Efficient Solar Panel Arrangement and Exploration through Biological Imitation

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Recently, we can often see many solar panels around us. However, most of them are only used to generate small amounts of electricity because of insufficient setup space. To solve this problem, we want to make space effective solar panels. Thus, we decided to imitate plants which evolve by getting solar power efficiently. In fact, we imitated plant's phyllotaxis ratio and Boston Ivy's adhesive disk structure. First, we carried out experiments on various phyllotaxis ratios, 1/8 phyllotaxis ratio was found to be the most efficient for solar energy generation. In the actual experiment, 40 solar panels applying the 1/8 phyllotaxis ratio were connected as a series-circuit on a 50-cm high rectangular base made of acryl. As a controlled experiment, a solar panel was placed on a 400cm2 area and its energy generation was analyzed. In second research, we made two models. One is an ordinary model solar panels simply attached to the wall. Another model is our special model that imitates Boston Ivy. Arranging the solar panels through bio-mimicking the foliage arrangement resulted in 1.673 times higher energy generation than that of flat surface placement. The results lead to the conclusion that solar panel arrangement through bio-mimicking foliage arrangement will make energy generation more efficient. After creating a solar panel through bio-mimicking the adhesive disks of the Boston Ivy, we have a test that are comparing two models. After testing, results lead to the conclusion that the solar panel created through bio-mimicking the adhesive disks of the Boston Ivy will be able to generate energy more efficiently.

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