Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

How water meets a very hydrophobic surface SUDESHNA CHATTOPADHYAY, AHMET UYSAL, BENJAMIN STRIPE, YOUNG-GEUN HA, TOBIN MARKS, PULAK DUTTA, Northwestern Univ., EVGENIA KARAPETROVA, Argonne National Lab. — Recent X-ray and neutron scattering experiments [1] have provided evidence both for and against the existence of low-density regions between water and hydrophobic surfaces. We have studied the interface between water and fluoroalkylsilane self-assembled monolayers using synchrotron X-ray reflectivity. These surfaces are significantly more hydrophobic than methyl-terminated monolayers. We find that the width of the depleted region increases with aqueous contact angle and becomes larger than the experimental resolution. When the advancing contact angle is 120°, the effective depletion layer thickness is ∼5Å. We interpret the apparent contradictions in previous studies as scatter in measurements of sub-resolution effects. The water-gap interface is expected to undergo large fluctuations [2]; our data place an upper limit of 3.5Å on the RMS width caused by fluctuations.
[Supported by NSF grant no. DMR-0705137]

[1] e.g., A. Poynor et al., *PRL* **97**, 266101, 2006; M. Mezger et al., *PNAS* **103**, 18401, 2006; M. Maccarini et al., *Langmuir* **23**, 598, 2007
[2] e.g. X. Zhang et al., *Science* **295**, 663 (2002); D. Chandler, *Nature* 445, 831 (2007)

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Date submitted: 24 Nov 2009 Electronic form version 1.4