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Effects of Substrate Temperatures during Spray Processing on Colored Perovskite Properties

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Mixed halide perovskites MAPb(I+Br)3 (MA=CH3NH3) are strong candidates for thin-film solar cells, as they are solution processable with excellent photovoltaic properties. With both halide and dimensionality tuning, colored perovskites can be fabricated with potential application for semi-transparent solar cells. Typically, spin coating is utilized for perovskite formation. However, to enable future large scale production, we explored spray processing for these semi-transparent materials. For spray fabrication, substrates are generally heated while coating for better film quality. This work studied morphological, optical, and electronic effects of substrate temperatures for three distinct colored mixed halide perovskites. The optimal temperature close to 200°C caused larger grains, higher absorption, better crystallinity, and good charge separation, yielding positive signs for superior photovoltaic performance.

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