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Superconducting Properties of Boron-Doped Nanocrystalline Diamond[1] GEORGINA KLEMENCIC, JESSICA WERRELL, SOUMEN MANDAL, SEAN GIBLIN, OLIVER WILLIAMS, Cardiff University — Following the discovery that diamond undergoes a metal-insulator transition through increasing the concentration of boron dopants, it was subsequently found to become a superconductor. By understanding the low temperature properties of this material, the extreme mechanical properties of diamond could be harnessed in combination with superconductivity to fabricate Nano Electro-Mechanical devices alongside and integrated with other quantum devices. Through efforts to understand the impact of the material growth on the superconducting properties, results are presented that have been obtained from a series of CVD-grown boron-doped diamond films with varying grain sizes. The transport and magnetisation properties of these films have been studied at low temperatures. The experimental results are presented, and the anticipated impact on device fabrication is discussed. Further to this, the impact of surface planarisation on the superconductivity has been studied.

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