

Optical Sensor (2B)

- Light
- Electromagnetic Wave
- Photo-conductive Effect
- Photo-voltaic Effect
- Photo-electric Effect
- Pyro-electric Effect
- Thermo-electric Effect

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Light

Wavelength	
1 ~ 390 nm	UV
390 ~ 780 nm	Visible Light
0.78 ~ 1000 μm	IR
0.78 ~ 2.5 μm	Near IR
2.5 ~ 50 μm	IR
50 ~ 1000 μm	Far IR

Electromagnetic Wave

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$c = \lambda \nu$$

c : speed of light
 λ : wave length
 ν : frequency

Energy of a photon

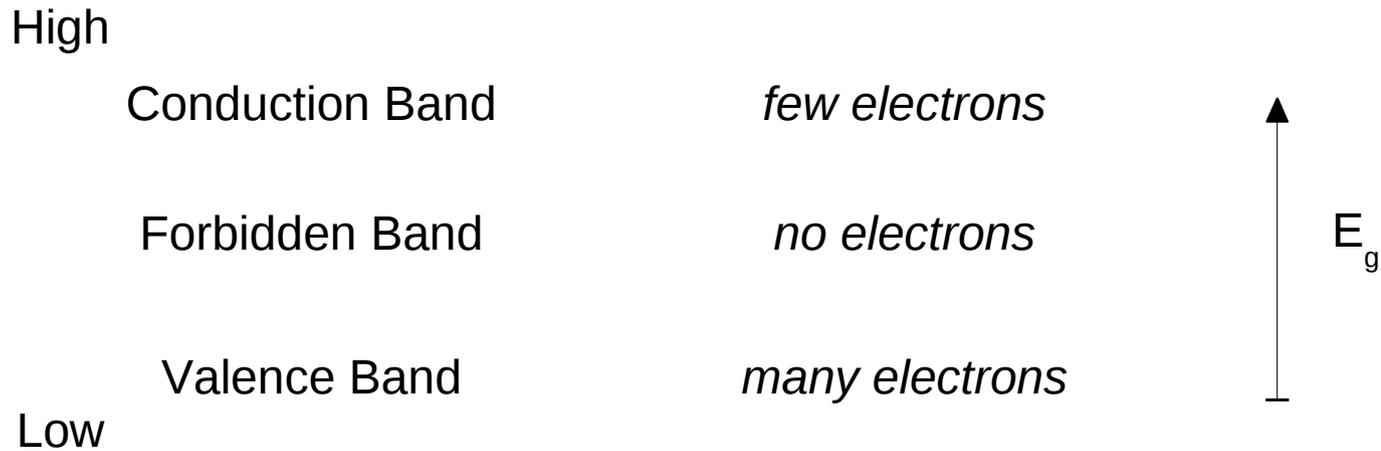
$$E_{ph} = h\nu = \frac{hc}{\lambda}$$

h : Planck constant

Emission and Absorption of a Photon



Photo-conductive Effect



After absorbing light

free electron : Valence Band \longrightarrow Conduction Band

Photo-voltaic Effect

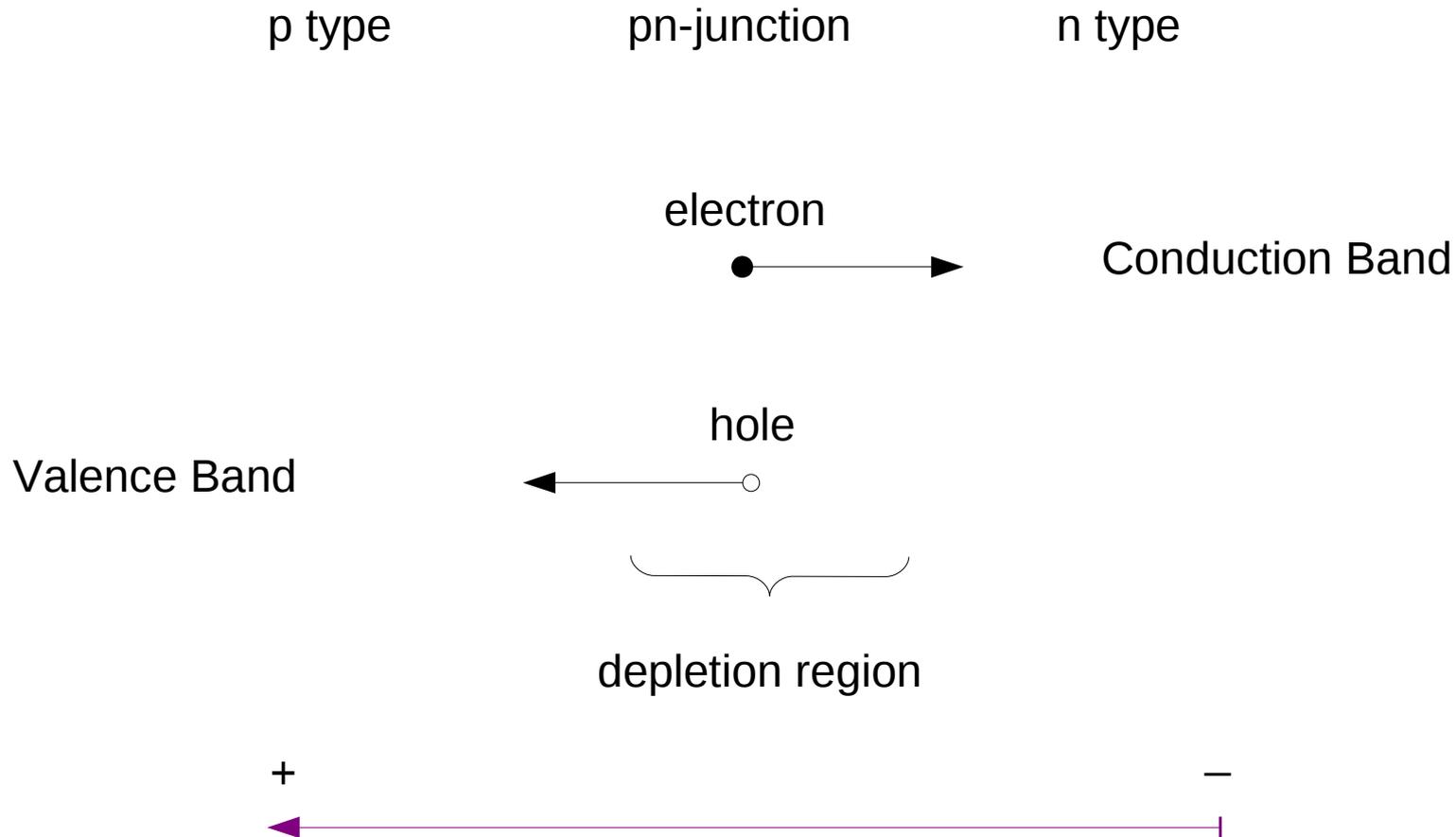
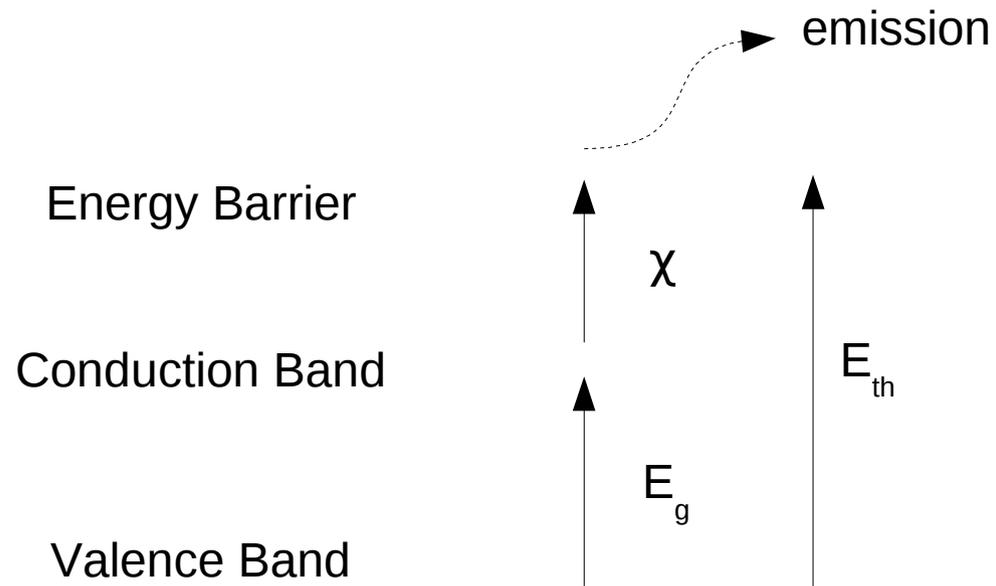
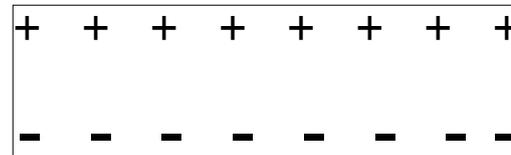
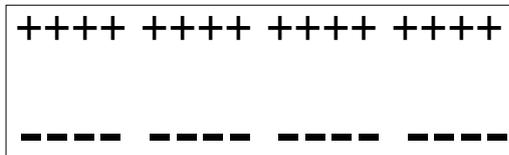


