## **Martin Moskovits** Brief Biography

Martin Moskovits, Dean of Science and Professor of Physical Chemistry at UC Santa Barbara, was educated at the University of Toronto (BS Physics and Chemistry, 1965, Ph.D. Chemical Physics, 1971). After receiving his B.S. he co-founded OHM Distributors and Manufacturers Ltd. an electronics manufacturing company which was sold in 1968. He worked at Alcan Research and Development (later re-named Alcan International) in Kingston during 1970-71 and returned to the University of Toronto attaining the rank of Professor of Chemistry in 1982. From 1993-1999 he was Chair of the Department of Chemistry. He is a Fellow of the Canadian Institute for Advanced Research and founding Director of its Nanoelectronics Program.

Professor Moskovits has authored or co-authored ca 220 technical papers, edited or co-edited 3 books and holds 10 patents. Over 60 graduate students and postdocs completed their studies under his supervision. These individuals are currently employed in industry, government and academia. Additionally, he hosted several international scientists as sabbatical guest in his laboratory. He has received over 240 invitations to speak at international conferences and meetings. Professor Moskovits' research interests have included matrix isolation, surface science, surface spectroscopy, surface-enhanced Raman scattering, metal and semiconductor clusters, template-fabricated nanostructures and nanotubes. He is best known for his work in surface-enhanced Raman spectroscopy to which he provided the correct interpretation of the effect leading to a number of predictions, later confirmed. His current interests include nanosensors, nanoscience and technology and novel scanning microscopies.

Professor Moskovits is a Fellow of the Royal Society of Canada, winner of the 1993 Gerhard Herzberg Award of the Spectroscopy Society of Canada, the 1993 Royal Society of Chemistry (London) award in Surface and Colloid Science, Killam Fellow (1989-91), Guggenheim Fellow, Department of Chemistry, UC, Berkeley, 1986-87, the 1995 400th Anniversary Johannes Marcus Marci Medal of the Czech Spectroscopy Society, 1999 winner of the CSC EWR Steacie Award, Fellow of Massey College, member of the editorial board of the Journal of Chemical Physics, member of the Advisory Board of the NRC's Steacie Institute for Molecular Sciences, member of the Research Corporation's Award Program Advisory Committee and member of the Santa Barbara Technology Group board of advisors, member of the Board of Sansum Medical Research Institute, and vice Chair of the US Department of Energy Basic Energy Sciences Advisory Committee.

### **Public Lecture: NanoScience and Technology; what is bonus; what is bogus**

(*October 13, 2004 7:30 pm Western Science Center G55*)

Nanoscience and technology is an interdisciplinary set of techniques, approaches, synthetic methods, fabrication methods and modes of thought that attempt to exploit the fact that materials and devices assembled with constituent structures at the nanometer (billionth of a meter) size scale show remarkable physical and chemical properties that are tunable by varying their size. The field, born in relative obscurity a decade ago, exploded into public view in the past five years or so, as a powerful incubating paradigm for creating potentially revolutionary applications in communications, computing and medicine. Additionally, highly ambitious and controversial goals for nanoscience such as creating self-replicating nano-robots capable of transforming garbage dumps into useful substances have been proposed. Given great public visibility through books such as Michael Crichton's "Prey" these proposals have raised public concern. What is the promise of nanotechnology as seen from today's perspective; and to what extent are the fearful aspects of Nanoscience and Technology real? This is what the lecture will try to address.

### **Technical lecture: Nanowire-based field-effect transistors as chemical and biological sensors**

( *October 15, 2004 3:30 pm 3M Center Rm 3025*)

Porous anodic aluminum oxide (PAO) has been known for half a century or more. Its use as a template in which to grow metal or semiconductor nanowires and other nanostructures, magnetic materials and catalysts goes back to the 1970s. Due largely to the work of Masuda, rapid techniques are now available to produce highly-ordered PAO and with it, large, highly-ordered arrays of nanostructures. Because the diameter and lengths of the pores in PAO can be manipulated over a significant size range this technique offers a powerful strategy for fabricating nanowires of variable dimensions that can be used to construct either single-nanowire, or more uniquely, nanowire-array-based devices. Semiconductor nanowires and nanotubes have shown remarkable electronic and optoelectronic properties when configured either as simple current/voltage impedance elements or as field-effect transistors. Their very high surface to volume ratio makes them ideal sensors in situations where the gaseous species adsorbing on their surface donate or extract charge, in turn affecting the nanowire's conductivity. By reversing the process, nanowires configured as FETs potentially allow the surface chemistry, and hence the catalytic properties of the nanowire, to be tuned using the gate voltage as a kind of chemical-potential-setting parameter. An exciting goal is to use functionalized single-nanowire FETs or devices based on nanowire arrays as systems on whose surface not only the rate and extent of a catalytic reaction but also its selectivity can be varied entirely by varying the voltages applied to the device's terminals.