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Effects of BaCO₃ addition on the microstructure and electrical properties of La-doped barium titanate ceramics prepared by reduction-reoxidation method

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Abstract

Effects of trace BaCO₃ addition were investigated on microstructure and electrical properties of La-doped BaTiO₃ ceramics prepared via reduction-reoxidation method. The addition of BaCO₃ could effectively facilitate the densification and grain growth of ceramics. SEM images suggested that numerous pores presented in ceramics due to the decomposition of BaCO₃ to expel generated CO₂ 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 BaCO₃ was added. An optimal addition of 0.3 mol% BaCO₃ 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 N₂ and reoxidized at 800 °C in air.

Keywords

PTCR; Reduction-reoxidation method; BaCO₃; Densification

1. Introduction

It is well known that ferroelectric BaTiO₃-based ceramics have become one of the most promising materials for electronics. Due to their ferroelectric features, donor-doped BaTiO₃ ceramics can exhibit a significant positive temperature coefficient of resistivity (PTCR) effect,

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