Photo-electric Effect

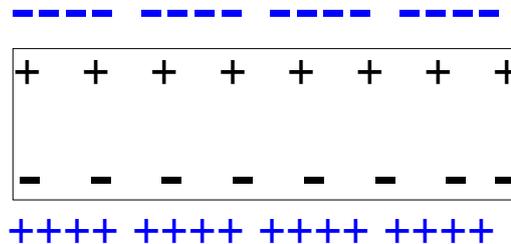
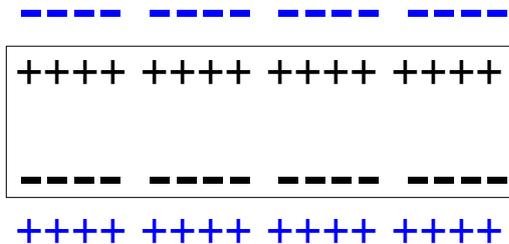


Pyro-electric Effect

Spontaneous Polarization



Increasing
Temperature

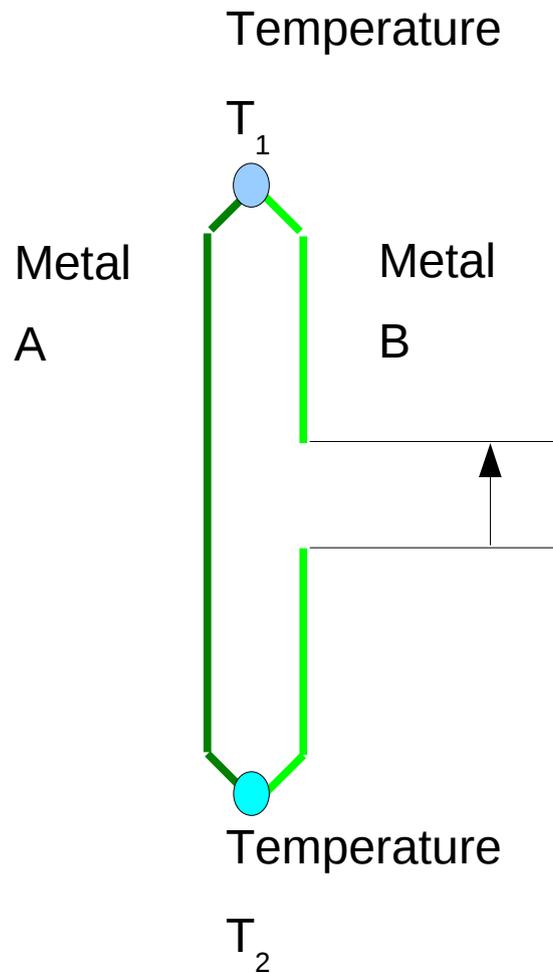


Pyro-electric Effect

Temperature difference



electricity



$$V \propto (T_2 - T_1)$$

References

- [1] <http://en.wikipedia.org/>
- [2] Nam Ki Min, Sensor Electronics, Dong-il Press