



PVP-assisted assembly of lanthanum carbonate hydroxide with hierarchical architectures and their luminescence properties

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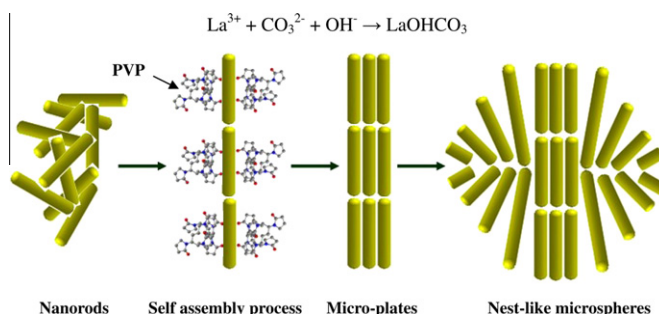
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HIGHLIGHTS

- Hierarchical LaOHCO₃ was synthesized by a simple PVP-assisted hydrothermal route.
- The LaOHCO₃ was assembled by numerous nanorods with uniform size.
- The morphology of LaOHCO₃ can be adjusted by changing the reaction time.
- The optical property of LaOHCO₃ with different morphology was studied.
- The luminescence property of LaOHCO₃ was size- and shape-dependent.

GRAPHICAL ABSTRACT



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ABSTRACT

In the presence of polyvinylpyrrolidone (PVP), three-dimensional (3D) hierarchical nest-like architecture of lanthanum carbonate hydroxide (LaOHCO₃) with uniform size is successfully synthesized by a facile hydrothermal process using La(NO₃)₃ as the starting material. The result indicates that LaOHCO₃ microspheres are constructed layer-by-layer from a large number of two-dimensional plates, which are composed of numerous nanorods with a length of ~50 nm. The formation mechanism is discussed on the basis of the result of a time-dependent experiment. It is demonstrated that PVP played an important role in the formation of the hierarchical structure. The room temperature photoluminescence properties of the LaOHCO₃ with different morphologies and size are investigated, showing that the nest-like LaOHCO₃ exhibits a relative stronger luminescence intensity at 420 nm than the synthesized rod- and apple-like LaOHCO₃ samples.

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1. Introduction

Rare-earth compounds have received significant attention in the area of electronics, photonics and magnetism due to their extraordinary crystal type, shape, size and composition [1]. Nowadays, much attention has been focused on the synthesis of lanthanide compounds. And there have been many reports for the synthesis of lanthanide oxides (La₂O₃) [2–5], lanthanide hydroxide (La(OH)₃) [6–9], and lanthanide carbonate (La₂(CO₃)₃)

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