Nucleation Characteristics of Tellurium during Plasma Enhanced Atomic Layer Deposition (PEALD)

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Tellurium(Te) films were prepared on TiN/Si, Si and SiO2/Si substrates by plasma enhanced atomic layer deposition(PEALD). The effects of process parameter, such as deposition temperature, plasma power, plasma pulse time, source pulse time, and purge time, were investigated to optimise the ALD process. Te films were deposited at 225~325℃, 1.0Torr. Precursor used for tellurium dipositon is di-isopropyl-tellurium[Te(C3H7)2]. The vapor pressure of tellurium precursor at room temperature were found to be high enough for ALD process in this work. The films on the SiO2/Si substrate were not detected nucleation. So effects of surface treatment by Chloro-trimethyl-silane and THF, were investigated. The thickness, composition, cross-section, step coverage and surface morphology of films were evaluated by using field-emission scanning electron microscopy (FE-SEM), trasmission electron microscopy (TEM), X-ray photoemission spectroscopy (XPS), aeger electron spectroscopy (AES), atomic force microscopy (AFM).