Title: Inhibiting Corrosion of Functional Nanostructured Materials

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Abstract
A significant, global scale effort is put into preventing the corrosion of materials. The inhibition of corrosion is central to many industries, such as transportation, housing, and the preservation of infrastructure that support these industries. We are investigating the preservation of materials and structures on a much smaller scale. The high surface area and small dimensions of nanostructures are essential to a range of important properties, but also put these materials at risk for corrosive attack. Commercially available technologies incorporating nanostructures include device packaging to protect these materials against potentially corrosive environments. The type of device architectures in which nanostructured materials are currently incorporated into is, however, limited by traditional device packaging strategies. We are developing technologies to protect relatively fragile nanoscale materials from corrosion without compromising their ability to be incorporated as a key functional component in flexible electronic and electromechanical devices. One approach we are pursuing uses surface initiated radical polymerization to coat high aspect ratio semiconducting nanowires with a thin, uniform layer of polymer that resists chemical attack of the core material. A second approach that will be discussed is our development of techniques to understand the regularity (or the irregularity) of protecting the surfaces of semiconductors with self-assembled monolayers. We seek to understand and control the regularity of these surface modification techniques on a scale appropriate for preserving nanostructured materials. This talk will cover our recent progress in developing protective coatings based on polymers and self-assembled monolayers, and the ability of these films to resist the corrosion of nanoscale materials. Lessons learned from these studies are applicable to other nanostructured materials, as well as to materials of larger dimensions.

Biography
A Tier II Canada Research Chair in Surface Chemistry at Simon Fraser University, Byron Gates has built a research program to investigate the synthesis, self-assembly and fabrication of nanostructures with a particular focus on the surface chemistry of these materials. He has previously worked on developing new routes to structured materials (e.g., photonic bandgap materials) and pushing the limits of soft lithography. His current research interests include the development new approaches to biosensing, drug delivery and bioimaging, biomimetic materials, structured catalytic materials, and self-assembled nanostructured materials. To achieve these goals, he is developing new strategies to make designer nanostructures and techniques to investigate their surface chemistry. Byron received his B.Sc. from Western Washington University, and his M.Sc. and Ph.D. from the University of Washington in Seattle, Washington while working with Professor Younan Xia. He was a postdoctoral fellow at Harvard University with Professor George M. Whitesides, before joining the faculty at Simon Fraser University where he is an Associate Professor of Chemistry and Director of Nanofabrication Facilities at 4D LABS.