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Linear mode reach through APD for X-ray imaging in 0.2 μ m SOI-CMOS technology

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Prototype of an Avalanche Photodiodes with Reach-Through (RT-APD) was fabricated using Silicon On Insulator (SOI) technology. It replaces a pixel sensor with the silicon APD to detect soft X-ray which generate very small charge. These new devices offer fast proportional response and good S/N based on linear mode operated at below breakdown voltage. In this study, to investigate edge termination effect, the RT-APD prototype was fabricated and the results of current-voltage characteristics with different guard ring width and also photon sensitivity in order to evaluate multiplication gain were measured. These RT-APD sensors are composed of N+/P-well/P-substrate. The wafer type is floating zone with 200 μ m thick and its resistivity is around 6k Ω cm. Potential and electric field distribution was also analyzed with TCAD simulation.

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