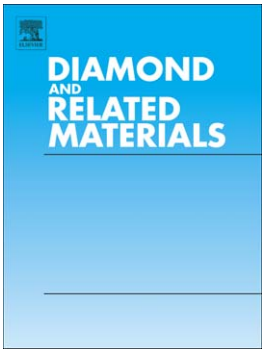

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Surface modifications on as-grown boron doped CVD diamond films induced by the B_2O_3-ethanol-Ar system

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Abstract

The surface termination of as-grown microcrystalline (MCD) and nanocrystalline (NCD) boron-doped diamond films was assessed by X-ray photoelectron spectroscopy (XPS) and water contact angle techniques. The diamond coatings were grown on mirror-polished silicon nitride ceramic substrates using the hot-filament chemical vapor deposition (HFCVD) technique. The boron doping source, boron oxide (B_2O_3) diluted in ethanol, was dragged by a constant Ar flow at different CH_4/H_2 gas ratios and system pressures. The electrical resistivity of these semiconducting diamond films was obtained and their surfaces were further characterized by scanning electron microscopy (SEM) and Raman spectroscopy.

The results have shown that the increasing total pressure particularly affects the crystal size of the boron doped MCD samples by enhancing diamond renucleation due to the higher residence time of Ar. Also, both as-grown MCD and NCD surfaces types were found to be inherently hydrophobic, with contact angles ~90ºC, but retain