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Chemical Film Formation at Liquid-Solid and Liquid-Vapor Interfaces: Correlating Film Organization with Molecular Structure

Molecular adsorption to solid/liquid interfaces plays an important role in processes as diverse as waste control in rivers and streams to efficient pharmaceuticals separation. Our recent studies have explored the effects of solute structure and solvent identity on adsorption of related solutes to silica/liquid interfaces. Steady state fluorescence measurements report intensities of coumarin solutes adsorbed to silica slides from solutions having concentrations < 30uM. The specific systems we have examined thus far include silica/methanol, silica/chloroform and silica/hexane and coumarin solutes having different types of hydrogen bonding abilities. Of particular interest are the roles played by hydrogen bond donating and accepting properties as well as steric considerations. Our results show that polarity, not hydrogen bonding accepting capabilities of the solvent allow the solutes to organize themselves on the silica surface. These results come from fluorescence measurements taken at the silica vapor interface and we are currently constructing a total internal reflection fluorimetry spectroscopy chamber to verify these results in situ. With these data we plan to examine how the original solid/vapor work correlates with in situ solid/liquid interfaces.