The influence of Microwave-Assisted Hydrothermal and Capping reagent on $SrMoO_4$ Phosphors Photophysical Properties

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Introdução

Molybdate materials with a scheelite structure, how $SrMoO_4$ (SMO), is an important material type that presents a high application potential and practical applications in various fields, e.g. photoluminescence, solid state laser, optical fibers, scintillator materials, humidity sensor, magnetic materials and catalysts [1]. Due to their excellent thermal and chemical stability, molybdates are considered good hosts for luminescent materials. The Microwave-Assisted Hydrothermal (MAH) method is promising for fabricating ideal micro- and nanometric material with appropriate morphologies. The microwave energy accelerates the formation of well organized nanostructures, particles with a controllable size and shape, high crystallinity and low agglomeration can be obtained using this synthetic route [2].

In this work the influence of the synthesis method on the morphology, particle size, dispersion uniformity and on the optical properties of $SrMoO_4$ were observed through the use of MAH method. Based on experimental results, it is proposed that the synthesis method and applied experimental parameters can modify PL properties in accordance with the optical properties desired.

Resultados e Discussão

The all SMO samples were crystalline and showed scheelite-type phases by DRX, Raman and FTIR data. Nevertheless, different disorder degree at short- and intermediate-ranges in the crystalline structure were observed by Raman spectroscopy which is an effective tool for studying the structural order and disorder. These observations demonstrate that these materials have different levels of deep defects which depend upon thermal treatment and the addition of a capping reagent. PL emission suggest that both facts can provoke alterations in structure because of the residual stresses induced in systems, accordingly influence in their properties.

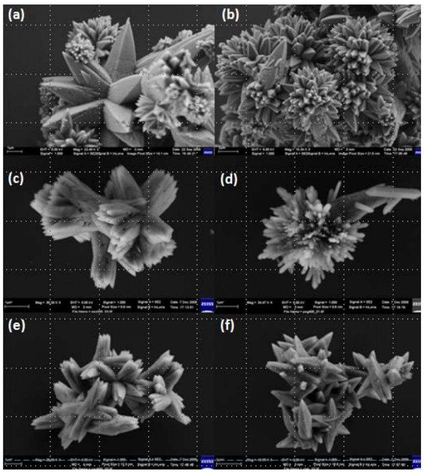

Figure 1. FE-SEM images of $SrMoO_4$ pure. SMO-1 (a), SMO-2 (b), SMO-3 (c), SMO-4 (d), SMO-5 (e), SMO-6 (f).

The influence of the pressure on hydrothermal conditions and the introducing of the surfactant (capping reagent) in the control the growth of crystals can be visible in FE-SEM micrographs (Figure 1).

Conclusões

This simple method can be probably expanded to produce others materials with novel morphologies and different properties.

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