

CAMT Seminar

“Optical and Electrical Properties of $\text{Ti}_x\text{Si}_{(1-x)}\text{O}_2$ Films Prepared by ALD and PECVD”

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Date: 30 August, 2018 (Thu) 14:00-15:00

Location: Main Conference Room (1st floor), Bldg. A12

Center for Atomic and Molecular Technologies (CAMT)

(A12 棟 1 階会議室)

Abstract

The mixed TiO_2 - SiO_2 oxides have multiple possible optical applications with demonstrated use in waveguides, laser mirrors and rugate filters. They are also considered as an alternative dielectric for high-k applications and they attracted considerable attention in the area of photocatalysis because they are more active than pure TiO_2 . $\text{Ti}_x\text{Si}_{(1-x)}\text{O}_2$ were deposited on Si substrate by plasma enhanced atomic layer deposition (PEALD) and plasma enhanced chemical vapor deposition (PECVD). The overall stoichiometry of the final ALD film was varied by changing the relative number of TiO_2 and SiO_2 cycles as 1:1, 2:1, 1:2 and 3:1. The stoichiometry of PECVD films was varied by changing the flow rate ratios of the gaseous precursors for Ti and Si. The chemical bonding in the films was confirmed by X-ray photoelectron spectroscopy (XPS). Optical properties were determined in the wide spectral range 0.6-10.3 eV. The results on dielectric function and band gap were in good agreement with the density functional theory (DFT) predicted optical properties of amorphous $\text{Ti}_x\text{Si}_{(1-x)}\text{O}_2$ solid solutions. The electrical properties of the films were investigated in the MOS capacitor structures.

(Host: Satoshi Hamaguchi Ext:7913)