
Editorial

Qi Jie Wang

School of Electrical and Electronic Engineering
and School of Physical and Mathematical Sciences,
Nanyang Technological University,
50 Nanyang Avenue, 639798, Singapore
E-mail: qjwang@ntu.edu.sg

Cherming Tan and K. Radhakrishnan

School of Electrical and Electronic Engineering,
Nanyang Technological University,
50 Nanyang Avenue, 639798, Singapore
E-mail: ecmtan@ntu.edu.sg
E-mail: eradha@ntu.edu.sg

Jianmin Miao

School of Mechanical and Aerospace Engineering,
Nanyang Technological University,
50 Nanyang Avenue, 639798, Singapore
E-mail: mjmmiao@ntu.edu.sg

Biographical notes: Qi Jie Wang is currently a Nanyang Assistant Professor at the School of Electrical and Electronic Engineering and the School of Physical and Mathematical Sciences. He has published/co-published more than 80 papers (including six invited papers) in top international journals, more than 70 conference papers (including numerous invited talks) and co-authored seven US patents. He was the recipient of the top prize for the Young Inventor Awards of the SPIE Photonics Europe Innovation Village in 2004; a golden award from the Fifth Young Inventor's Awards in 2005 organised by HP and *Wall Street Journal*; the co-recipient of the IES (Institution of Engineers Singapore) Prestigious Engineering Achievement Team Award 2005 of Singapore, and the World Culture Council Special Recognition Award 2013.

Cherming Tan is an Associate Professor in the School of Electrical and Electronic Engineering. He has published more than 260 International Journal and Conference papers, and holding eight patents and one copyright for reliability software. He has given more than 20 invited talks in International Conferences, and has written three books and three book chapters in the field of reliability. He is an Editor of *IEEE Transactions on Devices and Materials Reliability*, the Series Editor of *SpringerBrief in Reliability*, Editor of the *Scientific World Journal*, and member of Editorial Advisory Board in Microelectronics Reliability. He is also a senior member of IEEE and ASQ, Distinguish Lecturer of IEEE Electronic Device Society on reliability, Founding Chair of IEEE Nanotechnology Chapter – Singapore Section, Standing Committee Chair of IEEE International Nanoelectronics Conference, Fellow of Institute of Engineers, Singapore, Fellow of Singapore Quality

Institute, Executive Council member of Singapore Quality Institute, Director of SIMTech-NTU Reliability Lab, and Senior Scientist in SIMTech. His research interests include reliability and failure physics modelling of electronic components and systems, finite element modelling of materials degradation, statistical modelling of engineering systems, nano-materials and devices reliability, and prognosis & health management of engineering system.

K. Radhakrishnan is an Associate Professor in the School of Electrical and Electronic Engineering at Nanyang Technological University, Singapore. His research interests lie in the area of MBE and MOCVD growth and characterisation of III-V and III-Nitride compound semiconductors, devices for high frequency and high power applications, sensors, photodetectors, and low-cost solar cells. His work has been featured in over 200 publications in the form of journal articles and conference presentations. He is a member of IEEE and a recipient of National Defense Technology Prize in 2007.

Jianmin Miao is an Associate Professor and Director of Micromachines (MEMS) Centre in the School of Mechanical and Aerospace Engineering at Nanyang Technological University, Singapore. He has published 100 journal papers, 150 conference papers and several books/book chapters, and filed five patents. He has been awarded many project grants from A*Star, MOE, DSO and industries in Singapore, USA and Europe. He served as chair and co-chair of the MEMS international conferences, technical committee member for international conferences including IEEE-MEMS and Transducers. He is the reviewer for the numerous journals such as *Nature-Nanotechnology*, *Journal of MEMS*, *Nanotechnology*, etc. He was invited by many international MEMS conferences as plenary speaker, keynote lecturer and invited speaker.

It is a great pleasure to present here a selection of the best papers from the *5th IEEE International Nanoelectronics Conference (IEEE INEC)* held in Singapore, in January 2013. The theme of the conference is ‘sustainable nanoelectronics’, aiming at nanoelectronics for the future. Since the first edition in Singapore in 2006, this conference has become an important symposium in a short span of time on nanoelectronics, photonics and nano-science, linking scientists and engineers from academia and industry. INEC 2013 brought together more than 100 participants to Singapore from all over the world including China, Japan, Korea, India, Thailand, Egypt, Iran, Australia, Sweden, Canada, USA, France and UK, showing broad and international scientific interest.

This conference includes invited and contributed talks and poster session, spreading out in four parallel symposia:

- *Nano-Fabrication* – including nanofabrication technologies, modelling & simulation, metrology characterisation and manipulation.
- *Nano-Electronics* – including electronic materials & structures, spintronics, systems & reliability, modelling & simulation and molecular electronics.
- *Nano-Photonics* – including photonic phenomena, materials & technologies, modelling & simulation, molecular photonics.

- *Nano-Sciences* – ranging from nanoscale based biology, physics and chemistry. This includes modelling & simulation, materials & structures and methods & applications.

In summary, 242 papers were presented at a high scientific level including four keynotes and 57 invited talks. The selected papers reflect the most important works done in these areas/fields, including nanoelectronics, nanomaterials (e.g., carbon nanotube, graphene), nanodevices (solar cells, metal-oxide semiconductor field effect transistors (MOSFETs), memory, sensors, etc.), nanofabrication, and so on. Eight papers present research progress in field effect transistor (FET) and MOSFET devices, including effects of stress, interface states, temperature, graphene quantum dots on the characteristics of MOSFET, properties of MOSFETs, and application of FET in sensing, etc. Seven papers deal with memory devices realised using a variety of materials that include devices based on Si_3N_4 , polycrystalline silicon, TiO_2 , and graphene oxide. Some characteristics (e.g., resistive switching, conduction mechanism) of these devices are analysed, showing the important developments in this field. Six papers report fabrication of nanodevices (e.g., high density nanoelectronics and nanotube based FETs) and nanostructures (nanowire), and the characteristics of nanomaterials (e.g., carbon nanotube). Five papers concentrate on ZnO-based nanoparticle and functional films, and analyse their characteristics, performance and applications. There are several papers that discuss nanophotonic devices (e.g., solar cells, photodetector and LED) and ab initio modelling.

We believe that the papers selected for this volume reflect the high quality of research in nanotechnology and the great efforts made by research groups contributing to many significant issues, such as nanodevice fabrication, material characteristics analysis, memory and energy devices.

We would like to thank the Editorial Board of the *International Journal of Nanotechnology* and especially Dr. Lionel Vayssieres, the Editor-in-Chief of the IJNT for their support. We would also like to appreciate and thank all the authors who have contributed to this special issue.