

Holes

Holes are somewhat curious objects at first: they are the absence of electrons but their motion represents an electric current. One way to think about holes is to imagine an electron being removed from a Si - Si bond, leaving only one electron shared between the two atoms. If an electron from a neighboring bond jumps in to fill the gap, the hole left by the absence of an electron can move from its original location to a neighboring location. In this way electrons migrate in one direction from atom to atom (they are not free, like the electron that got away) and so, effectively, a positive charge moves the other way: hole current to the right means electrons are moving from atom to atom to the left. However, for our purposes it is advantageous to treat a hole as an actual particle carrying electric charge $+q$ and having a finite mass, and we will consider the hole to be a particle here and treat current flow in terms of the motion of the two kinds of charge carriers, holes and electrons.