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Radiation damage investigation of epitaxial p-type silicon using Schottky and pn-junction diodes

This project focuses on the investigation of trap energy levels introduced by radiation damage in epitaxial p-type silicon. Using 6-inch wafers of various boron doping concentrations ($1e13$, $1e14$, $1e15$, $1e16$, and $1e17$ cm^{-3}) with a $50\ \mu m$ epitaxial layer, multiple iterations of test structures consisting of Schottky and pn-junction diodes of different sizes and flavours are being fabricated at RAL and Carleton University.

In this talk, details on the diode fabrication and electrical measurements of the structures will be given. IV and CV scans of fabricated test structures have been performed and cross-checked between institutes, the results of which will be presented. Emphasis will be placed on approaches to reduce the surface component of the leakage current that could potentially be applicable to the foreseen irradiated sample measurements.

Furthermore, trap parameters obtained from Deep-Level Transient Spectroscopy (DLTS) and Thermal Admittance Spectroscopy (TAS) as well as process and electrical simulations of the diodes fabricated from the high resistivity wafer will be shown.

Finally, the on-going activities for the next round of wafer processing and proposed plans for irradiation in the coming months, will be reviewed.

Primary experiment

RD50

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