The Effect of Sulfate Compounds on Perovskite Solar Cell Voltage Output

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The purpose of this study was to examine the effect of sulfate compounds on the voltage output of perovskite solar cells. Three groups of four perovskite solar cells were used: one of solar cells containing 0.01g of ammonium sulfate, another of solar cells containing 0.01g sodium sulfate, and the last of solar cells containing no additional sulfate compounds. Each solar cell was first heated prior to the application of the methylammonium lead iodide perovskite precursor and the solar cell's appropriate sulfate compound. Finally, each was annealed and evenly spread on a countertop under a lightbulb. The voltage output was recorded seven times per cell over two weeks and the average per cell was calculated. A one-way ANOVA determined that the data were significant, with a p-value of 1.14E-4 and an alpha level of .05. A Tukey test then revealed where the significance rested between groups, with a Dmin of 4.81. The difference was shown to be between the sodium sulfate group and the ammonium sulfate and control groups. This supported the original research hypothesis that applying sodium sulfate to the methylammonium lead iodide perovskite precursor solution for impregnation of the solar cells would produce the highest average voltage output of the perovskite solar cells. In summation, the sodium sulfate improved the film morphology of the perovskite solar cells to the extent of producing a significant difference in voltage output between solar cell groups.

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