Western Institute for Nanomaterials Science

RESEARCH TALK

Nanoscience and Nanotechnology Research at the Australian National University

by
Prof. Jim Williams
Director, Research School of Physical Sciences and Engineering,
Australian National University, Canberra

THURSDAY SEPTEMBER 2, 2004, AT 2:00 PM
IN ROOM 123 (PHYSICS & ASTRONOMY BUILDING)

The Research School of Physical Sciences and Engineering at ANU has a major research effort in the area of nanoscience and nanotechnology that covers a diverse spectrum of fundamental studies and applications. There are around 40-50 research staff and a similar number of students working on micro- and nano-science projects within the School. This presentation will provide an overview of those activities and some of the most exciting recent results.

Firstly, work on the growth of complex self-assembled inorganic materials (particularly involving structures of carbonate-silica complexes) has uncovered some intriguing structures that mimic purported microfossils. Our results question an existing supposition that such complex structures can only arise from biomineralisation processes in living creatures: we can grow them in the lab by totally synthetic means. Other examples of material synthesis that are more applicable to technological applications are: i) use of a novel femtosecond laser ablation apparatus to produce a range of thin films with unusual properties such as carbon foam, ii) production of carbon and boron nitride nanotubes by an entirely solid state growth process, and iii) the use of ion implantation to produce nanoparticles and nanocavities with attractive properties. The School also has a decidedly photonics emphasis in much of its materials research: examples include the development of polymer films for a range of waveguide, splitter and switching applications, and the growth and processing of quantum dot laser devices that can be tuned to emit light at a precise wavelength. Further research in nanotechnology covers diverse areas such as quantum computing and the use of nanoparticles in medical diagnosis. Finally, we have a program of nanoindentation into semiconductors that has revealed a range of intriguing phase transformations that occur in extremely small volumes under the indenter as it is pressed into the surface of the material.

COFFEE AND DONUTS AVAILABLE AT 1:45 PM