Band Bending and Potential & Kinetic Energies Lesson

Band Bending and Potential & Kinetic Energies

Band bending occurs when an electric field is applied to a semiconductor. When an electric field is not applied, the energy bands are not a function of position. Therefore, when an electric field is applied, energy is being supplied to the carriers in the material. Where band bending has occurred, we can measure the energy given to the electrons or holes by taking a reference energy and measuring the distance between it and the energy the carrier is at.

In essence, the potential energy of an electron is the distance the electron is from the reference energy to $E_c$, the lowest conduction band energy. The kinetic energy of an electron is the distance between $E_c$ and the energy it is at. For holes, it’s similar. A hole’s potential energy is measured as being the distance between the reference energy and $E_v$, the highest valence band energy. The kinetic energy of a hole is measured by taking the difference between $E_v$ and the energy the hole is at.