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XPS and FT-IR studies of plasma polymerized ethylenediamine thin films for biochip applications

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The polymerized thin films with specific functional groups have attracted considerable attention for biochip applications. Plasma Polymerized EthyleneDiAmine (PPEDA) thin films deposited by Plasma Enhanced Chemical Vapor Deposition (PECVD) were characterized by using X-ray Photoelectron Spectroscopy (XPS), Fourier Transform InfraRed (FT-IR) spectrophotometer, fluorescence measurements and UltraViolet-Visible spectrophotometer (UV-Vis). XPS and FT-IR spectra of PPEDA thin films and target molecules, PentaFluoroBenzAldehyde (PFBA) hybridized with the surface amine groups of PPEDA thin films were obtained to study the elemental and chemical compositions of specific functional groups including amine groups. The absolute surface amine density was also determined by the derivatization technique⁽¹⁾ using 4-NitroBenzAldehyde (4-NBA). The reactive surface amine density was decreased from 5.1 molecules/nm² to 2.3 molecules/nm² as plasma power increased. Conventional fluorescence measurements using Fluorescein IsoThioCyanate (FITC) hybridized with the surface amine groups were performed and compared with results of XPS, FT-IR and UV-Vis experiments.