University of Victoria
Centre for Advanced Materials & Related Technology

CAMTEC SEMINAR

TITLE: ***The Role of Pyridine Derivatives in the Formation of Anisotropic Gold Nanoparticles***

SPEAKER: **Prof. Ian Burgess**
Department of Chemistry, University of Saskatchewan

DATE: Friday, Aug 4, 2017

TIME: 10:30 am

LOCATION: Elliott Building, Room 226

Abstract:

It is appealing to develop and understand new approaches to generate anisotropic metal nanoparticles (NPs) owing to their application in optical based sensing platforms. Empirically, the formation of anisotropic NPs is typically back-rationalized by speculating that shape-directing ions or molecules preferentially adsorb on different crystallographic facets of the growing particle. An alternative strategy is described herein whereby electrochemical measurements of pyridine derivative adsorption on different low index single crystal surfaces conclusively demonstrate preferentially adsorption on Au{100} surfaces. This serves as a starting basis for developing rational approaches to generate homogeneous and heterogeneous anisotropic NPs through chemical and electrochemical reduction of AuIII precursors. The pyridine derivatives are shown to play a critical role in the formation of Au nanopods and nanodaggers. Electrochemical evidence is provided of a two-step reduction of tetrachloroaurate involving a pyridine-stabilized AuI species which plays a key role in producing anisotropic structures. Both electrodeposited and suspended NPs have surface plasmon resonances that extend well into the near IR ($\lambda max \approx 1000\text{-}1350$ nm). Near-IR Raman sensing applications are demonstrated using FT-Raman with 1064 nm excitation. Electrodeposited nanodaggers provide SERS enhancement factors greater than 106 for monolayers of 4-aminothiophenol (4-ATP).

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