

Preparation and characterization of $\text{Ba}_{0.77}\text{Ca}_{0.23}\text{TiO}_3$ ceramics

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Abstract

Barium calcium titanate ceramics with composition $\text{Ba}_{0.77}\text{Ca}_{0.23}\text{TiO}_3$ (BCT23) were prepared by solid state reaction. Appropriated amounts of BaCO_3 , CaCO_3 and TiO_2 were mixed for 96 h by ball milling in isopropyl alcohol. A systematic study of temperature and time of the calcination was performed aiming to determine the experimental conditions to obtain the BCT23 phase. It was only observed the BaTiO_3 (BT) and CaTiO_3 (CT) phases at calcination temperature up to 1200 °C and time up to 12 h. However, it was possible to obtain the BCT23 phase by increasing the temperature for 1250 °C for 12 h. In order to obtain ceramics without Ti-rich liquid phase in grain boundary, it was development two methodologies for preparing the ceramics: 1- Methodology I: ceramics were prepared by uniaxially pressing of the powders calcined at 1250 °C for 12 h and 2- Methodology II ceramics were prepared by uniaxially pressing of the powders calcined at 1100 °C for 2 h. The methodology utilized to prepare the ceramics influenced on the microstructure, relative density and dielectric properties of the ceramics. Denser ceramics with better dielectric properties and without Ti-rich phase segregate in the grain boundary were obtained by using Methodology II.

Key words: BCT, dielectric property, solid state reaction.