
Editorial

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Biographical notes: Jadranka Travas-Sejdic obtained her BSc (Hons) and MSc Degrees in Chemical Engineering at the University of Zagreb, Croatia, and her PhD Degree in Chemistry at the University of Auckland in 1999. After some years working as a project manager in an industrial R&D environment she took up a position at the University of Auckland where she is currently a Associate Professor in Macromolecular Chemistry and Director of the Polymer Electronics Research Centre since its inception in 2003. She is a Principal investigator in the MacDiarmid Institute for Advanced Materials and Nanotechnology. Her main research interests are in the area of advanced polymeric materials for biomedical applications. Her research was recognised by an Easterfield medal from Royal Society of Chemistry in 2008.

Shaun Hendy completed a PhD in Physics at the University of Alberta in Canada in 1998. He then took up a New Zealand Science and Technology post-doctoral Fellowship at Industrial Research Limited in Wellington, New Zealand. He currently holds a joint position as a Principal Scientist at Industrial Research Ltd. and as a Senior Lecturer in the School of Chemical and Physical Sciences at Victoria University of Wellington. He is also the Deputy Director of the MacDiarmid Institute for Advanced Materials and Nanotechnology.

This special issue of the *International Journal of Nanotechnology* presents an overview of nanoscience and nanotechnology research in New Zealand. As the contributions in this

issue will illustrate, despite its small size, New Zealand has strong capabilities in a number of key areas in nanoscience and nanotechnology. These include *nanophotonics* (see “Plasmon-enhanced optical transmission of nanostructured metallic multilayers”), *organic electronics and hybrid materials* (“Hybrid materials of conducting polymers with natural fibres and silicates”, “Nanoscale films covalently attached to conducting substrates: structure and dynamic behaviour of the layers”, “Raman-frequency dispersion studies of substituted polythiophene films”), *nanomaterials* (“Nanostructures of zinc oxide”, “Multi-wall carbon nanotubes synthesized from different catalysts: morphology, dielectrophoresis and conductance”, “Chaotic scattering in nano-electronic systems: from billiards to clusters”), *nano-biotechnologies* (“Single cell imaging with AFM using Biochip/Bioimprint technology”, “A proposition for single molecule DNA sequencing through a nanopore entropic trap”, “Protein nanofibres of defined morphology prepared from mixtures of crude crystallins”, “Quantum dots and nanostructured conducting polymers for biosensing applications”) and *nanoscale device development* (“Atomic Cluster Device Research in New Zealand”, “Molecular dynamics simulations of nanoparticles”, “Group-IV and V ion implantation into nanomaterials and elemental analysis on the nanometer scale”). The breadth and scope of the research presented here reflects the enormous potential of the New Zealand science community to contribute to the development of novel technologies that can have global reach. We hope that this special issue provides a representative snapshot of the exciting developments that are taking place in nanoscience and nanotechnology in New Zealand.

However, New Zealand has only started to invest in these areas at a relatively late stage and low level in comparison to other developed countries. It is estimated that New Zealand Government is investing only NZ\$ 6 M per annum directly into actual nanoscale research and development with a total of NZ\$ 11 M per annum invested in projects involving aspects of nanoscience and nanotechnology in 2007 [1]. The Government acknowledges that this is a low level of investment and in 2007 the New Zealand Ministry of Research Science and Technology (MoRST) developed a series of documents under title “Roadmaps for Science” that include “Nanoscience and Nanotechnology Roadmap” which aims to provide a strategy and broad guidance from a New Zealand perspective in this particular area of science for the future. The main directions identified were

- focus on basic research
- increased focus on relevance to existing New Zealand industries
- increased focus on more transformative applications [1].

However, New Zealand needs to meet some fundamental challenges to achieve these goals. It must provide sufficient infrastructure to enable world class nanoscience and nanotechnology research, ensuring access to researchers nation-wide, while avoiding the replication of capital-intensive facilities at multiple institutions. These, and other challenges are discussed in a contribution to this issue by a Senior Advisor in the Ministry, Robert Hickson under title “Setting directions for nanotechnology in New Zealand”.

In spite of these challenges, research in nanoscience and nanotechnology of a high calibre has emerged at New Zealand Universities and Crown Research Institutes (CRI). The major hubs of nanoscale research lie within the MacDiarmid Institute for Advanced Materials and Nanotechnology - one of the New Zealand Centres of Research Excellence,

which is a collaborative venture between number of New Zealand Universities and CRIs (see the contribution “The MacDiarmid Institute for Advanced Materials and Nanotechnology: a New Zealand Centre of Research Excellence”), with others at Industrial Research Limited (one of the CRIs) and at the University of Auckland, including the Polymer Electronics Research Centre. The *BioNanoNetwork* [2], established by the MacDiarmid Institute, coordinates a large part of New Zealand’s activities related to the application of nanoscience techniques to biotechnology and biomedical engineering. New spin-off companies, such as Nano Cluster Devices Ltd., that develops new techniques involving atomic cluster deposition for the assembly of nano-electronics and sensing devices, and Advanced Nano Imaging, that is developing novel lithographic and imaging techniques, have started to evolve from the initial investments in fundamental research. This special issue highlights some of these successes.

To conclude, we would like to thank to Dr. Lionel Vayssieres for the opportunity to edit this special issue of the *International Journal of Nanotechnology*. It has been a pleasurable and educational experience. We would also like to thank the contributors for the high quality of their submissions. We believe this issue demonstrates, that with the appropriate level of support from the New Zealand Government, the future of nanoscale research and development in New Zealand can be very bright.

References and Notes

- 1 www.morst.govt.nz/Documents/work/roadmaps/MoRST-Nanotechnology-Roadmap.pdf
- 2 <http://www.bionano.net.nz/>