IR-SPECTROSCOPY ANALYSIS OF THE STRUCTURE AND COMPOSITION OF THE Si—O PHASE IN ULTRATHIN (10—15 nm) SiO_2 FILMS

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S u m m a r y

The structural features of ultrathin (10—15 nm) SiO_2 layers thermally grown at 850 °C both on standard and hydrogen-plasma-treated Si wafers have been studied by IR-spectroscopy, spectral ellipsometry, and computer simulation. The analysis of IR spectra has shown that the structure of standard SiO_2 layers (as compared to that grown on hydrogenated Si) is characterized by the presence of SiO_2Si_2 molecular complexes and the relatively large concentration of strained 4-fold rings of SiO_4 tetrahedra. This fact indicates a more ordered and less strained SiO_2 lattice as well as an improved Si—SiO_2 interface in the case of the oxide films on hydrogen plasma cleaned Si. These conclusions are in a good agreement with ellipsometric data which have demonstrated a higher level of silicon oxidation for the oxides grown on hydrogenated silicon.