Characterization of n-on-p detectors with different p-stop and p-spray structures by simulations and measurements

Tanja Palviainen[a], Tuure Tuuva[a], Jaakko Härkönen[b],
Esa Tuovinen[b], Panja Luukka[b]

[a]Lappeenranta University of Technology (LUT), Laboratory of Microelectronics,
P.O.Box 20, FIN-53851 Lappeenranta, Finland
[b]Helsinki Institute of Physics (HIP), CMS Program, Finland

In this paper the simulation and measurement results of the n-on-p MCz-Si detector structures are described. The five different p-stop and p-spray ion implantation combinations are researched. The combinations are:

1) p-stop $1x10^{15}$ cm^{-2} only
2) p-stop $1x10^{15}$ cm^{-2} and p-spray $1x10^{12}$ cm^{-2}
3) p-stop $1x10^{15}$ cm^{-2} and p-spray $3x10^{12}$ cm^{-2}
4) p-stop $1x10^{15}$ cm^{-2} and p-spray $5x10^{12}$ cm^{-2}
5) p-spray $3x10^{12}$ cm^{-2}.

The diodes are electrically characterized by C-V and I-V measurements.

The computer simulations of the n-on-p strip detector are done using Silvaco Virtual Wafer Fab (VWF) software. The cross-section of the n-on-p strip detector is simulated in two-dimensions with different dose of p-stop and p-spray. Simulation and measurement results are compared.