Surface Morphology and Wettability of Ultrananocrystalline Diamond Films

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At the present time, ultrananocrystallinediamond/hydrogenated amorphous carbon composite (UNCD/a-C:H) films have been attracting significant attentionowing to their potential application in superhydrophobic surface.The wettability properties of diamond-like carbon (DLC) films have ever been investigated.Conversely, few reports have been carriedout in terms of examining the wettability properties based on UNCD films.In the current research, the surface morphology and wettabilityproperties of UNCD films were explored. UNCD films wereproduced onto Si wafers via usage of coaxial arc plasma deposition (CAPD) at asubstrate temperature of 550 °C. The surface morphology view of UNCD films was exploredusing field emission scanning electron microscopy (FESEM) and atomic forcemicroscopy (AFM). The wettability of the film surface was determinedusing contact angle measurement. It was observed from the FESEM image that the producedUNCD films consisted of a large amount of crystalliteswith diameters of lower than 10 nm. The AFM scanning result demonstrated thatthe surface of the UNCD films was smooth with a root mean square roughness of3.0 nm. Theaverage contact angle between water droplet and UNCD film was 90.8 degrees. Fromthe acquired result, the surface of the UNCD filmexhibited hydrophobic properties. It was demonstrated that theUNCD films produced by means of CAPD could potentially be applied to hydrophobic surface.