

Mini Review

Recent Research Progress on Lead-free or Less-lead Perovskite Solar Cells

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Perovskite solar cells (PSCs) have been attracting great research interests and attained remarkable progress since its debut in 2009. Remarkably, the power conversion efficiency (PCE) of PSCs has already surpassed other types of solar cells that have been researched over 20 years in the last 7 years. However, organic lead halides are extensively used as absorption materials of current PSCs, which are toxic and environment-unfriendly and hinder the practical applications of PSCs. For these reasons, research on less-lead or lead-free PSCs is of great importance. Tin is an ideal substitution to lead because it is nontoxic and the absorption spectra of some of the tin-based perovskites are broader than lead-based perovskites. However, tin-based perovskite materials are more prone to be oxidized than organic lead halide perovskite, which would result in a lower PCE and poorer stability for tin-based PSCs than those for the organic halide lead PSCs. Therefore, it is necessary to further optimize the less-lead or lead-free perovskite materials and fabricate efficient, stable and environmental friendly PSCs. Recent research progress on less-lead and lead-free PSCs is summarized in this mini review and the possible solutions to the issues regarding the photoelectric performance and stability are proposed.

Keywords: Perovskite solar cells; less-lead; lead-free; tin-based perovskite

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