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FT IR spectroscopy of silicon oxide and HfSiO_x layer formation

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ABSTRACT

Hafnium oxide is an interesting material for a broad range of applications. Infrared spectroscopy was used to study the impact of aqueous environment and mechanism of formation of 5 nm HfO₂ films after nitric acid oxidation (NAOS) of n-doped Si (100) substrates. Samples were annealed in N₂ atmosphere at different temperatures 200°C - 400°C for 10 min. For NAOS passivation 100% vapor of HNO₃ (set A) and 98% aqueous solution (set B) was used. FTIR measurements reveal silicon oxide layer formation and formation of HfSiO_x layer. There are differences in HfSiO_x layer formation between samples of set A and B caused by different environment. This layer of samples set B is thinner because of Si-OH bonds that may inhibit formation of this layer. Absorption IR spectra of set A show more ordered SiO_x layer in comparison with samples of set B. The structural properties of HfO₂ are crucial for application in the future.

Key words: hafnium oxide, silicon oxide, infrared spectroscopy

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