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M-center in low-energy electron irradiated n-type 4H-SiC

In this work, we present a study on the low-energy electron irradiated 4H-SiC material studied by means of deep-level transient spectroscopy (DLTS) and Laplace-DLTS. Electron irradiation has introduced the following deep level defects: EH1 and EH3 previously assigned to carbon interstitial-related defects, and M-center, a metastable defect also recently assigned to carbon interstitial defects. We propose that EH1 and EH3 are identical to M1 and M3 and we assign them to C_iˆ(=) (h) and C_iˆ(0) (h), respectively. Additionally, we discuss about the conversion barriers C_iˆ(=) (h) ⊠ C_iˆ(=) (k), which could be lower than previously assumed. Moreover, we provide direct evidence that Laplace-DLTS can be used as an excellent and practical tool to distinguish otherwise identical DLTS signals associated with S1 (VSi) and EH1 (Ci). These signals have caused much confusion in the labeling and identification of irradiation-induced deep level defects located at 0.40 and 0.70 eV below the conduction band.

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