

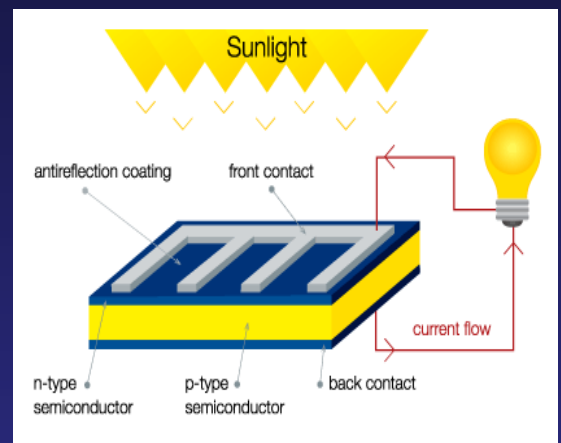
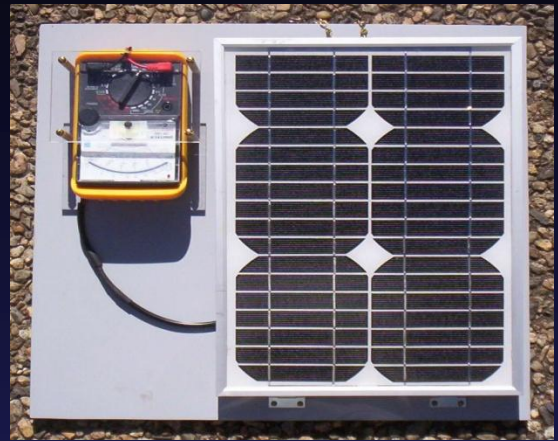
Mono-crystalline Solar Cells

What to do

1. Change the angle of the solar panel in relation to the light
2. Observe the current output and compare with the other types of solar cells

The solar cell changes sunlight into electrical energy which can be stored or used to power appliances. Each cell is composed from two layers of silicon. However, the silicon is not pure - the top layer has been mixed with an element with easily freed electrons ('n-type') such as phosphorus and the bottom layer has been mixed with an element which has free places for electrons to occupy ('p-type') such as boron. Where the two layers meet, the free electrons from the n-type silicon fill the available places in the p-type silicon and form a barrier which blocks further electrons moving in this direction.

When light hits the top electron-rich layer more electrons are released, however they cannot pass through the junction to reach the spaces available for them on the other side, so instead they travel through a wire connecting the n-type and p-type layers. This creates a flow of electrons in the wire – electricity!



Mono-crystalline Silicon

The silicon used to make mono-crystalline solar cells (also called single crystal cells) is cut from one large crystal. This means that the internal structure is highly ordered and it is easy for electrons to move through it. The silicon crystals are produced by slowly drawing a rod upwards out of a pool of molten silicon. Under carefully controlled conditions crystallization will occur at the end of the rod as it exits, creating a long cylindrical crystal. The column is then sliced into thin pieces for use in the solar cells. Elements allowing the silicon to exhibit n-type or p-type properties are mixed into the molten silicon before crystallization.

You can identify mono-crystalline solar cells by the empty space in their corners where the edge of the crystal column was. Each cell will also have a uniform pattern as all of the crystals are facing the same way. Mono-crystalline silicon solar cells are the most efficient type of solar cells, however they are also the most expensive due to the technology involved in making large highly uniform silicon crystals.

