IV. Surface Barrier Field for Blue-Light Sensitivity

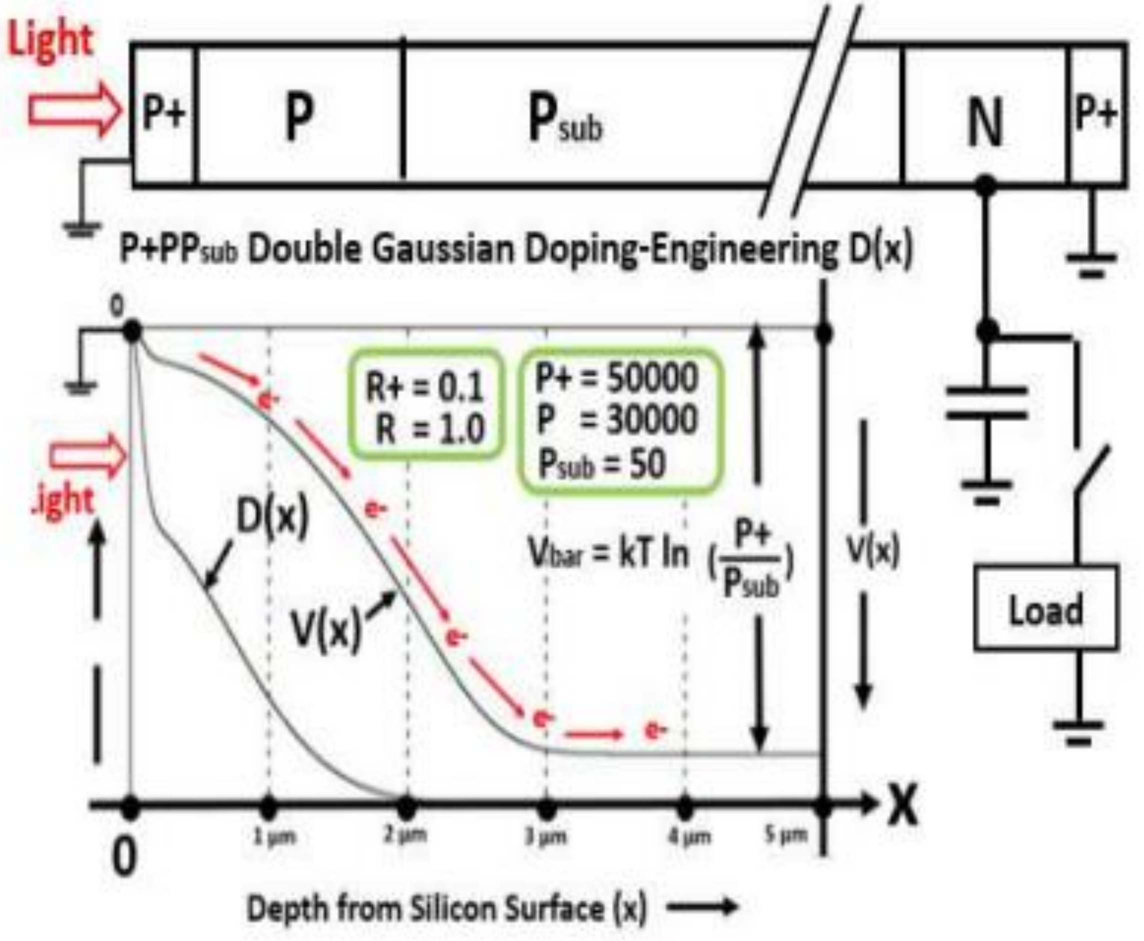

Fig. 10 Exact Numerical Computation of P+P Surface Barrier Potential V(x)

Fig. 10 shows an exact numerical computation of the P+P surface barrier potential V(x) for a two-step double doping-engineering of the double Gaussian doping D(x) with the spread parameters R+ = 0.1µm and R = 1µm. The substrate doping level is taken as Psub = 50 μm^{-3} while the two-step double Gaussian peak surface doping levels are taken as P=3000μm^{-3} and P+=5000μm^{-3} . The surface barrier electric field was found to be extending up to 3µm in depth into the silicon crystal. Thus by a proper surface double doping-engineering D(x) with the high energy ion implantation technology an ideal surface barrier electric field can be achieved to separate efficiently the electron and hole pairs generated by the short-wave blue light, which cannot penetrate more than 50 nm in depth in the silicon crystal. In this way, the ideal spectral response was achieved for the PNP double junction type Pinned Buried Photodiode.