Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Investigation of Nanodiamond and Silicon Carbide Foils Product for H- Stripping to Support Spallation Neutron Source[1] GARY HARRIS[2], JAMES GRIFFIN, Howard Univ, RD VISPUTE, Bluewave Semiconductor , CIQM COLLABORATION — Diamond and silicon carbide (SiC) is an ideal material as an H- stripper foil for spallation neutron source (SNS) applications due to their high thermal conductivity, low molecular weight, and strength. Cubic silicon carbide grown on silicon is a material tension stress and the foil does not curl. Polycrystalline diamond is characterized by a high degree of internal stress, which causes the foil to curl when not supported by the substrate. the sic is grown using a RF CVD system. Hot filament chemical vapor deposition (HFCVD) was used to grow diamond on a silicon substrate. In both cases a 1.2 cm diameter window was etched in the silicon using a 1:1:3 solution of hydrofluoric, nitric, and acetic acids so that the diamond of SiC foil would be suspended while being supported on all sides by the silicon. Wax and or photoresist were used as masks to protect the outer silicon from etching. Raman spectroscopy verified the quality of the grown material. Atomic force microscopy (AFM) revealed that the diamond foil originally against the substrate had an average roughness of <6.7 nm while the foil away from the substrate had an average roughness of 13.2 nm. The SiC foils had roughness less than 3 nm. Scanning electron microscopy (SEM) revealed no cracks in the suspended foil.

[1]NSF-STC CIQM
[2]HNF/CIQM/PRDM

Gary Harris
Howard Univ

Date submitted: 14 Nov 2014 Electronic form version 1.4