

Surface Defects States on a SiO₂/Si Observed by REELS

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The defect states of a Ar-sputtered SiO₂ surface on Si (001) were investigated using Auger electron spectroscopy (AES) and reflection electron energy loss spectroscopy (REELS). The REELS spectra at the primary electron energy of 500 eV showed that three peaks at 2.5, 5.1, and 7.2 eV were found within the band gap after sputtering. These peaks do not appear at the primary electron energies of 1,000 and 1,500 eV, which means that the defect states are located at the extreme surface of a SiO₂/Si thin film. According to the calculations, two peaks at 7.2 and 5.1 eV are related to neutral oxygen vacancies. However, the third peak at 2.5 eV has never been previously reported and the theories proposed that this defect state may be due to Si-Si bonding. Our Auger data showed that a peak for Si-Si bonding at 89 eV appears after Ar ion sputtering on the surface of the sample, which is consistent with the theoretical models

Keywords: Reflection electron energy loss spectroscopy (REELS), Auger electron spectroscopy (AES)
oxygen vacancies