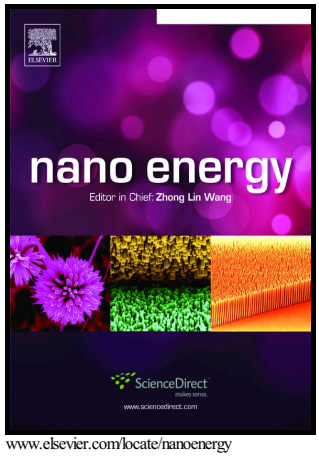


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# Low-dimensional Perovskite Interlayer for Highly Efficient Lead-free Formamidinium Tin Iodide Perovskite Solar Cells

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## Abstract

Organic-inorganic hybrid lead halide perovskite solar cells (PSCs) have attracted tremendous attention in recent years due to the high device performance and the unique optoelectronic properties of perovskite materials. However, the toxicity of lead remains a concern for the further application and commercialization of this technology. Therefore, it is desirable to explore efficient lead-free PSCs. Here in the tin-based inverted PSCs, we introduced an ultrathin low-dimensional perovskite (LDP) interlayer close to the PEDOT:PSS/perovskite interface. The LDP structure advantageously assists the growth of perovskites close to the interface, resulting in improved film morphology and reduced trap states. We demonstrated that the trap passivation could effectively suppress charge carrier accumulation and recombination in the device. As a consequence, a champion power conversion efficiency of 7.05% was achieved, which is one of the highest reported efficiencies for the lead-free