عنوان مقاله:

Determining the optimal conditions for calcium titanate nanoparticles synthesized via mechanical alloying method

محل انتشار:

مجله سرامیک های پیشرفته, دوره 1, شماره 1 (سال: 1394)

تعداد صفحات اصل مقاله: 6

نویسندگان:

Sahebali Manafi - *Department of Engineering, Islamic Azad University*

Mojtaba Jafarian - *Department of Engineering, Islamic Azad University*

Morteza Jafarian - *Department of Engineering, Islamic Azad University*

خلاصه مقاله:

In this research, calcium titanate nanoparticles have been synthesized via mechanical alloying (MA). By changing the parameters of mechanical alloying, optimal conditions for synthesis of this compound was determined. For synthesis of this compound, a mixture of calcium hydroxide and titanium dioxide, rotation speed of ۲۵۰ rpm and differnet ball to powder weight ratio was used. Phase investigation, morphology and structure of calcium titanate powder obtained were evaluated by X-ray diffraction (XRD), scanning electron microscopy (SEM) and Energy-dispersive X-ray Spectroscopy (EDS) respectively.The results of the X-ray diffraction analysis confirmed the formation of single-phase calcium titanate nanoparticles with cubic crystal structure. The agglomeration of powder has been shown in SEM images. According to the results, the minimum of ball to powder weight ratio for synthesizing this compound via mechanical alloying and without using heat treatment was ۵۰:۱ and milling time of ۶۰ h. In this situation the range of grain size (apparent size) using Williamson-Hall equation is ۷۰ nm. The results of Zetasizer showed that the major part of the particle size distribution was in the range between ۶۰ to ۸۰ nm and this confirms the results of Williamson-Hall equation and SEM images. Also, by using of Nelson-Riely and Cohen equations for assessing the lattice parameter, it was found that by increasing milling time to ۶۰ h, lattice parameter values has been closed to ideal values of calcium titanate phase.

کلمات کلیدی:

mechanical alloying, Calcium titanate, Nanoparticle, Perovskite