Organometal Halide Perovskites as Visible-Light Sensitizers for Photovoltaic Cells
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Abstract
Two organolead halide perovskite nanocrystals, CH$_3$NH$_3$PbBr$_3$ and CH$_3$NH$_3$PbI$_3$, were found to efficiently sensitize TiO$_2$ for visible-light conversion in photoelectrochemical cells. When self-assembled on mesoporous TiO$_2$ films, the nanocrystalline perovskites exhibit strong band-gap absorptions as semiconductors. The CH$_3$NH$_3$PbI$_3$-based photocell with spectral sensitivity of up to 800 nm yielded a solar energy conversion efficiency of 3.8%. The CH$_3$NH$_3$PbBr$_3$-based cell showed a high photovoltage of 0.96 V with an external quantum conversion efficiency of 65%.