Fano profiles at the onset of the x-ray absorption spectra of SiO_2.

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We analysed the x-ray absorption spectra at the Si2p edge of a 50nm thermal grown SiO_2 on a Si(111) substrate. At the onset of the spectra we found a characteristic Fano profile.

The Fano profile describes the result of the interference of two competing transition passes originating from a Si2p core hole. The photo-excited electron can either become excited into the valance band or into a discrete energetic state within the band gap. From the analysis of the spectroscopic profile we determine the details of that Fano interference. In particular, we derive the position of the discrete state. It is found to be 600meV below the conduction band minimum.

Our findings demonstrate that the fine structure in the Si2p XAS data are indeed assigned to oxygen deficient defects. The energetic position derived are in good agreement with theoretical data of Si dimer and trimer defects incorporated in the SiO_2 matrix. /1/

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