OPTIMAL FABRICATION METHODS FOR PEROVSKITE SOLAR CELLS WITH CARBON COUNTER ELECTRODES

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Abstract: Solar energy is a vital part of the search for viable renewable energy sources. Increasing the affordability of solar cells while maintaining their efficiency is critical to implementing them practically on a large scale. Currently, expensive materials, such as gold, are commonly used as counter electrodes. This study explores the use of carbon as a more affordable counter electrode material for perovskite solar cells. To fabricate the perovskite solar cells, the substrate was first spin coated with a titanium solution. After drying in the furnace, a layer of PbI2 was added by spin coating, the substrate was soaked in methylammonium iodide, and a layer of hole transport material (HTM) was added by spin coating. Finally, a layer of activated carbon was added on top of the perovskite layer. The I-V test (current-voltage test) was used to find the current and voltage when the solar cell was exposed to sunlight, and to calculate important parameters, including efficiency. Increasing the number of titanium layers improved the efficiency by helping to uniformly coat the surface. The efficiency was increased by using a thicker carbon layer and by increasing the amount of solution used when spin coating the PbI2. Drying the PbI2 and HTM layers on a heating pad also improved the performance, especially when the solar cell was placed in a dark environment between stages of fabrication. Continued research is necessary to verify these results and further optimize the process.

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