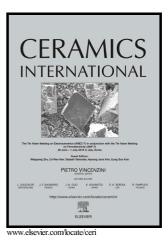
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Low dielectric loss of Bi-doped BaZr_{0.15}Ti_{0.85}O₃ ceramics for

high-voltage capacitor applications

Yan Zhang^{1,2}, Yaoyao Li^{1,2}, Haikui Zhu^{1,2}, Zhenxiao Fu³, Qitu Zhang^{1,2}*

Abstract

BaZr_{0.15}Ti_{0.85}O₃ ceramics are prepared via the conventional solid state reaction method. The effects of Bi₂O₃·3TiO₂ doped on dielectric properties and breakdown strength of BaZr_{0.15}Ti_{0.85}O₃ ceramics are systematically discussed. Doping of Bi₂O₃·3TiO₂ can obviously improve the breakdown strength and reduce the dielectric loss of the material. It is attributed to the Bi³⁺ substituted Ba²⁺ is an unequal ion substitution, and two Bi³⁺ substitute three Ba²⁺ to produce an A vacancy, thereby increasing the lattice energy and promoting the diffusion and migration of the particles during the sintering process, promoting the sintering and reducing the sintering temperature. However, the dielectric constant of the material is decreased. When the amount of Bi₂O₃·3TiO₂ is 12 mol%, the minimum dielectric loss tan δ = 0.0009, the maximum breakdown strength is E_b = 15.09 kv/mm, the insulation resistivity is $3.52 \times 10^{11} \Omega \cdot cm$. The energy storage density of the BaZr_{0.15}Ti_{0.85}O₃ ceramic samples doped with Bi₂O₃·3TiO₂ varies from 0.008 J/cm³ to 0.012 J/cm³.

Keywords: Dielectric properties; $Bi_2O_3 \cdot 3TiO_2$ doped; Breakdown strength; High-voltage capacitor; Low tan δ

1. Introduction

In recent years, BaZr_xTi_{1-x}O₃ (BZT) ceramics have gotten much attention from the

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