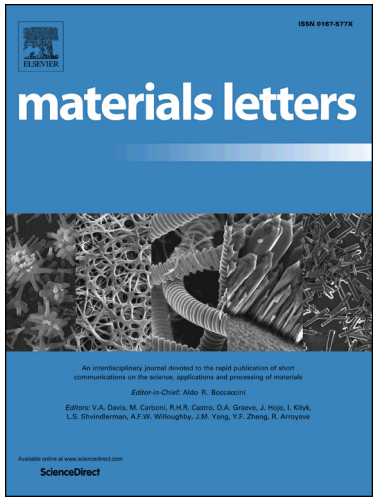

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Synthesis of $CeNb_3O_9$ perovskite by Pechini method

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Abstract

Pechini method was applied for the first time to synthesize $CeNb_3O_9$ perovskite at different calcination temperatures (600, 800 and 1000°C). A solution of water, citric acid, ethylene glycol, ammonium niobium oxalate and cerium ions was polymerized and calcined at 300°C for 2 hours. The precursor gels were submitted to a second calcination at 600, 800 and 1000°C to obtain perovskite at different temperatures. These materials were characterized through X-ray diffraction (XRD), thermogravimetric analysis (TGA), N_2 physisorption, scanning electron microscopy (SEM) coupled with energy dispersive spectroscopy (EDS), diffuse reflectance spectroscopy (DRS-UV_{vis}) and Fourier transform infrared spectroscopy (FTIR). Results showed the formation of perovskite only at 1000°C and Nb_2O_5-CeO_2 mixed oxides at lower temperatures with some interesting characteristics. Pechini technique allows the synthesis of cerium niobate perovskite at lower temperatures than those presented in the literature (prepared by different methods).

Keywords: Pechini method, Perovskite, Cerium niobate, $CeNb_3O_9$.

1. Introduction

Perovskites belong to a crystalline ceramic group of materials whose structure is ABO_3. Oxygen vacancies (OV) are common in these materials and are extremely important for the oxygen ionic conduction. They allow oxygen ions to be selectively transported by a hopping mechanism in which there is a gradient in oxygen chemical potential. This is feasible only when the oxygen ions possess sufficient thermal energy to overcome the energy barrier to transfer the ion [1-3]. The total positive valence of cations A and B are equal to the total negative valence of oxygen anions. However, this is a theoretical concept, since perovskite exists as $ABO_{3\pm\delta}$, where delta represents the deficiency or excess of oxygen