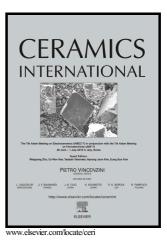
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Influence of feedstock concentration on tetragonality and particle size of hydrothermally synthesized barium titanate powders

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Abstract

Barium titanate (BaTiO₃) powders were synthesized through hydrothermal process with Ba(OH)₂·8H₂O and TiO₂. By increasing the feedstock concentration (FC) from 0.25 to 1.50 M, BaTiO₃ powders maintain a stable average particle size (~180 nm and ~6.4441 m²/g) with an increasing tetragonality (c/a: 1.0065 ~ 1.0075). Johnson-Mehl-Avrami and standard reaction rate equations were adopted to analyze the kinetic process of BaTiO₃ formation. The reaction is governed by first-order and phase-boundary-controlled mechanism for 0.25 M and 1.50 M, respectively. Lower extent of reaction is believed to lead to the better tetragonality for BaTiO₃ powders fabricated with higher FC. On the other hand, the relative stable particle size is correlated with the unvaried nucleation frequency and grain growth rate with various FC. This work can provide a guideline to manipulate the properties of BaTiO₃ powders used in electronic industry.

USCIN

Keywords: Barium titanate; Hydrothermal synthesis; Tetragonality enhancement; Stable particle size; Kinetics analysis

1. Introduction

 $BaTiO_3$ is the most widely investigated perovskite material due to its piezoelectric and ferroelectric properties. Various synthesis methods have been developed for $BaTiO_3$ fabrication [1-6]. Hydrothermal

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