

Study of bulk damage induced by gamma irradiation in n-in-p silicon diodes

Thursday, 3 March 2022 15:30 (20 minutes)

The main goal of the presentation is to show the dependence of the leakage current and full depletion voltage on TID. Whereas the measured I-V characteristics show a linear dependence on TID, the full depletion voltage and thus also the effective doping concentration significantly decreases with higher gamma irradiation. The gradual decrease of the effective doping concentration with higher TID can be associated with acceptor removal or donor introduction.

The study was performed on $8 \times 8 \text{ mm}^2$ n-in-p diodes fabricated on standard float zone silicon wafers with the initial resistivity of about $3 \text{ k} \cdot \text{cm}$. These diodes were irradiated in the range of (10 – 564) MRad by ^{60}Co gamma rays in an approximate charge particle equilibrium. An important feature of these samples is the presence of contact pads on the guard ring, which enables us to separate the bulk current from the total leakage current by grounding the guard ring during I-V and C-V measurements.

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