
Editorial

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Biographical notes: Anatoli Korkin is the President of a start-up company, Nano and Giga solutions, which provides research, consulting and software development in the area of computational materials science. He obtained his PhD degree from Lomonosov Moscow State University, Biophysics Department in 1981. Dr. Korkin held a Senior Scientist position in Motorola prior starting his own company. He conducted research in many areas of computational chemistry and materials design of micro- and nanoelectronics, biological and high energy materials. Dr. Korkin's current research interest is focused on atomic scale design of novel materials and interfaces for advanced and future electronics, sensors and renewable energy. Dr. Korkin has authored more than 100 papers in peer reviewed journals and 4 chapters in books and has been an editor of 8 journal issues and two books. He is also a co-founder and co-chairman of the popular biannual conferences in the area of advanced and future electronics and photonics – Nano & Giga Forums.

Jan Labanowski is a Director of computer facilities in Notre Dame University. He also manages Computational Chemistry List, one of the oldest, Internet based, virtual community (www.ccl.net), and the Atomic Scale Design Network (www.asdn.net), recently founded professional network. He obtained his PhD degree from Jagiellonian University in Krakow in 1981 in Cell Biology and holds MS degrees in Biochemistry and Theoretical Chemistry. His research interests span a wide range of topics: molecular modelling and molecular graphics (when he was associated with Tripos Associates and Washington University in St.Louis), computer applications for clinical laboratories (with American Red Cross Research Labs in Detroit), materials science and computational chemistry (as an academic leader within the DoD

High Performance Modernization Program for Computational Chemistry and Materials CTA and as the Senior Scientist at the Ohio Supercomputer Center in Columbus) and High Performance Computing and Communication and Network Security (when he lead the Science Computing Facility at The University of Notre Dame). He edited three books and three volumes as a guest editor, contributed over 40 papers in peer reviewed journals, and organised numerous conferences and workshops in the area of computational chemistry, toxicology, nanotechnology and computer-aided drug design. His also a co-founder (with Dr. Korkin) of popular Nano & Giga Forums.

Alex A. Volinsky is an Assistant Professor at the University of South Florida, Mechanical Engineering Department. He obtained his PhD degree from the University of Minnesota, Department of Chemical Engineering and Materials Science, in 2000. Thesis title: *The Role of Geometry and Plasticity in Thin, Ductile Film Adhesion*. Dr. Volinsky held an Engineering Materials Senior Staff Member position at Motorola's Process and Materials Characterisation Lab prior to joining USF. There, he conducted principal research employing XRD, SEM, FIB and FA analytical techniques for advanced technologies development, including porous low-K dielectrics. Professor Volinsky's current research interests are: Thin films processing, mechanical properties and characterisation; thin film porosity; adhesion and fracture of thin films. He is in charge of the Nanomechanical Testing and X-Ray lab at USF. Dr. Volinsky has authored 50 scientific papers, one of which was determined to be the most cited recent paper in the field of Materials Science by ISI® Essential Science Indicators: A.A. Volinsky, N.R. Moody, W.W. Gerberich, *Acta Mater.* Vol. 50/3, pp.441–466, 2002. He organised several conferences and symposia. Professor Volinsky's research was recognised by national and international awards.

The high level of attention and interest of the global community to NANO science and technology in large extent is linked to the GIGAntic challenges for the continuing growth of information technology and molecular biotechnology. Scaling of the conventional electronic devices to smaller sizes will soon be impossible due to the fundamental physical limitations, providing a strong motivation in search for alternatives, such as molecular and bio electronics.

Nanoscience and nanotechnology have sparked a very broad interdisciplinary and international cooperation. The series of conferences on Nano and Giga Challenges in Microelectronics (NGCM) was launched as a marriage of today's micro-, tomorrow's nano- and future molecular and bioelectronics. Following the first successful Summer School and Symposium in Moscow (NGCM2002), the second meeting was held in Krakow, Poland in 2004, hosted by the Jagiellonian University. The special issue of *Microelectronic Engineering* presents the proceedings of the second International Symposium on Nano- and Giga-Challenges in Microelectronics (NGCM2004) (<http://www.atomicscaledesign.net/ngcm2004>). The third Nano and Giga forum will be held in Arizona in the spring 2007 and the organisers look forward to make it one of the must-to-be-there meetings for leading professionals and students alike. For further information and registration, please, visit the conference website: <http://asdn.net/ngc2007/>.

Considering the importance of the tools development for future progress of nanoscience and nanotechnology, the organisers of NGCM2004 meeting collaborated with the *International Journal of Nanotechnology* in publishing a special issue on Nanotechnology Toolkit. This issue presents an outlook on development of the experimental and computational tools for design and characterisation at nano and atomic scales. Both manufacturing and characterisation aspects are extremely important and complement each other. Multiscale computer simulations are capable of filling the gaps, for which characterisation tools are currently not available or too expensive. Thus, manufacturing, characterisation and computer simulation tools form together the Nanotechnology Toolkit. This special issue of the *International Journal of Nanotechnology* is a compilation of the papers bound by the common theme of the Nanotechnology Toolkit.

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