

Simulation study for improving the breakdown voltage of Si sensors for use in High Energy Physics (HEP) Experiments

To ensure a reliable long term performance in the harsh radiation environment of present and future high energy experiments, silicon detectors are required to be operated at voltages beyond, sometimes quite far from, the full depletion voltages. It is, thus desirable to improve breakdown voltage characteristics of silicon sensors, and floating guard rings are generally employed to perform this task. However, it is important to understand the application of guard rings under the influence of various physical and geometrical parameters, both for its optimal design and to gain physical insight. In this work, a TCAD based simulation is performed for the detailed study of the silicon sensors equipped with floating guard rings. The results also establish the criteria for optimizing guard ring spacing under various conditions.

Summary

To improve the breakdown voltage characteristics, floating guard rings study is been performed under the influence of various Physical and geometrical parameters, both for its optimal design and to gain physical insight.

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