

Thin film thickness and uniformity measurement for lab-on-chip based nanoelectrode biosensor development

Abstract

One of the advantages of silicon substrate over other semiconductor substrate is the high temperature process capability of the silicon. In this work, silicon wafer is used for thermal processing which involves many high temperature processes such as oxidation and deposition. Thin films on the wafer surface are investigated for its thickness and uniformity. Silicon dioxide (SiO_2) is initially grown using wet oxidation method and characterized for its thickness using Filmetrics Spectrometer. The thickness of SiO_2 achieved is less than 300nm. Silicon Nitride (Si_3N_4) is then deposited by sputter method and its thickness is measured at 210 nm. For the electrode, polysilicon (PolySi) is deposited using Low Pressure Chemical Vapor Deposition (LPCVD) process. Silane (SiH_4) is used as the source for PolySi deposition and the thickness is measured at 160nm. Standard deviation is calculated based on the layer thickness and the uniformity is checked across 5 points on the wafer. Hence, it is very important to have a uniform layer across the wafer surface for a defect free device and at the same time it protects the sensitivity of the sensor.

Keywords; Filmetrics Spectrometer, LPCVD, Oxidation, Spectral Reflectance, Thin Film