Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Observation of Oxygen Bridging at the Si-SiO_2 Interface PHILIP BATSON, IBM Thomas J. Watson Research Center — Annular Dark Field (ADF) images of the Si-SiO_2 interface have been obtained using a 0.08 nm probe in an aberration corrected Scanning Transmission Electron Microscope (STEM). The 2 nm thick SiO_2 layer lies under an HfO_2 high dielectric constant structure, and contains isolated Hf atoms which are highly mobile under the beam. Assuming that Hf atoms occupy low energy sites within the oxide, they can substitute for Si atoms in tetrahedral coordination, or occupy incomplete octahedral pockets. In either case, they should provide a probe of the structure of the amorphous oxide. 0.3-0.6 nm from the crystalline Si, Hf atoms move mostly parallel to the interface, suggesting that quasi-planar structures may occur near the Si interface. Within 0.3 nm of the Si, tunnels run parallel to the [110] direction. Inside the tunnels, a single column of atoms is observed between two adjacent interface Si columns. ADF image simulations show that the observed scattering intensity for this column is consistent with oxygen, supporting the oxygen bridging model proposed by Tu and Tersoff (Phys Rev. Lett. **84** 4393 (2000)).

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Date submitted: 29 Nov 2005 Electronic form version 1.4