The Effect of Ground Composition on the Efficiency of Solar Pavers

Heilshorn, Lilly (School: Hempfield High School)

It was hypothesized that the solar paver would be more efficient at colder temperatures, due to the greater difference in voltage as electrons move inside the paver. Along with this, different ground compositions would demonstrate differing responses to temperature changes when generating electricity. The purpose of this experiment was to determine the ideal ground composition in which to install solar pavers in order to create the most efficient solar panel system. One donated Platio Solar Paver was used. The ground compositions tested were: standard roof panel, cement, concrete, grass, polymeric rubber, and brick. Each solar paver system was constructed using a paver soldered into a circuit, which was placed flush on top of the ground sample being tested. The systems were cooled inside a styrofoam cooling chamber until they reached 1.7 degrees Celsius, after which they were removed and tested. These tests consisted of removing the solar paver systems from the cooling chamber and placing them underneath a lamp. Extraneous light sources were turned off and the light source was turned on. Measurements were recorded for volts and milliamps over fifteen-minute intervals until the systems reached a temperature of 21 degrees Celsius. The recordings for volts and milliamps were multiplied together to determine the wattage output, which was divided by the surface area (in square centimeters) of the paver to determine the wattage per square centimeter. Experimental results supported both research hypotheses. The most efficient system was Grass and Soil, the least efficient system was Brick.