



Physics Colloquium

Friday February 12th, 2010

4:10 – 5:00 pm, 108 EPS

Chemistry in Unusual Places
Nonlinear Optical Studies of Liquid Interfaces

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Abstract:

Molecular organization at buried liquid interfaces arises from a multitude of asymmetric, competing forces. Macroscopically, these forces lead to observable quantities such as contact angles (solid/liquid) and interfacial tensions (liquid/liquid). Microscopically, developing a consistent, experimentally validated picture of how molecules arrange themselves at interfaces is challenging due to a limited number of applicable methods. Our group uses second order nonlinear optical (NLO) spectroscopy to study the structure, organization and reactivity of molecules at condensed phase interfaces. In particular, our studies employ resonance enhanced second harmonic generation (SHG) and vibrational sum frequency spectroscopy (VSFS) to examine how inter- and intra-phase forces between a surface and a solvent affect interfacial solvation and interfacial solvent structure. Data show that properties across weakly associating interfaces converge monotonically from those of one phase to those of the other. In contrast, strongly associating interfaces can create local environments having properties that do not reflect those of either adjacent phase, and the properties of this interfacial region depend sensitively on solvent structure. These findings have important consequences for evolving models of mass transfer across interfaces as well as surface reactivity and biological self assembly.

Host:

Jiong Qiu