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Surface-induced solid-liquid phase transitions in ultra-thin water films at T > 0 °C ANIMESH CHAKRABORTY, ANDREW GELLMAN, LAYTON BAKER, ESTEBAHN BROITMAN, carnegie Mellon University — We report here the measurements of both the adsorption isotherms and the dissipation in ultra-thin films of water adsorbed on the surfaces of SiO2 . The measurements were made in a small high vacuum chamber in which we have mounted a QCM. The chamber was evacuated to ∼10-8 Torr and then filled with water vapor at pressures ranging from 10-3 – 40 Torr (the vapor pressure of water at room temperature is ∼22 Torr). In addition the temperature of the apparatus can be varied in the range 10 – 60°C. This is sufficient to measure the adsorption isotherm and to probe the phase of adsorbed water films over the range of conditions. Recently published work studying the adsorption of water on the SiO2 layer formed on Si single crystals has suggested that the phase of the water at temperatures well above 0°C is actually that of a solid, ice-like structure rather than liquid water [1]. That work is based on the comparison of the vibrational spectrum of thin water films with those of liquid water and ice. In our study we are using the QCM to investigate the possibility of formation of Ice-like structures on SiO2.
[1] Asay, D. B. and Kim, S.H., Evolution of the Adsorbed Water Layer Structure on Silicon Oxide at Room Temperature. J. Phys. Chem. B. 2005, 109, 16760-16763

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