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Properties of Cubic Boron Nitride Particles formed by Ion Implantation.

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Hardness measurements of poly-crystalline hexagonal boron nitride (h-BN) ion implanted samples were carried out using the FM-700 (Vickers) micro-hardness tester. Previously, it has been shown that the implantation of h-BN with different ions structurally deforms the irradiated surface layer to cubic-BN nano-particles as revealed by Raman spectroscopy, X-ray diffraction and electron microscopy, and the measured hardness increases with ion fluence. In the present study, the h-BN samples were implanted with 150 keV helium (He+), lithium (Li+), boron (B+) and neon (Ne+) ions at different ion fluences from 1 x 10¹⁴ to 5 x 10¹⁶ ions/cm², while varying the sample temperature from room temperature to 300^oC. The stress, strain and Young's modulus of the formed cubic-BN nanoparticles were determined from micro-indentation measurements. The results show that maximum stress on the samples was induced at an ion dose of 5 x 10¹⁵ ions/cm² and the calculated Young's modulus at that fluence was 0,3 GPa for all ions.

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