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Investigations on the Characterization of Ion implanted boron Nitride

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Abstract content
   (Max 300 words)

Boron nitride is an interesting group III-V binary compound. Formed from atoms that straddle carbon in the periodic table, it occurs in modifications that are isostructural to those formed by carbon. The hexagonal BN (similar to graphite) and cubic BN (similar to diamond) phases are the stable phases and therefore commonly used. Cubic BN is particularly of great interest to material scientist because of its fantastic properties such as extreme hardness of 75 GPa second to diamond, high thermal conductivity, wide band gap, low dielectric constant and chemical inertness especially with ferrous materials and oxygen at high temperatures. These properties expose c-BN to various applications such as coating and cutting of iron or nickel based material, fabrication of high speed – high temperature opto-electronic device among others. Research has been on going for over half a century to find ways of synthesizing c-BN in different forms. In the work presented herein, we used ion implantation as a method to introduce defects into h-BN phase to enhance a phase change to c-BN nanoparticles. This was achieved by varying various parameters such as the ion mass, the fluence (from 1x10ˆ14 - 1x10ˆ16 ions/cmˆ2) and the implantation energy (from 40-150 keV). The annealing effect was also investigated. Raman spectroscopy,TEM and EELS were used as characterization techniques to investigate this phase changes. The occurrence of new phonon peaks in the Raman spectra, the occurrence of nanocrystallites in the TEM micrographs and the vanishing of the π*peaks and emergence of the* σpeaks in EELS in the implanted samples confirmed a possible phase transformation of h-BN to c-BN.

Apply to be
 consider for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD)?

PhD

Main supervisor (name and email)
and his / her institution

Prof. T. E. Derry Trevor.Derry@wits.ac.za
University of the Witwatersrand.

Would you like to
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No

Primary author: Ms ARADI, Emily (University of the Witwatersrand)

Co-authors: Prof. ZIEGLER, Alexander (University of the Witwatersrand); Dr NAIDOO, Mervin (University of the Witwatersrand); Prof. DERRY, Trevor (University of the Witwatersrand)

Presenter: Ms ARADI, Emily (University of the Witwatersrand)

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