

Surface & Coatings Technology

Allotrope conversion and surface hardness increase in ion implanted boron nitride

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Abstract:

Previously, it has been shown that the implantation of hexagonal boron nitride with light ions (e.g. He⁺, Li⁺, B⁺) produces a surface layer containing nanoparticles of the much harder cubic form, as revealed by Raman spectroscopy, X-ray diffraction and electron microscopy. The present study shows that the irradiated layer is measurably harder when interrogated by micro-indentation which probes a layer comparable to the ion range. The hardness value increases reproducibly with the ion fluence, confirming that the latter is responsible for it. There are possible implications for the surface hardening of BN components after they have been configured in the easily machinable hexagonal form. Some aspects of the hardening mechanism are discussed.