

Title: Over 100 nm Electron-Hole Diffusion Length in Lead-Free Double Perovskite Films

Abstract:

The toxicity of lead limits the industrial application of promising organic-inorganic lead-based perovskites. Here, we report an environmentally friendly double perovskite, Cs₂AgBiBr₆, with attractive photophysical properties and photovoltaic performance. We prepared Cs₂AgBiBr₆ films composed of single-layer particles and each particle is a single crystal. By applying transient photoluminescence spectroscopy, we uncover that the electron-hole diffusion lengths are greater than 100 nm. Together with the large absorption coefficient and high carrier mobilities, devices based on planar TiO₂ exhibit an average power conversion efficiency of above 1% with a maximum value of 1.22%. Further efficiency enhancements are expected through the optimization of the absorption range of double perovskites as well as interfacial engineering. The reported double perovskite solar cells represent a step towards the realization of environmentally friendly solar cells.