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Simulation and Device Characterization of the P+PN+P Junction Type Pinned Photodiode and Schottky Barrier Photodiode

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Abstract:

Process parameter tolerance of semiconductor device is very important for manufacturability and yield. Pinned Photodiode has by definition the pinned surface potential of the low surface dark current feature and the pinned empty potential well of the no image lag feature with the excellent blue light sensitivity of the ideal quantum efficiency. This paper reports simulation and device characterization of the unique P+PN+P junction type Buried, Depletion and Pinned Photodiode with excellent manufacturability, originally invented in 1975. Related various historical photodiode structures are reviewed, including the metal semiconductor Schottky Barrier photo sensor of Au/ β - Ga_2O_3 type in search for the low leakage and dark current photodiode which led the 1975 invention of the low leakage P+NPNsub junction Pinned Photodiode by Hagiwara.

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