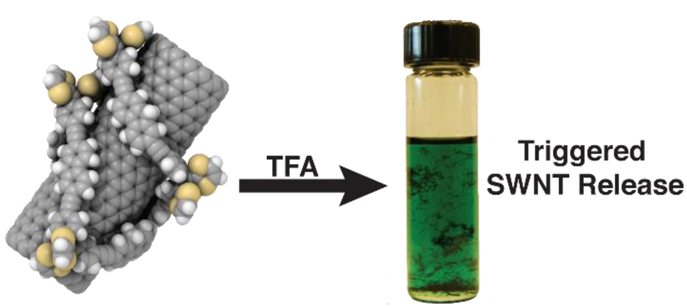
Chemical & Physical Sciences
UNIVERSITY OF TORONTO
MISSISSAUGA

COLLOQUIUM
Tuesday, 27 January 2015
11:00 am - 12:00 NOON
KN132

Dr. Alex Adronov

McMaster University
Department of Chemistry and Chemical Biology

π-Conjugated Polymers and their Interactions with Carbon Nanotubes



Single-Walled Carbon Nanotubes (SWNTs) exhibit a number of unique mechanical, thermal, and electronic properties that render them useful for numerous applications, ranging from molecular electronics to nano-scale construction materials. Although these numerous potential applications can have a significant impact on future technologies, the commercial exploitation of SWNTs has, thus far, been extremely limited. The highly insoluble nature of these materials is one of the major limitations to their applications, as they cannot be manipulated in solution at practical concentrations using any known solvents. In addition, the presence of both metallic and semiconducting SWNTs within all commercially available samples poses a major challenge in electronic applications. Supramolecular functionalization of SWNTs provides a versatile method to address many of these limitations. Specifically, the π-stacking interactions between conjugated polymers and SWNTs has been proven effective not only in dispersing individual nanotubes in a variety of solvents, but also in selectively interacting with semiconducting SWNTs. However, the selectivity of this polymer-SWNT interaction is still poorly understood, and requires improvement. Thus, investigation of new polymer structures that exhibit selective interactions with different nanotube types and diameters is warranted. We have devoted significant effort toward developing an understanding of the subtle impact that polymer structure has on nanotube selectivity, and have designed new polymers that can bind and release SWNTs upon application of a stimulus. Additionally, we are interested in designing conjugated polymers that bind SWNTs and enable their dispersion within bulk host materials.We aim to understand the architectural parameters necessary to produce electrically conductive SWNT-containing elastomers that exhibit reversible conductivity changes upon deformation. Such conductive elastomers can behave as stretch sensors, and can be utilized the production of artificial skin-like coatings.