4. LIGHT

When light strikes the surface of a substance, it may dislodge electrons from their orbits around the surface atom of the substance. This occurs because light has energy, the same as any moving force.

Some substances, mostly metallic ones, are far more sensitive to light than others. That is, more electrons will be dislodged and emitted from the surface of a highly sensitive metal, with a given amount of light, than will be emitted from a less sensitive substance. Upon losing electrons, the photosensitive (light sensitive) metal becomes positively charged, and an electric force is created. Voltage produced in this manner is referred to as a "photoelectric voltage". A complete device which operates on the photoelectric principle is referred to as a "photoelectric cell"

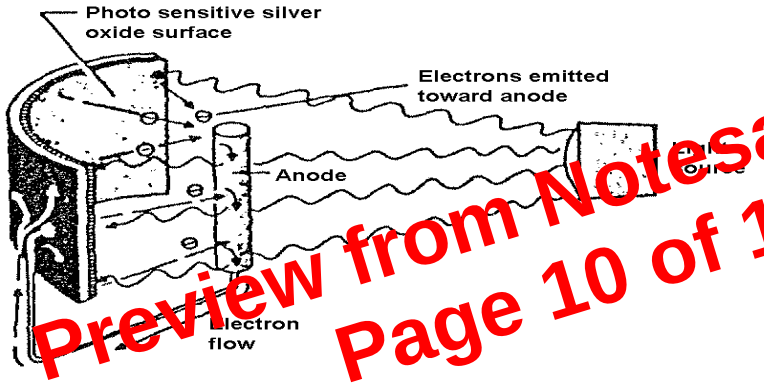

Figure (45)

Basic solar cell construction.

The cell in Figure (45) has a curved light sensitive surface focused on the central anode. When light from the direction shown, strikes the sensitive surface, it emits electrons toward the anode.

The more intense the light, the greater is the number of electrons emitted. When a wire is connected between the filament and the back, or dark side, the accumulated electrons will flow to the dark side. These electrons will eventually pass through the metal of the reflector and replace the electrons leaving the light-sensitive surface. Thus, light energy is converted to a flow of electrons, and a usable current is developed.

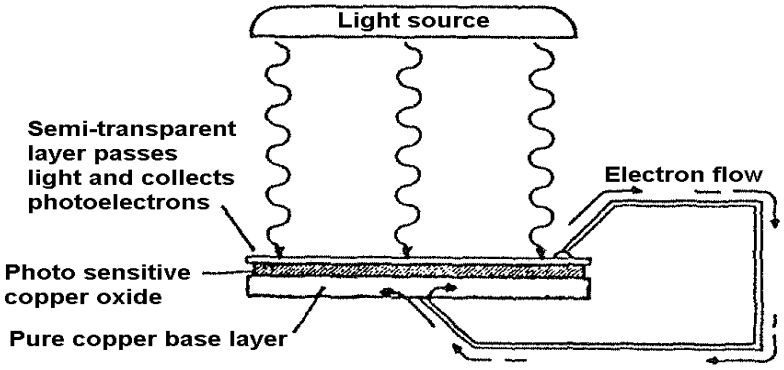

Figure (46)

Layered solar cell construction.

The cell in Figure (46) is constructed in layers. A base plate of pure copper is coated with light-sensitive copper oxide. An additional semitransparent layer of metal is placed over the copper oxide. This additional layer serves two purposes:

1. It is extremely thin to permit the penetration of light to the copper oxide.
2. It also accumulates the electrons emitted by the copper oxide.

An externally connected wire completes the electron path, the same as in the reflector type cell. The photocell's voltage is utilized as needed by connecting the external wires to some other device, which amplifies it to a usable level.

A photocell's power capacity is very small. However, it reacts to light-intensity variations in an extremely short time. This characteristic makes the photocell very useful in detecting or accurately controlling a great number of processes or operations. For example, the photo cell, or some form of the photoelectric principle is used in television cameras, automatic manufacturing process controls, door openers, burglar alarms, etc.