

SW-P009

Dry oxidation of Germanium through a capping layer

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Ge is a promising candidate to replace Si in MOSFET because of its superior carrier mobility, particular that of the hole. However Ge oxide is thermodynamically unstable. At elevated temperature, GeO is formed at the interface of Ge and GeO₂, and its formation increases the interface defect density, degrading its device performance. In search for a method to surmount the problem, we investigated Ge oxidation through an inert capped oxide layer. For this work, we prepared low doped n-type Ge(100) wafer by removing native oxide and depositing a capping layer, and show that GeO₂ interface can be successfully grown through the capping layer by thermal oxidation in a furnace. The thickness and quality of thus grown GeO₂ interface was examined by ellipsometry, XPS, and AFM, along with I-V and C-V measurements performed at 100K to 300K. We will present the result of our investigation, and provide the discussion on the oxide growth rate, interface state density and electrical characteristics in comparison with other studies using the direct oxidation method.

Keywords: Ge oxidation, Ge MOSFET, Capping layer, Ellipsometry, XPS, Interface state density

SW-P010

Infrared spectroscopy of the effect of metal electrode on adsorbate under electric field: Electrochemical model study of CO on Pt(111) with ice film capacitor method in ultrahigh vacuum

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The influence of electric field on CO adsorbed on Pt(111) was investigated with reflection-absorption infrared spectroscopy (RAIRS) in ultrahigh vacuum system. The ice film capacitor method was used to apply electric field to the amorphous ice film with CO on Pt(111). Two systems were compared by measuring the change of the CO stretching vibrational mode under applied electric field; one is CO on Pt(111), and the other is CO buried inside an ice film on Pt(111). By comparing them, we were able to calculate the additional effect of adsorption of CO on Pt(111) on peak shift. The CO adsorbed on Pt(111) has shown larger peak shift than CO adsorbed with H₂O when we applied stronger electric field. Additionally, the differences were observable when the applied electric field exceeds 1×10^8 V/m.⁸

Keywords: electric field, vibrational stark effect, Pt(111), CO, reflection absorption infrared spectroscopy