

Contribution from $E_g(T)$ dependence into parameterization of the bulk generation current of irradiated Si detectors

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The influence of the bandgap temperature dependence $E_g(T)$ on the parameters of irradiated Si detectors extracted from $I(T)$ measurements was analyzed via transformation of “statistical” form of the rate equation for the current generation to the “activation” form. The energy of the current generation, $E_t = 0.65$ eV, was defined for the single effective level $I(T)$ parameterization. The two level model based on the contribution from effective DDs and DAs positioned at $E_v + 0.48$ eV and $E_c - 0.52$ eV, respectively, was adapted for simultaneous calculation of the reverse current and the electric field distribution in irradiated detectors. The results of the study show that both models fit well to the experimental data and the contribution of the $E_g(T)$ dependence to E_t does not exceed 5%.

Primary author: Dr EREMIN, Vladimir (Ioffe Physical-Technical Institute of Russian Academy of Sciences, St. Petersburg, Russia)

Co-authors: Dr VERBITSKAYA, Elena (Ioffe Physical-Technical Institute of Russian Academy of Sciences, St. Petersburg, Russia); Dr LI, Zheng (Brookhaven National Laboratory, Upton, NY 11973, USA)

Presenter: Dr EREMIN, Vladimir (Ioffe Physical-Technical Institute of Russian Academy of Sciences, St. Petersburg, Russia)

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