Contribution ID: **327** Type: **Oral Presentation**

Characterization of the Phase Transition of h-BN - c-BN Nanoparticles by Ion Implantation

Friday, 15 July 2011 12:15 (15 minutes)

<p>The synthesis of the c-BN (cubic boron nitride) has developed great interest due to its excellent physico-electrochemical properties. These include; high hardness values (73 GPa) second after diamond, wide band gap (6.4 eV), optical transparency in a wide region of the electromagnetic spectrum, high temperature stability (1200 oC) and chemical inertness. These properties enable c-BN to be very useful for various industrial and electrical applications such as in cutting and grinding, fabrication of high temperature high frequency devices among many others. In this work, ion irradiation effect of the soft graphitic boron nitride (h-BN) is investigated from characterization with Raman Spectroscopy before and after implantation. This was to investigate a possible phase transformation of h-BN to c-BN. Boron, lithium and helium ions were implanted into the hot pressed h-BN samples at 150keV, and with fluences ranging from 1x1014 ions/cm2 to 1x1016 ions/cm2. Raman Spectroscopy showed that implantation of all the three ions led to an h-BN to a possible c-BN phase transition, evident from the longitudinal optical (LO) Raman phonon features occurring at 1303cm-1 in the implanted samples' spectra. The nature of the phonon peaks and their downshifting is explained using the spatial phonon correlation model. The extent of these peaks was found to depend on the mass of the incident ion and the fluence, where high ion mass required low fluence compared with the low ion masses.

Level (Hons, MSc,
   PhD, other)?

PhD

Consider for a student
   award (Yes / No)?

Yes

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

Yes

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

Co-authors: Mr ERASMUS, Rudolph (University of the Witwatersrand); Mr NAIDOO, S. R (University of the Witwatersrand); Prof. DERRY, Trevor (University of the Witwatersrand)

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

Session Classification: Applied

Track Classification: Track F - Applied and Industrial Physics