Title:	Layered Cs4CuSb2Cl12 Nanocrystals for Sunlight-Driven Photocatalytic Degradation of Pollutants
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Abstract:	Introduction of lead-free halide two-dimensional (2D) double perovskite with two mixed valent metals not only deals with toxicity issues but also shows tunable properties, for example, indirect to direct band gap conversion. In this category, a layered copper-antimony halide perovskite Cs4CuSb2Cl12 has been synthesized in recent years showing direct band gap with potentiality toward photovoltaic, magneto-electric or magneto-optic, and photoelectrochemical applications. This work reports a bottom-up synthetic protocol for obtaining direct band gap monodisperse (~3.9 nm) Cs4CuSb2Cl12 nanocrystals (NCs) utilizing the hot injection approach and their application as a photocatalyst in ferricyanide reduction and dye degradation. These nanocrystals possessing single unit cell thickness have strong absorption throughout the visible region, indicating that this could be a promising material as a photovoltaic absorber and a visible-light-driven photocatalyst. This process is very straightforward, reproducible, and does not require strict control on temperature, as well as stable nanocrystals can be easily dispersed in suitable solvents (e.g., toluene, chloroform). This finding is very relevant to further extending the synthetic protocol for other 2D-layered perovskite nanocrystals and to understand the quantum confinement effect due to nanosize on their property. Efficient sunlight-driven photocatalytic activity of these Pb-free “green” NCs has been revealed, for the first time, toward metal-centered redox and dye degradation reactions, and their activity has been found to be almost 1 order of magnitude higher than their bulk counterpart.
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