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Determination of capture barrier energy of the E-center in Pd/Sb-doped Ge by varying the pulse width

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The capture barrier energy of the E-center deep level defect induced in Pd/Sb-doped Ge by alpha-particle irradiation has been studied. Palladium Schottky barrier diodes (SBDs) fabricated by resistive evaporation technique were successfully characterised by current-voltage (I-V), capacitance-voltage (C-V), conventional and Laplace deep level transient spectroscopy (DLTS). The rectification quality of the Schottky contacts before and after irradiation was confirmed by I-V and C-V. The ideality factor and doping density were determined before and after alpha-particle irradiation to be in the range of 1.23 to 1.46 and 3.55 × 1015 to 5.25 × 1015 cm-3, respectively. The trap thermal emission activation energy and the apparent capture cross section of the E-center were determined from the Arrhenius plot to be 0.37 eV and 1.3 × 10-15 cm2, respectively. Capture barrier energy and true capture cross section of the E-center were also calculated to be 0.052 eV and 2.25 x10-17 cm2, respectively from the experimental findings after varying the pulse width at different temperature range from 145 to 180 K in step of 5 K.

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