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PLASMA POLYMERIZED THIN FILMS GROWN BY PECVD METHOD AND COMPARISON OF THEIR ELECTROCHEMICAL PROPERTIES

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Plasma polymerized organic thin films were deposited on Si(100) glass and Copper substrates at 25～100 °C using cyclohxeane and ethylcyclohexane precursors by PECVD method. In order to compare physical and electrochemical properties of the as-grown thin films, the effects of the RF plasma power in the range of 20～50 W and deposition temperature on both corrosion protection efficiency and physical properties were studied. We found that the corrosion protection efficiency (P_k), which is one of the important factors for corrosion protection in the interlayer dielectrics of microelectronic devices application, was increased with increasing RF power. The highest P_k value of plasma polymerized ethylcyclohexane film (92.1% at 50 W) was higher than that of the plasma polymerized cyclohexane film (85.26% at 50 W), indicating inhibition of oxygen reduction. Impedance analyzer was utilized for the determination of I-V curve for leakage current density and C-V for dielectric constants. To obtain C-V curve, we used a MIM structure of metal(Al)-insulator(plasma polymerized thin film)-metal(Pt) structure. Al as the electrode was evaporated on the ethylcyclohexane films that grew on Pt coated silicon substrates, and the dielectric constants of the as-grown films were then calculated from C-V data measured at 1MHz. From the electrical property measurements such as I-V and C-V characteristics, the minimum dielectric constant and the best leakage current of ethylcyclohexane thin films were obtained to be about 3.11 and 5 x 10^{-12} A/cm^2 and cyclohexane thin films were obtained to be about 2.3 and 8 x 10^{-12} A/cm^2