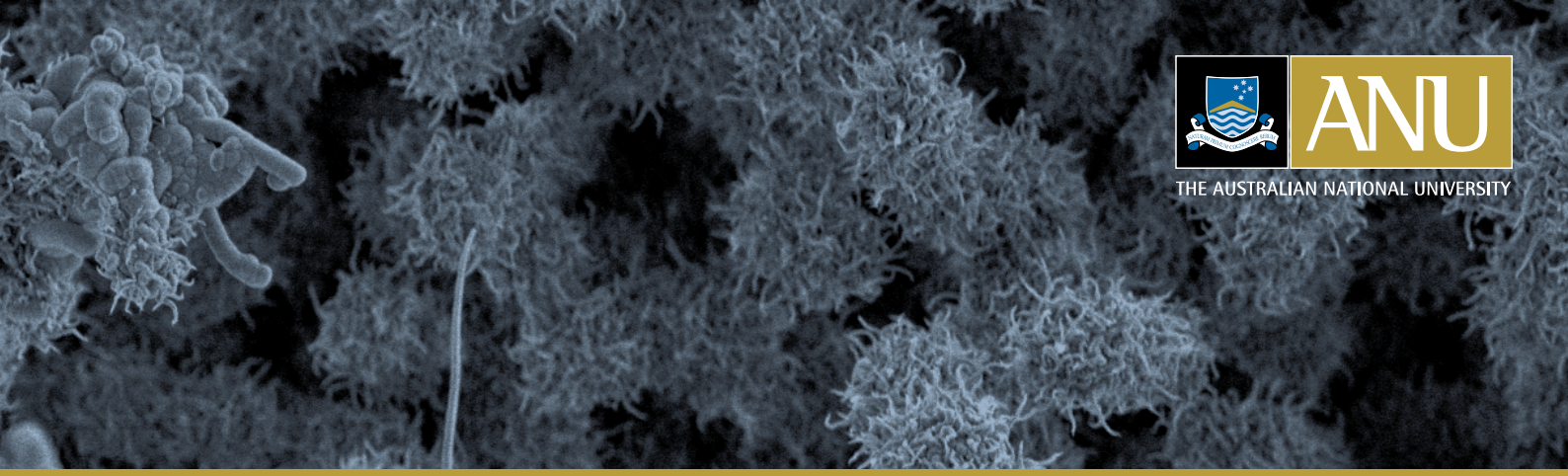


THE AUSTRALIAN NATIONAL UNIVERSITY

IMPROVED SENSITIVITY OF NANOWIRE-BASED BIOSENSORS

BACKGROUND

Nanowires are thin fibres or wires of matter with diameters in the order of 10 nanometres to one micron. They may extend more or less indefinitely, and have been observed in the order of millimetres of length; as such, they may have one dimension in the nano-scale and another dimension in the macro-scale of our everyday world.

As a result of their unique structure, in particular their immense surface area to volume ratio, nanowires have many unique properties. These particular properties lend these structures well to function as active sensing units in biosensors or electrochemical sensors.

As a technology, nanowires are in their infancy. All novel developments in the study of nanowires may have significant implications in the future use of nanowires in sensing and other applications.

TECHNOLOGY

Researchers in the Department of Electronic Materials Engineering at The Australian National University (ANU) have discovered several new methods to manufacture silica nanowires with interesting properties:

- the ability to separate the wires from their growth substrate, resulting in a self-supporting 'mesh' of nanowires
- the ability to grow branching, or secondary, nanowires upon existing nanowires
- the ability to form nanowires of a material different to that of the substrate upon which they grow
- the ability to optically dope or otherwise incorporate optically active metals into the wires to form luminescent structures.

These discoveries may be incorporated into a suite of new technologies that are incorporating nanowires and other nanostructures into bio- and chemo-sensors.

ANU has applied for provisional patent protection on these methods of nanowire production.

