



One-step synthesis and optical evaluation of hollow CdSe nanospheres with controllable morphology

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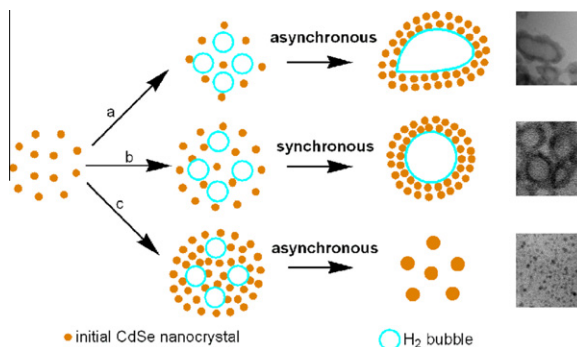
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HIGHLIGHTS

- ▶ The synthesis method was novel, simple and convenient.
- ▶ H₂ bubbles were used as soft templates to form hollow CdSe nanospheres, and the product morphology was controllable.
- ▶ The outer diameter of hollow nanospheres was smaller than those in previous works.
- ▶ The as-prepared hollow CdSe nanomaterials exhibited peculiar optical property.

GRAPHICAL ABSTRACT

The generation rate of initial CdSe nanocrystals and H₂ bubbles was the key to prepare hollow nanomaterials. When the generation rate of initial CdSe nanocrystals was synchronous with that of H₂ bubbles, the ideal hollow nanospheres were obtained. Conversely, if the generation rate of initial CdSe nanocrystals and H₂ bubbles was asynchronous, grain-like nanoparticles or distorted hollow nanospheres were achieved.



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ABSTRACT

A straightforward one-step route was developed to synthesize hollow CdSe nanospheres with adjustable inner and outer diameters. This proposed method was efficient and green because it adopted nontoxic trisodium citrate as stabilizing reagent, operated under ambient condition and only used water as reaction solvent. The desired hollow and grain-like CdSe nanospheres could be synthesized by expediently regulating the reaction conditions. Especially, this work focused on studying the influence of solution pH on the morphology and optical characteristics of the hollow CdSe nanospheres, and discussing the formation mechanism using H₂ bubbles as soft templates in detailed. The results suggested that the synchronous formation rate of initial CdSe nanocrystals and H₂ bubbles was the key to prepare hollow nanospheres. This facile one-step synthesis of hollow CdSe nanospheres with controllable morphology and peculiar optical property will be a reference and can be spread to the synthesis of other hollow nanomaterials.

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1. Introduction

Because of tailored structure, hollow inorganic micro and nanomaterials as new materials have received increasing

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