Abstract Submitted
for the TSF10 Meeting of
The American Physical Society

Evidence for hexagonal diamond in CVD grown diamond thin films RAJARSHI CHAKRABORTY, SURESH SHARMA, UT Arlington — Hexagonal diamond, an energetically unfavorable carbon structure, has been of interest, since the first report of its synthesis from crystalline graphite at high pressure and temperature ($\geq$130 kbar and 1000°C).....[1] The physical properties of this allotrope of carbon are significantly different from those of the cubic diamond. Although, the C-C bonding in both cubic and hexagonal structures is sp^3, the stacking sequences are different. Whereas it is "ABCABC..." in the commonly observed cubic structure, it is "ABAB..." in hexagonal diamond. These structures are further characterized by: (i) bond length a = 1.545 Å for cubic diamond and a = 2.52 Å and c = 4.12 Å for hexagonal diamond, (ii) calculated band gaps of 5.6 and 4.5 eV for the cubic and hexagonal structures, respectively, and (iii) relative stability (hexagonal being less stable), hardness (hexagonal is harder than cubic diamond), and different vibrational spectra.....[2] Based on the SEM and Raman spectroscopy data, we present clear evidence for nanometer size (10-100 nm) hexagonal diamond particles in CVD-grown diamond thin films....[3,4] [1]F. P. Bundy and J. S. Kasper, J. Chem. Phys. **46**, 3437 (1967) [2]M. R. Salehpour and S. Satpathy, Phys. Rev. B **41**, 3048 (1990) [3]S. C. Sharma et al, J. Mater. Res.**5**, 2424 (1990)

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Date submitted: 28 Sep 2010 Electronic form version 1.4