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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. Electro chemical 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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