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Carbon electrode for perovskite solar cell

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High-efficiency perovskite solar cell (PSC) normally utilizes metals such as gold or silver as the electrode to achieve the highest power conversion efficiency (PCE) as possible due to their high charge transfer properties. However, there are some disadvantages of the metal electrodes such as high price, high-temperature deposition requirement, and low hydrophobicity. Recent studies show that carbon has a great potential for being PSC's electrode due to its adequate conductivity, proper work function, flexible nature, hydrophobicity, low cost, and low energy input for fabrication. This work focuses on improving a commercially available carbon electrode material for perovskite solar cell by adding carbon black to increase its flexibility and conductivity, yielding reduction of resistivity by 50% measured with a 4 point probe. To further improve mixability between the carbon paste and the carbon black, different solvents were explored. Smaller pore size, smother morphology, better charge transfer, and homogeneous conductance distribution of the carbon film were achieved. The power conversion efficiency more than 15% with little hysteresis was demonstrated with the enhanced carbon electrode.

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