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SURFACE STATE EFFECTS ON N+P DOPED ELECTRON DETECTOR

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There is an ever growing need for highly effective electron detectors with high responsivity. One of the parameters that has been shown to have a negative influence on the responsivity of a radiation detector is the surface recombination velocities of minority carriers at the Si-SiO2 interface. With the n+p detector discovered to possess better responsivity than a p+n detector at any given interface recombination velocity or fixed oxide charge Qf, there is a need to further investigate the n+p detectors [1].

In order to identify the effects of the parameters in question, an n+p detector with doping profile (1e15 atoms/

Before the processing of the device, Monte Carlo (MC) simulation methods were used to model the interaction bet

To analyze the silicon bulk and the Si-SiO2 interface, we used some simple mobility models such as parallel field mobility model to account for carrier heating and velocity saturation effects. This was done by using analytic expressions for the drift velocity vd as a function of the electric field in the direction of current flow, E||, and defining μ(E||) = vd(E||)/E||. Other models used included Auger recombination model, Shockley-Read-Hall recombination model with fixed lifetimes as well as a concentration-dependent mobility model which involves the use of mobility tables to model the dependence of carrier mobility on impurity concentration.

This research offers a significant improvement in electron detectors in applications like gas chromatography detection of trace amounts of chemical compounds in a sample.

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