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A SOI Pixel Detector Using Pinned Depleted Diode Structure For High-Energy-Resolution X-ray Imaging and High-Sensitivity NIR Imaging

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This paper presents a SOI pixel(SOIPIX) detector using pinned depleted diode structure suitable for high-energy-resolution X-ray imaging and high-sensitivity NIR imaging. The pinned depleted diode(PDD) structure greatly reduces the R-G dark current generation at the SOI back-gate and the read noise thanks to the very small sensing capacitance and improves the charge correction efficiency. This pixel technology is also useful for high-sensitivity near-infrared imaging with fully-depleted substrate, particularly for time-of-flight(TOF) range imaging. An experimental chip shows an excellent pixel performance on low dark current, low noise, and resulting high energy resolution in X-ray imaging. Range measurement is also carried out using the proposed TOF sensor with the PDD-SOIPIX technology.

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