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Profile of the Interface between a Hydrophobic Surface and Water URSULA PEREZ-SALAS, Argonne National Laboratory, JOHAN STALGREN, Stanford Linear Accelerator Center, CHARLES MAJKRZAK, FRANK HEINRICH, NIST Center for Neutron Research, MICHAEL TONEY, Stanford Linear Accelerator Center, DAVID VANDERAH, NIST — Aqueous interfaces are ubiquitous and play a fundamental role in biology, chemistry, and geology. The structure of water near interfaces is of the utmost importance, including chemical reactivity and macromolecular function. Theoretical work by Chandler et al. on polar-apolar interfaces predicts that a water depletion layer exists between a hydrophobic surface and bulk water for hydrophobes larger than  $\sim 20$  nm2 (a  $\sim 4$  A in radius apolar molecule). Until now, what the interface really looks like remains in dispute since recent experiments give conflicting results: from complete wetting (no water depletion layer) to a water depletion layer. Those experiments that have found a water depletion layer report 40-70% water in the depletion zone: 40 -70% and a width of  $\sim$ 3A. However, an alternative interpretation to the profiles exists where no depletion layer is required. By studying hydrophobic SAM surfaces against several water mixtures we obtained the hydrophobic/water profile by phase sensitive neutron reflectivity. With this model independent technique we observe a 2 times wider and drier depletion water layer: 6A thick and 0-25% water. Given the level of disagreement, I will review the topic of immiscible interfaces and show how phase sensitive reflectometry is unique in obtaining nm resolution profiles without fitting bias.

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