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Optoelectronic studies of boron-doped and gamma-irradiated diamond thin films PUSKAR CHAPAGAIN, ANASTASIIA NEMASHKALO, Texas Christian University, Fort Worth, TX, RAUL PETERS, Paine College, Augusta, GA, JOHN FARMER, University of Missouri-Columbia, Columbia, MO, SANJU GUPTA, University of Pennsylvania, Philadelphia, PA, YURI M. STRZHEMECHNY, Texas Christian University, Fort Worth, TX — Elucidation of microscopic properties of a synthetic diamond, such as formation and evolution of bulk and surface defects, chemistry of dopants, etc. is necessary for a reliable quality control and reproducibility in applications. Employing surface photovoltage (SPV) and photoluminescence (PL) spectroscopic probes we studied diamond thin films grown on silicon by microwave plasma-assisted chemical vapor deposition with different levels of boron doping in conjunction with gamma irradiation. SPV measurements showed that while the increase of boron concentration leads to a semiconductor-metal transition, subsequent intense gamma irradiation reverts back the quasi-metallic samples to semiconducting state via compensating electrical activity of boron by hydrogen. One of the most pronounced common transitions in the SPV spectra was observed at $\sim$3.1 eV, also present in most of the PL spectra. We argue that this is a signature of the sp^2-C clusters/layers in the vicinity of grain boundaries.

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