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Fabrication of MIT layers in diamond via boron ion implantation processes.

The physio-chemical properties of semiconducting diamond materials under extremely low temperatures have fundamental implications in Condensed Matter Physics. Highly doped boron diamonds have been shown to reach a superconductive state at critical temperatures (T_c) ranging from $4-10$K, albeit, such properties are "at the moment" only attributed to heavily boron-doped synthesized samples via HPHT and CVD growth methods. Theoretical predictions have shown that by exceeding the current solubility limit of boron in diamond, an increase in T_c beyond the $4-10$K is possible, even close to room temperatures. However, in order to gain such a feat, an increase in active boron concentration beyond the metal-to-insulator transition (MIT) is an absolute necessity, and hence, non-equilibrium doping fabrication processes such as CVD growth and ion implantation are required. In this study, we explore carefully the properties of degenerate diamond layers with p-type impurity bands via low energy and low fluence ion implantation.

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

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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