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3D simulation and experimental exploration of implementing double-sided 3D trench electrode detector with 8-inch CMOS Process

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A double-sided 3D trench electrode detector (DS-3DTED) structure is proposed in this work to investigate manufacturing process implementation of 3D detectors for high energy physics, X-ray spectroscopy and X-ray cosmology applications. The device electrical characteristics are carried out with TCAD tool, including electric potential and electric field distribution, I-V, C-V, full depletion voltage, transient current and CCE with MIP incidence. In addition, a manufacture method to realize the DS-3DTED device is presented. Furthermore, a 311 μm deep and 10 μm wide trench has been achieved through Bosch process on the IMECAS 8-inch CMOS platform to verify the feasibility of the device structure. The maximum depth to width ratio is close to 105:1 when the trench width is 2 μm, which is a excellent foundation for the future 3D detectors manufacture with large fill factor and small dead zone.

Collaboration

Role of Submitter

I am the presenter

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