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Characterizing the Effect of Surface Hydrophobicity on the Depletion Layer ERIN BROWN, SHANNON PETERSEN, JESSICA JEROSKI, ARIEL STATMAN, ADELE POYNOR, Allegheny College — When water is forced into contact with an extended hydrophobic surface, a uniform region of reduced density forms along the interface. We seek to identify both a qualitative and a quantitative relationship between the hydrophobicity of a surface and the characteristics of the corresponding depletion layer, specifically its thickness and density. We determine these qualities using surface plasmon resonance spectroscopy (SPR). We produce surfaces of different hydrophobicities through the formation of self-assembled monolayers of organothiols on gold-plated slides. Self-assembled monolayers (SAMs) of 1-octadecanethiol are used to produce surfaces with high hydrophobicity, as the terminal methyl group is highly nonpolar, while 11-mercapto-1-undecanol is used to produce surfaces with minimal hydrophobicity, as the terminal hydroxyl group is hydrophilic. Surfaces of intermediate hydrophobicity are fabricated using mixed SAMs of 1-octadecanethiol and 11-mercapto-1-undecanol. We measure surface hydrophobicity for the resulting SAM-coated slides by their contact angle with water droplets. In order to ensure an unchanging hydrophobicity throughout SPR trials, we analyze the stability of the surfaces to through repeated testing of contact angle variability over time and after extended submersion both in water and in ethanol.

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