

Gamma irradiation induced suppression of reverse annealing in neutron irradiated MCZ Si detectors

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For the development of radiation hard Si detectors for the SiD BeamCal program for International Linear Collider (ILC), n-type MCZ Si detectors were irradiated first by fast neutrons to fluences of 1.5×10^{14} and 3×10^{14} neq/cm², and then by gamma. It is found that gamma radiation has suppressed reverse annealing in neutron irradiated detectors which were subject to gamma radiation during the 5.5 month room temperature annealing (RTA). The impressive effect is that in this mixed irradiation reverse annealing is totally suppressed by the same dose of gamma (500 Mrad) regardless of the neutron fluence. The following RTA of six months showed that suppression occurs only during gamma radiation that suggests some nonlinear effect, or interaction of radiation induced acceptor-type and donor-type defects.

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