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Direct probes of molecular interactions at buried interfaces[1]

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The molecular interactions at buried interfaces play an important role in adhesion, friction, and wetting. In my talk, I will discuss the use of interface-sensitive sum frequency generation (SFG) spectroscopy to study acid-base interactions at solid-liquid and solid-solid interfaces. The shift of the sapphire hydroxyl peak in contact with several polar and non-polar liquids and polymers can be used to determine the interaction energy. The magnitude of the interaction energies cannot be predicted based on measuring water contact angles. Molecular rearrangements at the sapphire interface, to maximize the interaction of the acid-base groups, play a dominant role and these effects are not accounted for in the current theoretical models. The importance of these interactions in controlling segregation of polymer blends and friction and adhesion of soft substrates will be discussed.

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