MECHANICAL AND AEROSPACE ENGINEERING
COLLOQUIUM SERIES

"Flow-through Microporous Media and Nanohole Arrays: Energy and Biomedical Applications"

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Friday, September 04, 2009
1:30PM
205 Thurston Hall
Refreshments: 2:30pm, 206 Thurston Hall

ABSTRACT

Microfluidic and nanofluidic transport phenomena may be exploited for a range of applications. This talk will focus on one energy and one biomedical application that exploit flow-through transport for advanced functionality. Microfluidic fuel cells exploit laminar flow to facilitate separation of fuel and oxidant in the absence of a physical membrane. Although microfluidic fuel cells have shown promise, performance has been limited due to transport and diffusive mixing of reactants. A flow-through microporous electrode architecture described here enables class-leading power density and fuel utilization, as well as opportunities for scale-up. Nanostructures can exhibit both nanofluidic and nanophotonic phenomena via confinement at this scale. In the case of nanohole arrays, the role of surface plasmons on resonant transmission motivates their application as surface-based biosensors. Research to date, however, has focused on dead-ended holes, and therefore failed to harness the benefits of nanoconfined transport combined with plasmonic sensing. A flow-through nanohole array format presented here enables rapid transport of reactants to the sensing surface and potential for improved biomarker yield through sieving.

BIO

David Sinton is a Canada Research Chair in the area of microfluidics and nanofluidics and an Associate Professor in the Department of Mechanical Engineering at the University of Victoria. He received a B.A.Sc. from the University of Toronto, M.Eng. from McGill University and Ph.D. from University of Toronto. Further information regarding his background and research is available at: http://www.microfluidics.uvic.ca/sinton.html. For the year ahead (Sept 2009 - Aug 2010) he is on sabbatical leave at Cornell.