Effects of Sintering Parameters on Structures and Properties of Positive Temperature Coefficient Barium-Strontium Titanate Ceramics

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Abstract

Antimony and manganese doped barium-strontium titanate ceramics with various heating and cooling rates were prepared. Microstructures and electrical properties were investigated by using XRD, SEM, impedance analyzer and temperature dependent resistivity(ρ-T characteristic) techniques. The lowest resistivity at room temperature and grain boundary resistance of about 164 Ω-cm and 20.5 Ω were obtained with the heating and cooling rates increased to 300 C h-1. After the heating or cooling rate increased to 1200 C h-1, the room temperature resistivities and grain boundary resistances gradually rose to 211 Ω-cm and 28.5 Ω or 228 Ω-cm and 82 Ω, respectively. The maximum resistivity decreased sharply when increasing in heating or cooling rate. Densities, the amount of Ba6Ti17O40 and Ba2TiSi2O8 second phases, microstructures, and electrical properties were found to be strongly dependent on the heating and cooling rate during sintering.