discussed with Zhili and Yu, and we thought it would be a timely activity to showcase what has happened in Singapore, one of the smallest countries in the world, yet one of the most highly-developed and well-organised countries.

Since the late 1990s, in response to the increasing nanotechnology heat worldwide, the government funding agencies, including Ministry of Education (MOE), Agency for Science, Technology and Research (A-STAR) etc., have put more and more emphasis on nanoscience and nanotechnology researches. In a recent report by Singapore Ministry of Trade and Industry (MTI), Science and Technology Plan 2010, 'nanotechnology' was repeatedly emphasised by 13 times. Nanotechnology has been regarded as the key enabling technology to sustain future development of the Singapore economy. A-STAR has called a few times for strategic research programs on nanotechnology, such as 'Nano-Manufacturing' and 'Molecular and Polymer Electronics'. As the main practitioners in nanotechnology research, the two universities in Singapore, Nanyang Technological University and National University of Singapore have set up Nanoscience and Nanotechnology Cluster (Nanocluster) and Nanoscience and Nanotechnology Initiative (NNI) respectively, in response to the global and local call for nanotechnology. Details of Nanocluster and NNI can be found at [www.ntu.edu.sg/nanocluster](http://www.ntu.edu.sg/nanocluster) and [www.nusnni.nus.edu.sg](http://www.nusnni.nus.edu.sg) respectively, where a lot of excellent researches can be found. The research institutes affiliated to A-STAR have also actively geared towards the nano-related researches. For example, the Institute of Microelectronics (IME) has pioneered a technology of silicon nanowire (7 nm in diameter) field-effect transistor ([www.ime.a-star.edu.sg](http://www.ime.a-star.edu.sg)), and the Institute of Materials Research and Engineering (IMRE) has spun off a company based on nanorod magnetic bar code ([www.imre.a-star.edu.sg](http://www.imre.a-star.edu.sg)).

Singapore universities and institutes are well-equipped and funded for nano researches. For example, in the Microelectronic Center of Nanyang Technological University (<http://www.ntu.edu.sg/eee/eee6/mec/index.asp>), we have state-of-the-art micro- and nano-fabrication facilities (one fully functioning CMOS line and one III-V

and other compound/organic clean rooms). The centre alone attracts more than S\$10 mil research funding.

After one year of work, we finally collected some representative papers from within the Singapore local research community, which includes Nanyang Technological University, National University of Singapore, Institute of Materials Research and Engineering, Institute of Microelectronics, Institute of Data Storage, Singapore Institute of Manufacturing Technology and a few others. It is worth mentioning that the papers collected in this special issue cannot cover every aspect of nanotechnology research in Singapore, yet they are a reflection of large and increasing successful efforts of Singapore scientists and funding agencies have put into nanotechnology research recently.

In this special issue, we have papers addressing diverse topics related to nanotechnology:

- 1 'Oriented attachment: a versatile approach for construction of nanomaterials', by Hua Chun Zeng in which a review on recent development of synthetic architecture of nanomaterials through oriented aggregations of primary colloidal particles is presented.
- 2 'Nano-characterisation of dielectric breakdown in the various advanced gate stack MOSFETs', by Pey Kin Leong et al. which reviews the recent reliability issue of high- $\kappa$  nano-CMOS devices.
- 3 'Nano-fractals from inorganic salts induced by fullerene polymer systems' by Yeong Loong Raymond Quek et al. investigates the formation of nano-fractals of inorganic salts induced by polymethacrylic acid- $b$ - $C_{60}$  (PMAA- $b$ - $C_{60}$ ) and polyacrylic acid- $b$ - $C_{60}$  (PAA- $b$ - $C_{60}$ ) under various physical conditions.
- 4 'Complex and useful polymer micro- and nanostructures via nanoimprint lithography' by Hong Yee Low presents an overview of nanoimprint lithography research carried out in their lab.
- 5 'Temperature dependent exciton radiative lifetime in ZnO nanorods' by X.H. Zhang et al. on exciton radiation mechanism in nanoscale ZnO, which is a hot topic nowadays.
- 6 'Nanoscale growth of (Zn,Sr)S system for electron-trapping optical memories' by K.L. Teo and T.C. Chong on nanoscale island growth of SrS and  $Zn_xSr_{1-x}S$  by MBE and applying them for memory applications.
- 7 'Self-assembled Ni nanoclusters in a diamond-like carbon matrix', by Edwin H.T. Teo et al., on self-assembled Ni nanoclusters formed in a diamond-like carbon matrix by filtered cathodic vacuum arc technique.
- 8 'Band structure investigation of strained  $Si_{1-x}Ge_x/Si$  coupled quantum wells' by F. Lu et al., on the detailed calculation of the band structure of  $Si_{1-x}Ge_x/Si$  quantum wells under strain, which are useful for silicon-based devices.
- 9 'Organic thin-film transistors based on conjugated polymer/carbon nanotube composites' by Ye Gan et al., on the field effect of conjugated polymer/carbon nanotube composites.

We hope that this special issue of IJNT will give readers some taste of Singapore nanotechnology research, of course, more importantly, that they will find the research useful and relevant to their own. Another aim, through this special issue, is to encourage researchers outside Singapore to visit Singapore, get in touch their counterparts in Singapore, form collaborations, and ultimately benefit mankind as a whole through their collaborative researches.