

第296回触媒化学研究センターコロキウム

共催 北海道大学グローバルCOEプログラム「触媒が先導する物質科学イノベーション」・電気化学会北海道支部・日本分析化学会北海道支部

Unusual Adsorption and Solvation Behavior at Silica/Liquid Interface

Professor Rob Walker (Department of Chemistry and Biochemistry, Montana State University)



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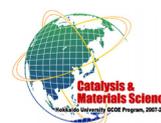
Seminar Room B/C, Sousei Hall, Hokkaido University

(創成科学研究棟4階セミナー室B・C)

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Understanding solution-phase surface chemistry can be simplified to answering two simple questions: 1) do molecules adsorb to liquid surfaces? and 2) If so, what sort of environment do they sample? While these questions may be simple to formulate, answers require detailed knowledge about the subtle, many-body interactions that occur between a solute and substrate, solvent and substrate, and solute and solvent. We have used both linear and nonlinear optical methods to explore the mechanisms of solute adsorption to silica/liquid interfaces and the effects that surfaces have on solute electronic structure and photophysical properties. Results show that weaker solute-substrate interactions as defined by smaller adsorption energies leave the solute more sensitive to surface induced changes in interfacial solvent structure. Specifically, solutes having smaller free energies of adsorption are more sensitive to variations in interfacial polarity than those solutes that associate strongly with the silica surface. A surprising result from these studies is that polar solvents such as methanol and acetonitrile can form local environments that are much lower effective dielectric constants than one would predict based on weighted contributions from the surface and the bulk solvent. These results can be understood in terms of long range order imposed on the interfacial solvent by the silica surface. This seminar will focus on identifying the inter-phase forces that control adsorption and solvation at silica/liquid interfaces, with an emphasis on how these forces affect common phenomena observed in chromatography and thin film formation.

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296th Catalysis Research Center (CRC) Colloquium

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