Technology of p-type microstrip detectors with radiation hard p-spray, p-stop and moderate p-spray insulations

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Abstract

A technology for the fabrication of p-type microstrip silicon radiation detectors using moderate p-spray implant insulation has been developed at CNM-IMB. The p-spray insulation has been optimized in order to withstand the ionizing irradiation dose expected in the middle region of the SCT-ATLAS detector of the future Super-LHC during 10 years of operation. A dedicated mask was designed in order to fabricate pads diodes with different sizes and test structures to measure the surface resistivity. The best technological options for the moderate p-spray implants were found by using a simulation software package and dedicated calibration runs. Detectors have been fabricated with Float Zone and Magnetic Czochralski p-type high resistivity silicon substrates in the Clean Room facility of CNM-IMB, and characterized by reverse current and capacitance measurements. The detectors fabricated with the moderate p-spray technology are compared to similar detectors fabricated with p-stop and p-spray insulation implants.