

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**Synthesis, micro and electronic structure investigation of diamond nanorod spherules by High resolution NEXAFS coupled PEEM and field emission performance**<sup>1</sup> SWATHI IYER, PAUL MAGUIRE, NIBEC, University of Ulster — We report the synthesis of Diamond nanorods/flake Spherules (DNRS) predominantly consisting of UNCD enveloped by graphite in the form of flake or a rod with nanodimension, projecting randomly outward in all directions. The diamond nanoflake with a diameter of  $\sim 2$  nm has a central diamond (111) core encapsulated by graphitic (0002) lacing. The structure composition by High Resolution Transmission Electron Microscopy (HRTEM) and X ray Photoemission Electron Microscopy (XPEEM) revealed that the nanoflakes predominant with core  $sp^3$  laced with  $sp^2$ , is embedded in carbon matrix consisting of other nanocarbon, such as the nanotubes, nanooonion and nanowires/sheets. High resolution localized XPEEM combined with XAS complimented the Raman and the XPS with a weak  $\pi^*$  peak, a prominent excitonic and a second band dip, which are the signature of diamond. The congregated nanorod spherules exhibits a low-threshold, high current-density of  $10 \text{ mA/cm}^2$  at  $2.9 \text{ V/m}$  which appears to be exceptional when compared to many other electron emitting nanostructures. Bias enhanced DNRS were also characterized by XPEEM and their FE's compared.

<sup>1</sup>VCRS Scholarship

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Date submitted: 04 Jan 2011

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