

Laying a Foundation for Molecular Devices

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Biosciences 587, University of Calgary (reception to follow)
plus interactive video linked locations

PE256, University of Lethbridge

Telus Centre Tiered Classroom, University of Alberta

Abstract

While many ideas for molecule-scale devices have been put forward in the past, the tools -- both synthetic and analytical -- to pursue those ideas did not exist. Nanoscale ideas were a fiction because so many of the parts of the scientific picture were missing. A detailed understanding, for example, of adsorbate-surface structures was entirely lacking when the first wave of enthusiasm for molecular devices crested roughly 20 years ago. These structures are essential if we are to create a foundation for molecular devices. Now, the control necessary to begin exploring ways to incorporate organic function into existing technologies or, eventually, to make new molecule-scale devices is within reach. Our understanding of and control over molecular adsorption on silicon has advanced very significantly in the last several years. It is now possible to provide a microscopic picture of molecule-silicon surface systems. In the next several years it is feasible to expect structures and concepts, dreamed about for decades, to begin to be realized. This talk will describe the research program used to realize some of these goals at the National Institute for Nanotechnology and the University of Alberta, and some of the emerging potential for collaboration in areas of advanced computing.

Biography

Dr Robert Wolkow is an iCORE Chair of Nanoscale Information and Communication Technologies at the University of Alberta and the National Institute for Nanotechnology (NINT) of the National Research Centre, headquartered in Edmonton. He moved to Alberta from Ottawa, where he was leader of the Molecular Interfaces Program of the Steacie Institute for Molecular Sciences. He first joined the Steacie Institute in 1994 as a senior research officer, and produced four key research results in the first two years, relating to first-time ever views of the dynamics of molecules on surfaces. These are key to understanding and fabricating nanoscale devices. More recently, he achieved a breakthrough in the understanding of the early stages of molecule-surface interactions, which was published in the journal, "Science". Another significant development was reported recently in the journal, "Nature", which has helped make the tools of the surface physicist relevant and accessible to chemists. He has received awards for outstanding achievement from almost every institution where he has worked, including the T.J. Watson IBM Outstanding Achievement Award, Steacie Institute for Molecular Sciences Outstanding Achievement Award, National Research Council of Canada Outstanding Achievement Award, Royal Society of Canada Rutherford Memorial Medal, and the Noranda Award of the Canadian Society for Chemistry. He became a fellow of the Academy of Science of the Royal Society of Canada in 2000. Beyond his own work, Wolkow is committed to the development of future researchers through support for students at all levels, including public awareness and science education outreach activities.