

Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Diamond Synthesis in a Hybrid PVD/CVD ECR Thin Film Deposition System WILLIAM SOMERS, ANDREW ZWICKER, Princeton Plasma Physics Laboratory — Diamond thin films are extremely hard, thermally conductive, resistant to chemical corrosion, and excellent insulators making them an ideal coating for semiconductors. In our electron cyclotron resonance (ECR) system, physical vapor deposition (PVD) and chemical vapor deposition (CVD) are used to create diamond thin films in a hybrid physical-chemical vapor deposition (HPCVD) system. In this process, a gas mixture that consists of 1% methane and 99% hydrogen is heated with a 2.45 GHz / 2.5 kW microwave source. Diamond deposition occurs from the physical sputtering of carbon from a negatively biased graphite target (PVD) and chemically from the stripped methane, CH_4 , molecules (CVD). A major advantage of our hybrid plasma processing system is that it can sputter diamond at a much lower temperature than typical CVD. A silicon wafer substrate handling system allows us to control rotational speed, bias, and temperature and allows for increased control of diamond deposition. The quality of the diamond films is measured by Raman spectra and SEM images. Initial results of growth rate, uniformity, and quality will be presented.

William Somers
Princeton Plasma Physics Laboratory

Date submitted: 17 Jul 2009

Electronic form version 1.4