Contribution ID: **83** Type: **not specified**

Sensor design, guard ring, breakdown

Wednesday, 29 November 2023 12:30 (20 minutes)

Silicon pixel sensors manufactured using commercial CMOS processes are promising instruments for high-energy particle physics experiments due to their high yield and proven radiation hardness. As one of the essential factors for the operation of detectors, the breakdown performance of pixel sensors constitutes the upper limit of the operating voltage.

In the first part, we present a comparative study of six types of passive CMOS test structures fabricated on high-resistivity wafers, and each of them features a combination of different inter-pixel designs and sets of floating guard rings, which differ in the geometrical layout, implantation type, and overhang structure. The study based on the leakage current measurements of unirradiated samples and TCAD simulations was carried out to identify correlations between the guard ring designs and the breakdown voltages. This ultimately provide design features targeting higher breakdown voltages.

In the second part, we present the simulation study for improving the breakdown performance in the design of RD50-MPW4 monolithic CMOS detector prototype.

Primary author: ZHANG, Sinuo (University of Bonn (DE))

Presenter: ZHANG, Sinuo (University of Bonn (DE))

Session Classification: Radiation damage general