

Characterizing Water Adsorption on Self-Assembled Monolayers

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Abstract: Self-assembled monolayers (SAMs) have numerous applications in fields such as nanotechnology and the materials sciences. SAMs are used to alter surface properties for drug delivery devices, molecular recognition, gas adsorption, and wetting experiments. Research in our group is focused on characterizing gas adsorption on SAMs using infrared spectroscopy. SAMs were grown on gold-coated slides by immersing the slides in solutions of various thiols. Humidified nitrogen gas was delivered to SAMs with different terminal groups. Polarization modulation infrared reflection-absorption spectroscopy (PM-IRRAS) was used to characterize the structural order and molecular packing of the SAM and to monitor for a hydration layer. Optical tensiometry was used to observe water contact angles as a measure of the wettability of the SAMs. In the presence of the humidified nitrogen, a hydration layer is observed on the hydrophilic SAMs but not on the hydrophobic SAMs. Future work is to characterize gas adsorption on mixed SAMs, which consist of more than one terminal group.