

Status of HV-CMOS developments within the RD50 collaboration

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Following from work in the wider community, specific High Voltage-CMOS (HV-CMOS) developments within the RD50 collaboration have started with a small test prototype (RD50-MPW1) in the 150 nm HV-CMOS technology from LFoundry S.r.l. The prototype, manufactured using mid (500 Ω -cm) and high (1.9 k Ω -cm) resistivity substrates, integrates two fully monolithic matrices of pixels and test structures aimed at Transient Current Technique (TCT) measurements. A dedicated DAQ based on Caribou, a modular readout system for pixel sensor R&D, is also being developed within the collaboration and an extensive measurement campaign will start soon. The knowledge gained with RD50-MPW1 will be used to design a large area demonstrator (RD50-ENGRUN1) in the same technology. The large area demonstrator will be produced using different resistivity substrates (low, mid, high and very high range) and processed directly at the foundry to allow thinning to 100 μ m or less and sensor backside biasing. It will integrate five fully monolithic large matrices of pixels and test structures aimed mostly at improving the speed and time resolution of the detector. TCAD simulations to study the performance of the sensors prior to their fabrication are running in parallel to the design. To evaluate the radiation tolerance of this sensor technology, the manufactured devices will be irradiated at a wide range of fluences and their performance compared with that of high resistivity float zone passive sensors.

This contribution describes the status of the HV-CMOS project within the RD50 collaboration. The design details of the test prototype RD50-MPW1 and the large area demonstrator RD50-ENGRUN1 will be presented at the workshop, together with TCAD simulated results and the very first measurements of RD50-MPW1.

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