

Abstract Submitted  
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**Plasma Characterization of MPCVD Discharges for Nanocrystalline Diamond Deposition** LEIGH WINFREY, STEVEN SHANNON, NC State University, RICHARD CHROMIK, McGill University, KATHRYN WAHL, Naval Research Laboratory, ROBERT NEMANICH, Arizona State University, MOHAMED BOURHAM, NC State University — Carbon forms into many different allotropes that can be useful in deposition of thin films. These forms or phases vary in properties and performance, and the variations are largely due to bonding structure and chemical properties. These properties result from plasma chemistry and environment. This work correlates the plasma deposition environment with surface properties and friction performance of nanocrystalline diamond coatings in a microwave plasma discharge. The plasma characterization was carried out using optical emission spectroscopy of the discharge at various gas mixing ratios in both UV-VIS and VIS-NIR. Examination of the plasma parameters has shown radical and ion formation, which satisfies conditions needed for diamond deposition. Plasma number density and electron temperature vary with plasma composition, they range from  $2-4 \times 10^{14} \text{ cm}^{-3}$  and 1-5 eV respectively.

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