

Influence of Different Thicknesses on Mechanical and Corrosion Properties of a-C:H Films

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Abstract : The hydrogenated amorphous carbon films (a-C:H) were deposited on p-type Si (100) substrates at different thicknesses by radio frequency plasma enhanced chemical vapor deposition technique (rf-PECVD). Raman spectra display asymmetric diamond-like peaks, representative of the a-C:H films. The decrease of intensity ID/IG ratios revealed the sp³ content arise at different thicknesses of the a-C:H films. In terms of mechanical properties, the high hardness and elastic modulus values show the elastic and plastic deformation behaviors related to sp³ content in amorphous carbon films. Electrochemical properties showed that the a-C:H films exhibited excellent corrosion resistance in air-saturated 3.5 wt% NaCl solution for pH 2 at room temperature. Thickness increasing affected the small sp² clusters in matrix, restricting the velocity transfer and exchange of electrons. The deposited a-C:H films exhibited excellent mechanical properties and corrosion resistance.

Keywords : thickness, mechanical properties, electrochemical corrosion properties, a-C:H film

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