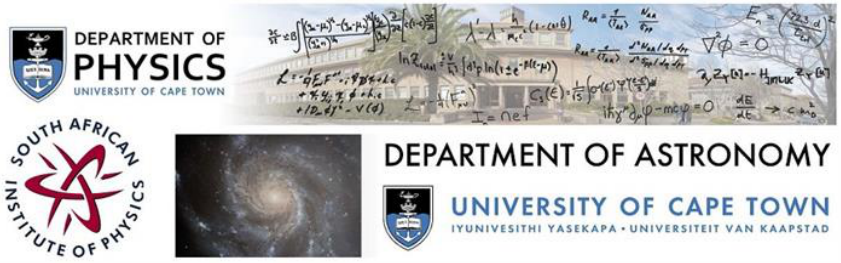

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Ion beam modification of diamond to DLC: A SBS, Raman and HRTEM study.

Friday, 8 July 2016 14:20 (20 minutes)

Abstract content
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Single crystal CVD diamond samples were implanted with a total fluence of 1.5 × 10¹⁶ ions/cm² at an energy of 150 keV using carbon ions. In this work we show for the first time the elastic properties of the ion implanted and annealed damaged layer created near the surface of the diamond using surface brillouin scattering (SBS). The results also show that it is possible to create a reflective layer in diamond, which allows for the use of the Kruger geometry to analyse the elastic properties of damaged diamond. The results in correlation with Raman spectroscopy and HRTEM show that the onset of the formation of graphitic carbon in diamond does occur during high fluence ion implantation and the SBS signatures of the layer become apparent after annealing at a temperature of 500deg;C. This implies an ''Ôtswald'' ripening process which leads to the formation of extended sp2 structures with a degree of sp3 bonding. This layer is shown to have a sound velocity (elastic properties) similar to those reported for tetrahedral amorphous carbon (ta-C).

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