The Effect of Hydrophobic Coatings on the Efficiency of Solar Panels

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The purpose of this study was to determine whether the addition of thin-film hydrophobic coatings on a photovoltaic cell (solar panel) had an impact on the energy output of the panel. The experiment was conducted in a local high school technology lab in 2021. Ten total solar panels were used as four different coatings were applied to eight of them (two solar panels per applied coating), with two saved for the control. There were four different weather conditions tested with data collected every 30 seconds for a total of 400 trials (40 on each cell). The amount of energy produced for every solar panel was recorded for the conditions of light only, water only, sand only, and water with an addition of sand. These tests together run with a two-factor ANOVA with replication, compared to an alpha value of .05, revealed a p-value of 2.6x10-129. This statistically significant result supported the research hypothesis which stated that the use of these coatings will provide an increased amount of energy under weathering conditions. Following, I conducted a Post-Hoc Tukey Test which identified significance between all coatings except for the Gray System-X. In conclusion, the provided coatings reduced the weathering effects on the solar panels for an increased output of energy.

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