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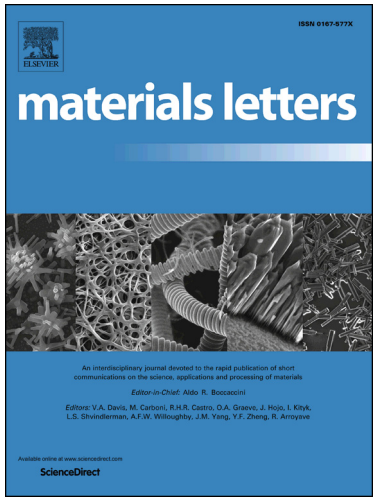

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Lingxia Li, Ruijie Wang, Shihui Yu, Zheng Sun, Haoran Zheng

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Novel tin-doped $BaTiO_3$ ceramics with non-reducibility and colossal dielectric constant

Lingxia Li*, Ruijie Wang, Shihui Yu**, Zheng Sun, Haoran Zheng

School of Microelectronics and Key Laboratory for Advanced Ceramics and Machining Technology of Ministry of Education; Tianjin 300072, China

**Corresponding author. Tel./fax: +86 2227402838, E-mail: lilingxia_tju66@126.com (L. Li);*

***Corresponding author. Tel./fax: +86 2227402838, E-mail: ysh728@126.com (S. Yu)*

Abstract

Novel $BaTiO_3$-based ceramics with non-reducibility and colossal dielectric constant were successfully synthesized by conventional solid-state route through the doping of Sn ions. Electrical measurements indicate that the Sn-doped $BaTiO_3$ ceramics show excellent dielectric and non-reductive properties. Compared with the Sn-doped $BaTiO_3$ ceramics sintered in air, the dielectric constant, loss tangent and insulation resistance almost have no change for the samples sintered in H_2-N_2. The Sn-doped $BaTiO_3$ ceramics sintered in H_2-N_2 show a colossal dielectric constant (1.2×10^4@1 kHz), low loss tangent (~1.0% at 1 kHz), and acceptable insulation resistance (4.5×10^{10} Ω•cm). The mechanisms of anti-reduction and colossal dielectric constant are proposed.

Keywords: Ceramics; Dielectrics; Electrical properties; Sintering

1. Introduction

$BaTiO_3$ (BT) based dielectric materials are used in MLCC (Multi-Layer Ceramic Capacitor) for their friendly-environment, moderate dielectric constant and low-loss. Up until today, most MLCCs are manufactured with expensive inner electrodes of Pd or Pd-Ag alloys [1-2]. Generally, the cost of inner electrodes accounts for more than 70% of the total device cost [3]. Therefore, it is an effective way to