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How Water Meets a Hydrophobic Surface ADELÉ POYNOR, WINA TJEN, STEVE GRANICK, University of Illinois Urbana-Champaign, PAUL FENTER, Argonne National Laboratory, ZHAN ZHANG, Argonne National Laboratory — The details of how water meets a hydrophobic surface are still hotly debated. Here we use two independent methods, ellipsometry in the time-resolved phase-modulated mode, and x-ray reflectivity, to investigate the view that thermodynamics causes a nanometer-sized low-density layer to form adjacent to the hydrophobic solid. Strong evidence in favor of the hypothesis is found. This "vapor" layer shows large fluctuations even with the spatial (over a beam size of 10 μm) and temporal (with a time constant of 30 ms) averaging inherent in the ellipsometry measurement. The very presence of the vapor layer shows hitherto-unsuspected dependence not only on pH of the water phase but also on chemical makeup and quality of the organic hydrophobic surface itself.

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