

Semiconductors Composition Lesson

Composition



All the elements used to make semiconductors appear in Column IV of the Periodic Table or are a combination of elements in columns at equal distance of Column IV on each side. For example, two elemental semiconductor materials are silicon and germanium from Column IV. Another common compound is gallium arsenide (GaAs), Ga from Column III and As from Column V. The elements for zinc oxide (ZnO) are each two columns away from Column IV, Zn in Column II and O in Column VI. This, however, is not a coincidence. All of these chemical bonds yield an average of four valence electrons per atom. These valence electrons are shared between all the atoms in the silicon crystal. To see how this occurs, take a look at the [demo](#).

Semiconductors are important because of their electrical properties. Some semiconductors are probably the purest materials on earth. Any trace of unintended impurity atoms can have a drastic effect on those properties. When being manufactured, purity must be very carefully controlled. Intentionally added impurities are called dopants. Dopants are added in a controlled environment and it is known beforehand how many impurity atoms will be added and what the effect will be.