



Dielectric behavior of spark plasma sintered BaTi_{0.7}Zr_{0.3}O₃ relaxor ferroelectrics

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Abstract:

In the present work we have studied the transport and dielectric behavior of BaTi_{0.7}Zr_{0.3}O₃ (BTZ30) relaxor ferroelectrics prepared by spark plasma sintering. Nanocrystalline powder of BTZ30 was obtained by solid state reaction followed by mechanical milling. Fine and coarse-grained ceramics of BTZ30 were prepared by spark plasma sintering at 1100 and 1400 °C, respectively. The obtained materials were characterized by X-ray diffraction and scanning electron microscopy. The grain size of the BTZ30 ceramics increased from 200 nm to 3.5 μm as the sintering temperature was increased from 1100 °C to 1400 °C. The electrical and dielectric properties of BTZ30 ceramics were studied by impedance spectroscopy over -150 to +200 °C temperature range. The dielectric constant exhibits very large values >10⁵ for the spark plasma sintered ceramics associated with very high dielectric loss and electrical conductivity. The insulating nature of the BTZ30 ceramics could be retained by re-oxidation of the samples. The dielectric data of the annealed have been analyzed by the modified Curie-Weiss law and the relaxation process in the materials was fitted by Vogel-Fulcher model.

Keywords:

Barium titanate zirconate Relaxor ferroelectrics Spark plasma sintering Dielectric properties

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