



The MacDiarmid Institute
for Advanced Materials and Nanotechnology

A New Zealand Centre of Research Excellence

Victoria University of Wellington – University of Canterbury
Industrial Research Ltd. – Institute of Geological & Nuclear Sciences – University of Auckland – Massey University – University of Otago

SEMINAR ANNOUNCEMENT

12.15pm Friday 27th September 2002

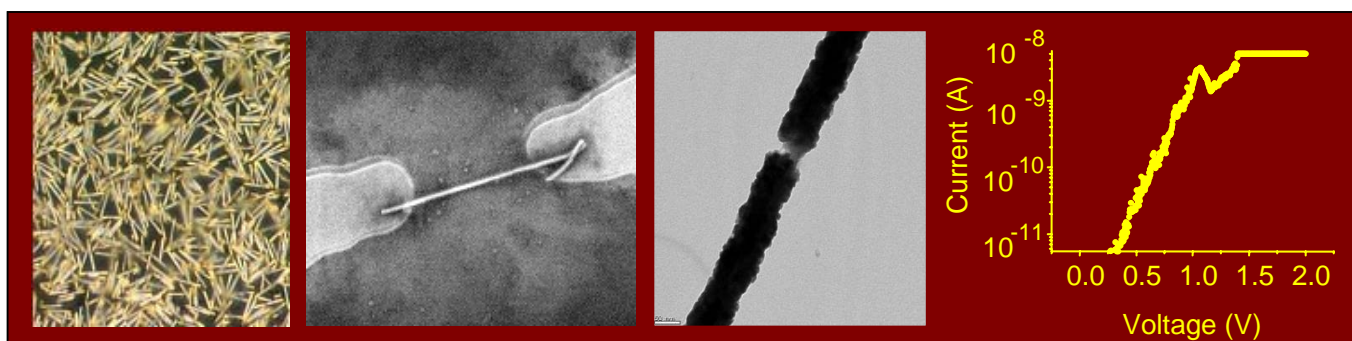
Videoconference Link Rooms:

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| Victoria University of Wellington | Murphy Lecture Theatre 101 |
| University of Canterbury | ECE Building, Level 3 Lecture Theatre |
| University of Otago | Information Services Building, Conference Room 1 (entrance West Lane off Albany Street, opposite National Bank) |

“NANO ELECTRONIC BUILDING BLOCKS: METALLIC SEMICONDUCTING, AND MOLECULAR ELECTRONIC NANOWIRES”

Associate Professor Theresa S. Mayer
Department of Electrical Engineering
Pennsylvania State University, USA

Nanoscale and molecular electronics promise to deliver ultra high-density memory and logic circuits that can be realized with dimensions well below the scaling limits of conventional microfabrication techniques. To realize this promise, considerable attention has been devoted to developing molecular-level devices that function as nonlinear circuit elements and nanowires that interconnect these circuit elements. In this talk, we will provide a review of our recent research activities related to the fabrication and characterization of nanoscale components including metal, metal-semiconductor-metal, and metal-molecule-metal nanowires, and the development of techniques that can be used to assemble these components into two-dimensional networks. In particular, we are using membrane replication methods to make high aspect ratio, segmented metal nanowires consisting of alternating layers of metals such as Au, Pt, Ag, and Pd. Electrical and optical functionalities are added to the nanowires by incorporating semiconductor layers such as CdSe and Silicon and molecules such as alkanethiols and nitroaromatics during nanowire synthesis. Using a combination of field- and chemical-assisted assembly techniques, we have aligned and attached 35 – 200 nm diameter nanowires with good uniformity and reproducibility onto templated SiO₂ substrates. This has allowed us to characterize electrically simple segmented metal nanowires as well as more complex nanowires containing semiconductor and molecular components at the interface between the metal layers.



Figures show (left to right) metal nanowire suspension, aligned metal nanowire, metal-SAM-metal nanowire, I-V characteristics of Au-mono-nitrobenzenethiol-Au nanowire