APPLICATION

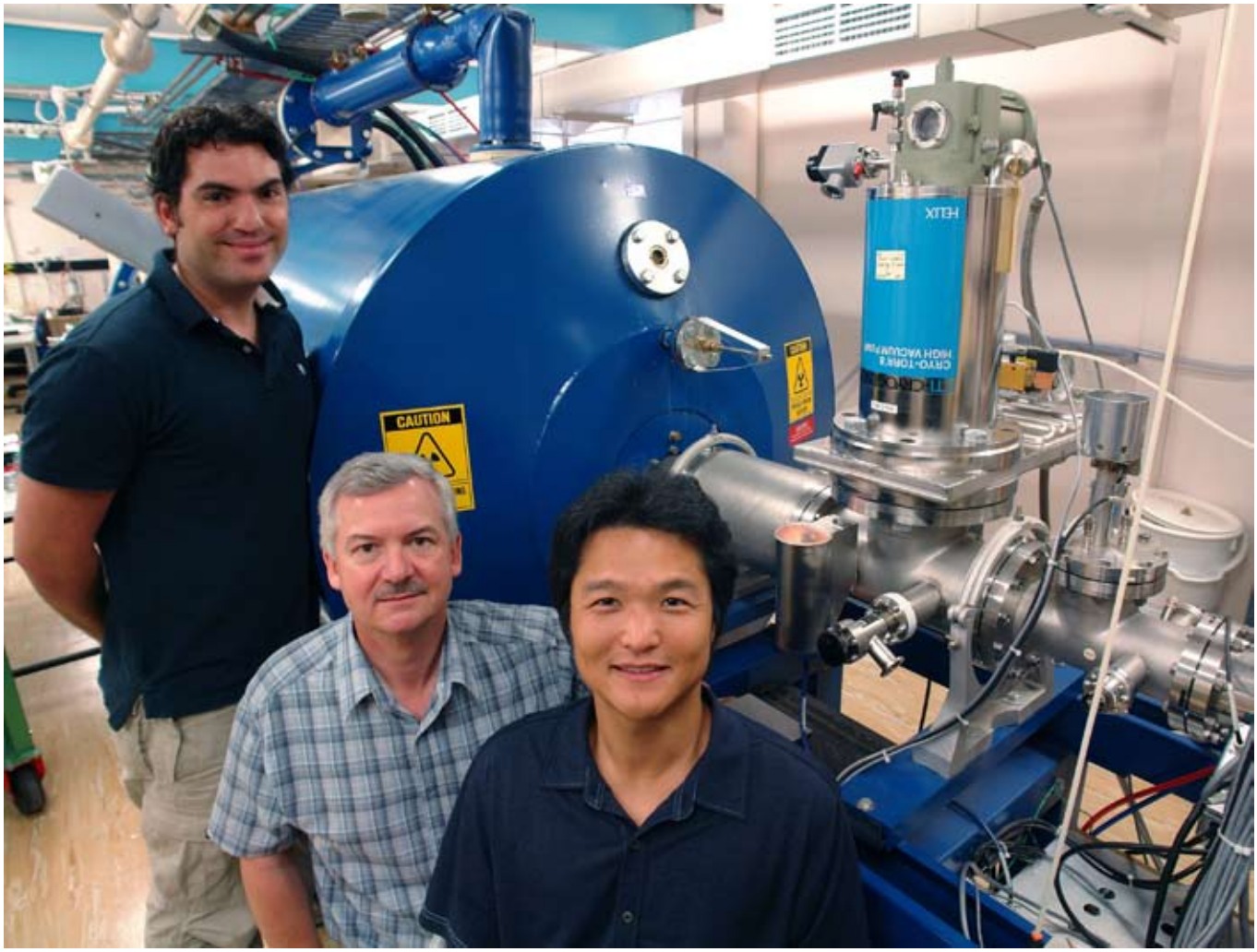
These nanowire manufacture techniques can increase the efficiency of sensors by offering a greater surface area, resulting in greater detection sensitivity.

Self-supporting nanowire structures are flexible once removed from their solid silicon substrate, a property that will lend to their use in various shapes or attached to curved substrates. Further, the films could be stacked to form a three-dimensional network of nanowires, which may include series of nanowires with different specificities.

This technology may be applied to a myriad of different uses in an industrial setting. With further development of the use of nanowires in industrial applications, more applications of branching and self-supporting nanowires may emerge.

BUSINESS OPPORTUNITY

ANU is looking to license this intellectual property to a partner organisation who is involved in the commercial manufacture of nanostructures for industry. We are ideally looking for a partner who will work with ANU researchers to assist in further developments in this field.



From L-R: Avi Shalav, Professor Rob Elliman, Taehyun Kim

THE INVENTORS

Professor Rob Elliman is the Head of the Electronic Materials Engineering Department in the Research School of Physics and Engineering, ANU College of Physical Sciences where he also leads an active research group with interests in semiconductor nanotechnology, silicon-based photonics, high-k dielectrics and ion beam modification and analysis of materials. He has published over 250 papers in peer-reviewed journals and conference proceedings, including several book chapters and review articles. Professor Elliman is a Fellow and former President of the Australian Institute of Physics and a Fellow of the Institute of Physics, UK. He received the Pawsey Medal from the Australian Academy of Science for his contribution to physics research and was awarded a DSc based on peer review of his published work.

Mr Taehyun Kim received his BSc and MSc degrees in physics from Kyunghee University, Youngin, Korea, in 2000 and 2002 respectively. He is currently a PhD student studying the growth and potential applications of novel silica nanowires within the Department of Electronic Materials Engineering at the ANU College of Physical Sciences.

Dr Avi Shalav received a BSc degree in mathematics and physics and an MSc in physics from Massey University, New Zealand, in 1999 and 2002 respectively. He was awarded a PhD in photovoltaic engineering from the University of New South Wales, Australia, in 2006. He has performed postdoctoral research into novel hybrid photovoltaic devices within the Optoelectronic Materials Group, Delft University of Technology, The Netherlands. He is currently a Postdoctoral Fellow investigating the growth and potential applications of silica nanowires at the Department of Electronic Materials Engineering, ANU College of Physical Sciences.

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