A special section on nanotechnology for sensing

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A Special Section on Nanotechnology for Sensing

The use of nanomaterials and nanotech-based methodologies has changed the landscape of the field of sensing and biosensing. Three main avenues have been pursued in this type of research. In the first, an increasingly wide variety of materials, manipulated at the nanoscopic level, have been employed in sensing, in many cases leading to enhanced sensitivity and selectivity. For biosensing, in particular, biomolecules immobilized in nanostructured films have generated a whole host of biosensors, including for clinical diagnosis. In the second avenue, researchers have exploited various methods to fabricate nanostructured films with precise control of molecular architecture. This is crucial for the synergy sought in combining distinct nanomaterials in a single sensing device. As for the third avenue, the different principles of detection have been adapted for applications in nanodevices.

Our decision to edit a special section of JNN dedicated to sensing and biosensing was aimed at capitalizing on the effervescent activity in the three aspects mentioned above. We are happy to say that the papers appearing in this special section indeed cover all these three aspects of research. Just by way of illustration, the reader will be able to check state-of-the-art procedures to immobilize nanowires, nanorods, hybrid oxide structures, carbon nanotubes, graphene oxide, DNA and electrospun nanofibers in order to detect a variety of analytes. In biosensors, reports include the use of peptides for HIV-diagnostics and avidin-modified electrodes for genosensing. Nanomanipulation is also addressed in some of the papers, as is the case of nanopillars, nanobelts and nanoleaves produced for sensing.

In addition to dealing with various types of application, from gas sensors to analysis of wine and clinical diagnosis, the special section brings reports of innovative ways to treat sensing and biosensing data, which include artificial intelligence and information visualization techniques, and methods to investigate molecular-level interactions responsible for biosensing. The latter include surface plasmon resonance in nanosystems and atomic force spectroscopy for the design of nanobiosensors.

We hope that the highly selected collection of manuscripts in this special section will provide our readers with an overview of the state-of-the-art in sensing and biosensing.

Guest Editors

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ABOUT THE GUEST EDITORS

Osvaldo N. Oliveira, Jr is the deputy director of the São Carlos Institute of Physics, University of São Paulo, Brazil. He received his Ph.D. Degree from Bangor University, Wales, in 1990, and since then has led research into the fabrication of novel materials in the form of ultrathin films obtained with the Langmuir–Blodgett and self-assembly techniques. Most of this work has been associated with fundamental properties of ultrathin films with molecular control, but technological aspects have also been addressed in specific projects, including applications of electronic tongues and the use of chitosan nanostructured films in textiles. Professor Oliveira is one of the founders of the Interinstitutional Center for Computational Linguistics (NILC), which is a leading institute for natural language processing of Portuguese. In recent years, Professor Oliveira has pioneered the combined use of methods from distinct fields of science, with the merge of methods of statistical physics and computer science to process text, and use of information visualization to enhance the performance of sensing and biosensing. In 2006, Professor Oliveira was awarded the Scopus Prize from Elsevier, with other 15 Brazilian scientists considered most productive in terms of number of papers and citations. He has served as Associate Editor of the Journal of Nanoscience and Nanotechnology since January, 2007.

Katsuhiko Ariga is the Director of Supermolecules Group and Principal Investigator of World Premier International (WPI) Research Center for Materials Nanoarchitectonics (MANA) at the National Institute for Materials Science (NIMS). He was born in 1962, and received his B.Eng., M.Eng., and Ph.D. Degrees from the Tokyo Institute of Technology (TIT). He was an Assistant Professor at TIT, worked as a postdoctoral fellow at the University of Texas at Austin, USA, and then served as a group leader in the Supermolecules Project at Japan Science and Technology (JST) agency. Thereafter, he worked as an Associate Professor at the Nara Institute of Science and Technology and then got involved with the ERATO Nanospace Project at JST. In January 2004, he moved to NIMS. He has been appointed as a Professor at the Tokyo University of Science in 2008. His research field is based on supermolecular chemistry and surface science, including the boundary research areas of organic chemistry, physical chemistry, biochemistry, and materials chemistry. His major interests are the fabrication of novel functional nanostructures based on molecular recognition and self-assembly including Langmuir–Blodgett films, layer-by-layer films, and mesoporous materials. Dr. Ariga is the Asian Editor for three journals including Journal of Nanoscience and Nanotechnology (www.aspbs.com/jnn), Advanced Science Engineering and Medicine (http://www.aspbs.com/asem.html) and Nanoscience and Nanotechnology Letters (www.aspbs.com/nml).