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Wetting Transition of Water SERAH FRIEDMAN, MATT KHALIL, PETER TABOREK, University of California, Irvine — Pure liquid water does not wet most solid surfaces. Liquid water on these surfaces beads up and forms droplets with a finite contact angle. General thermodynamic principles suggest that as the temperature approaches the critical point, the contact angle should go to zero, marking the wetting transition. We have made an optical cell which can operate near the critical point of water (Tc=373C, Pc=217 atm) to study this phenomenon on sapphire, graphite and silicon. We have used two methods to measure the wetting temperature of water on these surfaces. Firstly, we studied a single droplet on a horizontal surface and optically measured the change in contact angle as a function of increasing temperature. Second, we studied the condensation of droplets on a vertical plate as a function of temperature. As the temperature approached the wetting temperature in both cases, the droplets spread and eventually form a smooth film along the surface of the plate. The wetting temperature on sapphire is near 240C and is considerably higher on graphite. Our observed values of Tw are significantly higher than the predictions made by the sharp-kink approximation and recent molecular dynamics simulations.

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