

Peeling the Astronomical Onion

Supplementary Information

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Experiments regarding re-adsorption of H₂O after the initial exposure of H₂O are explained here as conducted at HWU where 0.5 ML H₂O films were investigated on aSiO₂. The re-adsorption experiments involved reflection-absorption infrared spectroscopy (RAIRS) and temperature programmed desorption with the results shown in Fig. 1.

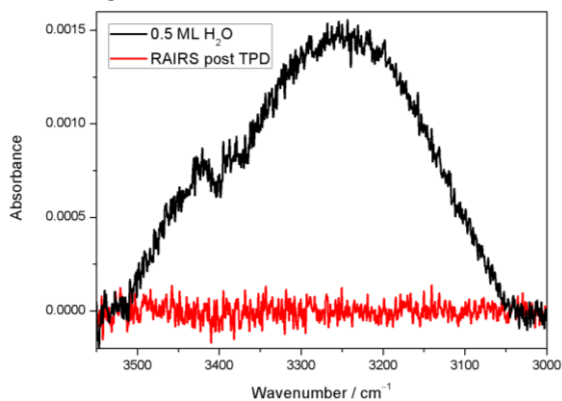


Figure 1: What is shown here is 0.5 ML H₂O on aSiO₂ at 17 K (black trace) which is later desorbed leading to the red trace showing no signs of re-adsorbed H₂O. Figure also found in reference [1].

A 0.5 ML H₂O film was deposited onto the aSiO₂ surface at 17 K followed by the collection of a RAIR spectrum as shown with the black trace in Fig. 1. The film was then desorbed with a heating rate of 0.04 K s⁻¹ and the surface was held at >170 K until a partial pressure of 2×10^{-10} mbar of H₂O was monitored with the mass spectrometer (this is the same partial pressure range the de-wetting experiments were conducted at). The sample was allowed to cool to the base temperature of 17 K over the timescale of a typical experiment and a secondary RAIR spectrum was collected as shown with the red trace in Fig. 1. As can be seen, the red trace shows negligible amounts of H₂O indicating that re-adsorption does not occur once the initial low coverage H₂O film has been deposited onto the surface.

References:

- 1 A. Rosu-Finsen, Ph.D. Thesis, Heriot-Watt University, 2016.

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Electronic Supplementary Information (ESI) available: [details of any supplementary information available should be included here]. See DOI: 10.1039/x0xx00000x