
Editorial

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Biographical notes: Anatoli Korkin is an Associate Research Professor at Arizona State University and President of Nano & Giga Solutions, a company that provides consulting in development and project management in education, science and technology innovations. Anatoli obtained his Master Degree in chemistry from D. Mendeleev University of Chemical Technology of Russia and his PhD in physics from Moscow Lomonosov State University. He has an extensive experience in computational and physical chemistry and industrial research in process and material design for advanced electronics and solar energy materials. He has published over 100 refereed journal articles and edited several books and special journal issues. Prior starting his career as an entrepreneur in 2004 he worked for Motorola as a Senior Scientist in R&D division. He was a Researcher and Visiting Scientist in world-class academic institutions, including: Russian (Soviet Union) Academy of Sciences, University of Erlangen-Nurnberg, Max-Planck Institute of Radiochemistry, Dalhousie University, University of Florida, Philipps University Marburg, Tyndall National Institute and University of Tokyo. His entrepreneurial activities include organising conferences and seminars, consulting in technology commercialisation, education, science and executive management for start-up companies, organisation and management of professional networks.

Peter Mueller joined IBM Research as a Research Staff Member in 1988. His research expertise covers broad areas of distributed computing systems architecture, microwave technology, device physics, nano-science and

modelling. His current field of research is in the areas of data center storage security and reliability and the high frequency technology. He is a founding member and was the Chair of the IEEE Communications and Information Security Technical Committee (CIS-TC). In the course of his carrier he authored and co-authored more than 100 papers, 2 books, granted 10 patents and served as guest editor for many special issue publications. He also served as a government counsel and as organiser for numerous international conferences and workshops. His affiliations include society membership in IEEE; the Society for Industrial and Applied Mathematics (SIAM); the Electrochemical Society (ECS); and the Swiss Physical Society (SPS).

Fred Roozeboom received his MSc (Chemistry) from Utrecht University, and his PhD (Chemical Engineering) at Twente University, The Netherlands. From 1980–1983, he worked on zeolite catalysis with Exxon R&D Labs in Baton Rouge, USA and Exxon Chemicals in Rotterdam. In 1983, he joined Philips Research in Eindhoven. Since 2007, he is also a part-time Professor of Applied Physics at the Eindhoven University of Technology. In 2009, he left Philips/NXP to join TNO, the largest independent Dutch research institute, in Eindhoven, as a senior technical advisor. He is a specialist in thin-film manufacturing, and author on ~180 journal and conference publications, holds 28 US patents and approximately 30 WO patent applications, and has edited or co-edited 31 conference books on thin film technology and semiconductor processing.

This special issue of *International Journal of Nanotechnology* is a collection of selected papers presented at the *Nano and Giga Challenges in Electronics, Photonics and Renewable Energy* (NGC2014) conference held at Arizona State University in Tempe, Arizona. It addresses both theoretical and experimental achievements and provides an overview of the technological developments in these highly topical fields of research.

Energy and information, which are interconnected, are essential elements for the development of human society. Processing and storage of information requires energy consumption, while the efficient use and access to new energy sources requires new information (ideas and expertise) and the design of novel systems such as photovoltaic devices, fuel cells and batteries. Semiconductor physics creates the knowledge base for the development of information (computers, cell phones, etc.) and energy (photovoltaics) technologies. The exchange of ideas and expertise between these two technologies is critical and expands beyond semiconductors. Efficient use of solar energy requires the development of novel energy storage devices while biosystems provide new paradigms for the development of materials and devices for information (processing and storage) and energy (e.g., biofuel and artificial photosynthesis) technologies and biomedical applications (sensors and diagnostics).

Progress in information and renewable energy technologies requires miniaturisation of devices and reduction of costs, energy and material consumption. The latest generation of electronic devices is approaching atomic dimensions; new materials are being introduced into electronics manufacturing at an unprecedented rate; and alternative technologies to mainstream CMOS are evolving. The low cost of natural energy sources have created economic barriers to the development of alternative and more efficient solar energy systems, fuel cells and batteries. However, there is an emergent understanding

that the sustainable development of human society requires use of new alternate sources of energy to natural gas and oil.

Nanotechnology is widely accepted as a source of potential solutions in securing future progress for information and energy technologies. Our conference series is an interdisciplinary forum in education, research and innovations in the development of new materials, devices and systems for these key technologies. The NGC2014 conference (the 6th Nano and Giga Forum) invited academic and industrial researchers to present tutorial and original research papers dedicated to solving scientific and technological problems in the following areas of electronics, photonics and renewable energy: atomic scale materials design, bio- and molecular electronics, high frequency electronics, fabrication of nanodevices, magnetic materials and spintronics, materials and processes for integrated and subwave optoelectronics, nanoCMOS, new materials for FETs and other devices, nanoelectronics system architecture, nano optics and lasers, non-silicon materials and devices, chemical and biosensors, quantum effects in devices, nano science and technology applications in development of novel solar energy devices, and fuel cells and batteries. We also invited inventors, entrepreneurs and business leaders to join the unique opportunity provided by our interdisciplinary forum on technical due diligence and to explore the potential commercialisation of emerging new technologies.

The success of the conference and publications would have not been possible without generous support from many sponsors and research institutions. The conference organisers gratefully acknowledge contributions and support from Arizona State University, Springer Publisher, National Institute of Health, Biologic and other sponsors and partners.