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Plasma Polymerized Organic Thin Films and Comparison on their Physical and Electrochemical Properties

S.-H. Cho, Y.-J. You*, M.-C. Kim, S.-B. Lee, J.-G. Kim*, and J.-H. Boo

Department of Chemistry, Sungkyunkwan University, Suwon 440-746, Korea

*Department of Advanced Materials Engineering, Sungkyunkwan University, Suwon 440-746, Korea

Plasma polymerized organic thin films have been deposited on copper metal substrates at 25~100°C using thiophene and toluene precursors by PACVD method for corrosion protection in the interlayer dielectrics of microelectronic devices. In order to compare physical and electrical properties of the as-grown thin films, the effect of the plasma power and deposition temperature on the contact angle, corrosion protection efficiency were mainly studied. The result of contact angle measurement showed that the plasma polymerized toluene films have more hydrophobicity than the plasma polymerized thiophene films. Corrosion protection efficiency(P_k) examined by AC impedance measurement in 3.5 wt.% NaCl solution provided an increasing tendency with increasing RF power. The highest P_k value of plasma polymerized toluene film (85.27% at 70W) was higher than that of the plasma polymerized thiophene film (65.17% at 100W), indicating inhibition of oxygen reduction because the densely packed and tightly interconnected toluene film acted as an efficient barrier layer to the diffusion of molecular oxygen.