

Location of bias voltage breakdown in n-in-p silicon segmented sensors with p-stop structure before and after irradiation

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We have fabricated n-in-p miniature silicon microstrip sensors and small test structures. A p-stop structure is implemented in order to isolate the n-implant against the inversion layer of electrons in the interface of silicon bulk and the oxide surface passivation. Along irradiation the strongest electric field is said to move from the edge of the n-implant to the edge of the p-stop due to the resulting electron inversion layer in the silicon surface with the build-up of positive charges in the interface; the breakdown may occur at the p-stop edges. We have irradiated the samples for protons or gamma's and evaluated the location of the breakdown. In all samples, we have observed the breakdown at the n-implant edges. With the help of TCAD simulations, we have understood the observation that is explained by the diminishing of the electron inversion layer by increasing the bias voltage.

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