

Physical Chemistry Seminar



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Development of a General Interaction Potential for Hydrophobic and Hydrophilic Interactions with Applications to Wetting and Contact Angles

We have carried out surface force measurements between surfactant-bilayer coated surfaces whose hydrophobicity could be reversibly modulated by light activation, and have obtained a possibly universal interaction potential for the attractive interaction between surfaces whose hydrophobicity varies from $f=0$ (fully hydrophobic surfaces, interfacial energy ~ 50 mJ/m²) to $f=1$ (no hydrophobic interaction). A picture is emerging that suggests that both hydrophobic and hydrophilic interactions can be described by the same equation, that is, for $f>1$ the equation also appears to quantitatively describe the additional repulsive 'hydration' force between naturally hydrophilic surfaces or surfaces rendered hydrophilic by the adsorption of hydrated ions. A universal exponential decay length of ~ 1.0 nm is proposed for both interactions. The equation also relates the orientations of surfactant molecules in adsorbed monolayers to their interfacial energy and, in turn, to water contact angles, and especially the molecular (reorientation) processes and dynamics associated with contact angle hysteresis effects.

Monday, March 11, 2013

4:00 P.M.

2033 Young Hall