Factors That Affect Output From Photovoltaic Cells

Objective:

To discover, through experimentation, what factors enhance and detract from the performance of photovoltaic (PV) cells.

Description:

Students will collect data from the output of PV cells while changing the conditions under which the cells are performing. They will experiment with a variety of factors including, but not limited to, various colors of cellophane filters, shadow, mirrors, etc. From the data they collect and graphs they construct, students will be able to determine environmental factors that affect the performance of PV cells.

Discussion:

In the previous two experiments, students have determined angles and direction that produce optimum results from PV cells. In this lab activity, they will be experimenting with other factors that may enhance or detract from the performance of PV cells. Encourage the students to make good observations and to maintain the integrity of the experiments they are conducting. Remind the students that at no time should they ever look directly at the sun or at the reflected sun.

Time Requirements:

Setup and data collection – 45 minutes
Data analysis – graphing – 30 minutes
Discussion and data comparison – 45 minutes

Materials:

PV cell
Digital voltmeter or multimeter
Cellophane paper – various colors
Clear plastic wrap
Dark paper – to produce shadow
Mirror – hand held
Magnifying lens

Procedure:

1. Connect the PV cell to the voltmeter and align it towards the sun. If the students have completed the activity titled “Correctly Catching Rays”, they should use the direction and angle selected in that activity to aim their PV cell.
2. Pass various objects and filters in front of the PV cell.
3. Measure and record the output of the solar cells in each of the different situations.
4. Use the mirrors and magnifying lenses to focus light to the PV cell.
5. Measure and record the output of the solar cells