PF-P047

Characterization of In-Situ Film Thickness and Chamber Condition of Low-K PECVD Process with Impedance Analysis

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For a low dielectric constant inter-metal dielectric application, the low-k SiCOH film with a dielectric constant of 2.8-3.2 has been deposited by plasma-enhanced chemical vapor deposition with decamethylcyclopentasiloxane, cyclohexane, and helium which is carrier gas. In this work, we investigated chemical deposition rate, dielectric constant, characterization of plasma polymer films according to temperature(25C-200C) of substrate and change of component concentration. We measured impedance by using V-I prove during process. From experimental result, deposition rate decrease with increasing temperature. Through real time impedance analysis of chamber, we find corelation between film thickness and impedance by assuming equivalent circuit