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Effects of $BaCO_3$ addition on the microstructure and electrical properties of La-doped barium titanate ceramics prepared by reduction-reoxidation method

Hao Zu, Qiuyun Fu*, Chao Gao, Tao Chen, Dongxiang Zhou, Yunxiang Hu, Zhiping Zheng, Wei Luo

School of Optical and Electronic Information, Huazhong University of Science and Technology, Wuhan, 430074, China

Engineering Research Center for Functional Ceramics, Ministry of Education, China

*Author to whom correspondence should be addressed.

E-mail address: fuqy@hust.edu.cn.

Abstract

Effects of trace $BaCO_3$ addition were investigated on microstructure and electrical properties of La-doped $BaTiO_3$ ceramics prepared via reduction-reoxidation method. The addition of $BaCO_3$ could effectively facilitate the densification and grain growth of ceramics. SEM images suggested that numerous pores presented in ceramics due to the decomposition of $BaCO_3$ to expel generated CO_2 gas. The presence of pores promoted reoxidation of the reduced ceramics. As a result, lowering room-temperature (RT) resistivity and improving PTCR jump were simultaneously achieved as suitable amount of $BaCO_3$ was added. An optimal addition of 0.3 mol% $BaCO_3$ led to a low RT resistivity of about 28 Ωcm and a PTCR jump up to $10^{3.7}$ after ceramics were fired at 1100 °C in high-purity N_2 and reoxidized at 800 °C in air.

Keywords

PTCR; Reduction-reoxidation method; $BaCO_3$; Densification

1. Introduction

It is well known that ferroelectric $BaTiO_3$-based ceramics have become one of the most promising materials for electronics. Due to their ferroelectric features, donor-doped $BaTiO_3$ ceramics can exhibit a significant positive temperature coefficient of resistivity (PTCR) effect,