PW-P019

Effects of Plasma Surface Treatments Using Dielectric Barrier Discharge to Improve Diamond Films

In-Je Kang, Min-Guk Ko, Suresh Rai, Jong-Keun Yang, Heon-Ju Lee

Department of Nuclear & Energy Engineering, Jeju National University

In our study we consider Al2O3 ceramic substrates for Plasma Surface Treatments in order to improve deposited diamond surface and increase diamond deposition rate by applying DBD (Dielectric Barrier Dischrge) system. Because Plasma Surface Treatments was used as a modification method of material surface properties like surface free energy, wettability, and adhesion. By applying Plasma Surface Treatments diamond films are deposited on the Al2O3 ceramic substrates. DC Arc Plasmatron with mathane and hydrogen gases is used. Deposited diamond films are investigated by SEM (Scanning Electron Microscopy), AFM (Atomic Force Microscopy) and XRD (X-ray Diffractometer). Then the C-H stretching of synthetic diamond films by FTIR (Fourier Transform Infrared Spectroscopy) is studied. As a result, nanocrystalline diamond films were identified by using SEM and diamond properties in XRD peaks at (111, 43.8□, (220, 75.3□ and (311, 90.4□ were shown. Absorption peaks in FTIR spectrum, caused by CHx sp3 bond stretching of CVD diamond films, were identified as well. Finally, we improved such parameters as depostion rate (2.3 μm/h), diamond surface uniformity, and impurities level by applying Plasma Surface Treatments. These experimental results show the importance of Plasma Surface Treatments for diamond deposition by a plasma source.

Keywords: CVD Diamond, Plasma Surface Treatment, Dielectric Barrier Discharge