Surface Reaction of TBOS (tetra-n-Butyl orthosilicate) on Si (100) by TPD and AES

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TBOS(tetra-n-Butyl orthosilicate) has been studied as a metal-organic Si-source to deposit metal silicate by metal-organic chemical vapor deposition (MOCVD) or atomic layer CVD (ALCVD). TBOS has Si-O bond in a single-source and is expected to deposit SiOx film. Knowledge of the surface reaction of metal-organic precursor can aid in describing the kinetics of MOCVD and ALCVD film growth. Thus, it is important to investigate the surface chemistry and thermal decomposition of TBOS for better understanding of film growth mechanism. TBOS has four butoxy(-O(C4H9)) groups. In general, C-O bonds of TBOS were easily decomposed. Surface adsorption, decomposition and desorption of TBOS were studied by temperature programmed desorption (TPD) and Auger electron spectroscopy (AES). As a result of repetition of Ar sputtering (1h) and annealing (1100 K), we could get clean surface. Multilayer desorption of TBOS was observed at low temperature. Adsorbed TBOS was desorbed through β-hydride elimination. Butene (C4H8) was desorbed from butyl on Si through β-hydride elimination reaction, which also producing butene(C4H8) and atomic hydrogen. Complete decomposition of TBOS results in carbon and oxygen detected on the surface after TPD by AES.