Title:	Halide Double Perovskites Cs 4 CuSb 2 Cl 12 and Cs 2 AgSbCl 6 : Synthesis and Photocatalytic Application
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Abstract:	Perovskite nanocrystals (NCs) have gained substantial attention due to their defect tolerant nature, high absorption coefficient, and good charge carrier mobility making them suitable for photovoltaic and optoelectronic applications. For the past few years, lead halide- based perovskites have been developed and achieved excellent electrical and optical properties, but the stability and toxicity issues led to the search for alternative materials. For this, lead- free halide double perovskites became promising due to their higher stability and less toxicity, hence the properties of such materials have been well studied for potential applications. In this thesis, the synthesis and characterization of 2D layered Cs 4 CuSb 2 Cl 12 NCs through a facile hot injection synthetic method has been described. The chemical and structural characterizations have been carried out using UV-Vis spectroscopy, PXRD, AFM, TEM, and EDX, and the thermal properties were studied using TGA and DSC. The synthesized NCs are found to be phase pure and have good thermal and moisture stability with narrow bandgap suitable for solar cell applications. Apart from photovoltaics and optoelectronics, the high stability and bandgap tunability allow perovskite materials to work effectively in photocatalysis under sunlight. Since lead halide perovskites have been ruled out from many applications due to its toxicity, a variety of halide double perovskite materials have been investigating for potential applications but their exploration in photocatalysis is rare. Thus, in this work, the photocatalytic properties of Cs 2 AgSbCl 6 and Cs 2 Ag x Cu (1-x) SbCl 6 (x = 0.25, 0.5, 0.75) intermediates have been examined through the photodegradation reaction of MB dye. The photocatalysts were synthesized via acid-mediated solution-phase synthetic route. The results show that Cs 2 AgSbCl 6 exhibits good stability and photocatalytic activity hence can be used as an efficient photocatalyst for dye degradation but a poor degradation rate has been shown by the intermediates.
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