

V. PINNED BURIED PNIP PHOTODIODE TYPE SOLAR CELL

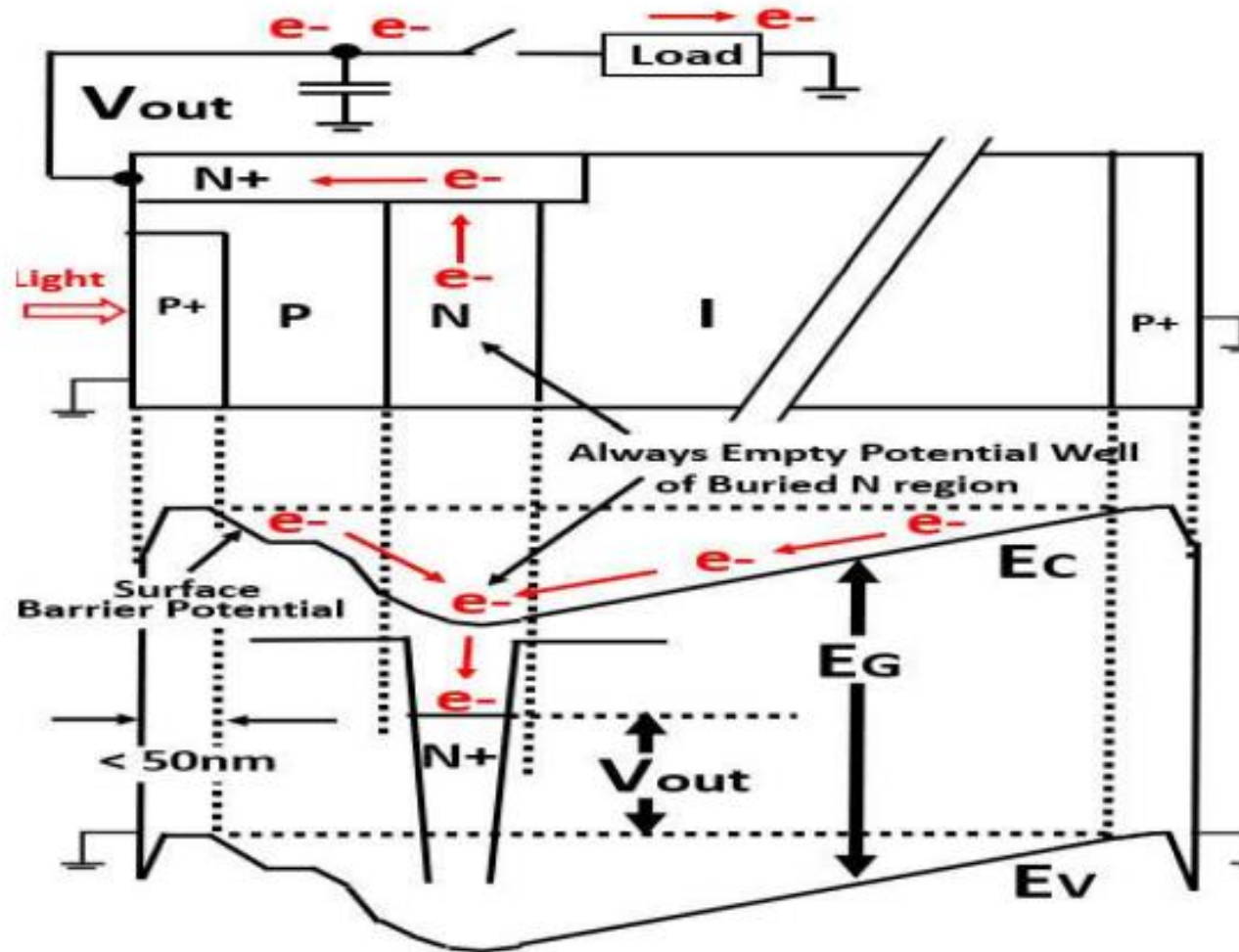


Fig. 11 Pinned Buried P+PNIP+ Photodiode Structure type Solar Cell

Image sensors and solar cells both operate by the same physical principle of converting the photon energy to the electron energy. Pinned Buried Photodiode has an excellent quantum efficiency and is also expected to improve the quantum efficiency of Pinned Buried Photodiode type solar cells. PIN diode invented by Jun-Ichi Nishizawa is also a simple photodiode with the wide intrinsic I-type middle region. PIN diode is suitable for high-voltage power electronics, fast switches and photodetectors applications. The floating surface N+P single junction-type photodiode is now used widely in solar cells because of its simple structure and the cost performance consideration, but with a poor low quantum efficiency problem.

The Pinned Buried PNIP Photodiode type Solar Cell shown in Fig.11 has a receiving charge storage bucket of a heavily-doped N+ region for the ohmic contact connecting the output power line which is connected via the output switch to the solar cell load. The output voltage of a single solar cell unit is less than the silicon energy gap E_G of 1.1 eV but the total output voltage can be boosted by connecting many of the solar cell units in series.

Note that there is a constant electric field and no bending in the electron potential E_c in the intrinsic region. The right edge P+ region has a very small depletion region to absorb the constant electric field in the intrinsic region.