

- The operation principle of VLPCs is the effect of impurity band.
 - Occurs when a semiconductor is heavily doped with shallow donors or acceptors.
 - The impurity atoms are close together \rightarrow electrical transport occurring by charge hopping from impurity site to impurity site!
- The standard 1.12 eV gap of Si is used to absorb photons
- The small gap with the impurity band is used for creating an electron – D⁺ avalanche multiplication.
 - Small gap ~ 0.05 eV \rightarrow Relatively low field is required for avalanche the required field for producing an avalanche is low.
 - Localized and self-limiting avalanche (due to local field collapse, D⁺ have low mobility)
- The drift region can be seen as an internal resistor in series with an ideal VLPC

