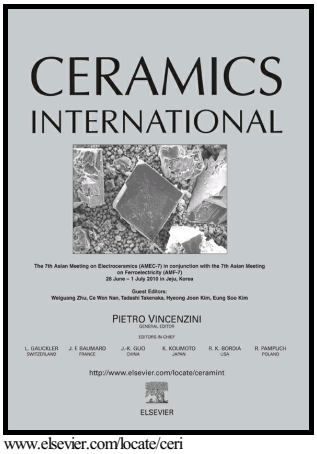

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Poonam Yadav, Shivani Sharma, N.P. Lalla

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Poonam Yadav, Shivani Sharma, N.P.Lalla

UGC-DAE Consortium for Scientific Research Indore, India

Abstract

Synthesis, formation, structural phase transition, dielectric and magnetic properties of polycrystalline $Ba_{0.90}Mn_{0.10}TiO_3$ (BMTO) ceramic have been investigated to study the effect of magnetic ion (Mn) doping at Ba-site in the well-known ferroelectric (FE) material $BaTiO_3$ (BTO). The polycrystalline ceramic BMTO has been prepared via solid state reaction route. The Wyckoff-site occupancy of the substituted Mn has been determined through x-ray diffraction (XRD) and soft X-ray absorption measurement via confirmation of its oxidation state to be 2+ and that of Ti to be 4+. The temperature dependent XRD, dielectric and pyroelectric studies show all the known transitions similar to the pristine BTO. However, the transition temperatures (T_c) were found shifted towards lower temperatures as compare to the pristine BTO. The shifts in T_c corresponding to cubic-tetragonal and tetragonal-orthorhombic transitions are significant as compared to that of orthorhombic-rhombohedral transition. Frequency dependent dielectric measurements show the space-charge related dielectric relaxation. The dc-magnetization measurements show antiferromagnetic interactions in BMTO. Our results also address the role of Ba site on the ferroelectric properties of BTO.

Keywords: Magneto-Electrics; Multi-feroics; Ferroelectrics; Dielectric relaxation; BaTiO3

Introduction:

In recent years, multiferroic materials typified by the coexistence of two ferroic orders, ferroelectricity and magnetism have attracted much attention because of its potential application in high density data storage [1]. There are very few materials which possess such multiferroic and magneto-electric properties [2,3,4,5]. In ABO_3 perovskite based materials the $BaTiO_3$ (BTO) is well known due to its interesting properties like ferroelectricity, large dielectric constant,