Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Nucleation, condensation, wetting and dewetting of water on a silver surface SUSAN DOUNCE, SHIH-HUI JEN, University of Pennsylvania, MINCHUL YANG, Naval Research Laboratory, HAI-LUNG DAI, University of Pennsylvania — Water adsorption and nucleation on a single crystal silver surface has been characterized over the temperature range of 100 - 170 K. At temperatures greater than 165.5 K, Second Harmonic Generation studies show that water can not be condensed on the Ag surface even though the condensation rate is faster than the desorption rate. At this temperature classical nucleation theory predicts a very large critical nucleus size such that stable nuclei cannot form under normal laboratory deposition conditions. In the temperature range of 133.5 - 165.5 K SHG during isothermal adsorption-desorption and temperature programmed desorption experiments show that water desorbs from three-dimensional structures on the surface with a desorption energy of 48 kJ/mol. In contrast, at temperatures less than 133.5 K, water desorbs from a 2-D structure with an activation energy of 25 kJ/mol. In this lowest temperature range water wets the silver surface. This wetting-dewetting transition can be understood in terms of classical nucleation theory where below 133.5 K the critical nucleus height is less than one monolayer.

Susan Dounce
University of Pennsylvania

Date submitted: 23 Nov 2004 Electronic form version 1.4