X-Ray Diffraction Of H_2S Monolayers On MgO Substrate

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H_2S is one of the environmental pollutants emitted during the burning of sulfur containing fossil fuel. A combination of thermodynamic and x-ray techniques was used to investigate the interaction of H_2S with MgO (100) surfaces. Isotherm measurements indicate that at least 2 or 3 layers of H_2S form on MgO between 150 and 175K (**Figure 1**). To obtain structural information, x-ray scans were taken at X7B *in situ* during the deposition of H_2S monolayers. The difference spectra (between clean and H_2S covered substrate) show a sharp asymmetric peak at Q=2.11Å^{-1}, a position that is consistent with the formation of a 2D solid phase that is commensurate a with the MgO substrate (1x1), and a broad peak at about Q= 1.8 Å^{-1}, which we suspect to be the result of the dissociation of the molecule. The signal due to this disordered phase shows a striking resemblance to the liquid sulfur S(q) (**Figure2**).

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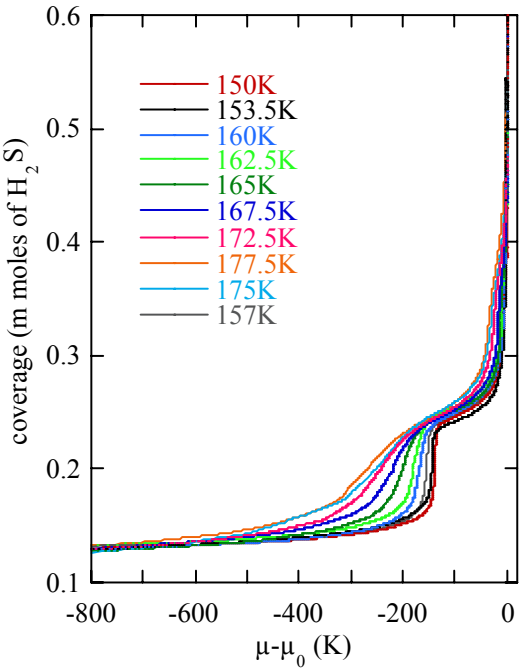

Figure1: Adsorption isotherms of H_2S on MgO (100) as function of temperature

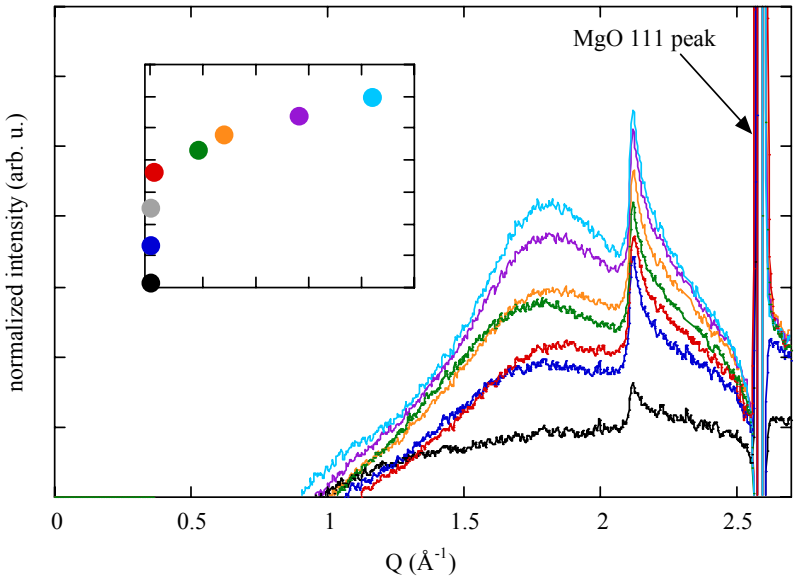

Figure 2. X-ray difference spectra at 170K. The inset shows the coverage of H_2S at which the spectra were taken. The difference spectra and points in coverage are colored correspondingly.