

International Conference and Expo on Ceramics

August 17-18, 2015 Chicago, USA

Progress of lead-free ferroelectric dielectric ceramics: $(\text{Bi}_{0.5}\text{Na}_{0.5})\text{TiO}_3$

E A Zereffa

Dilla University, Ethiopia

In recent years, ferroelectric ceramic capacitors have attracted considerable attention due to their potential application in energy storage devices. They become one of the most promising materials for vibration energy harvesters, with the advantages of simple configuration, miniaturized size, higher efficiency and cost-effective fabrication. Lead containing perovskite-type mixed metal oxides at phase boundaries have been found to be extensively useful because of their excellent ferroelectric and piezoelectric properties. However, in order to minimize the use of toxic lead, several other materials have been investigated, of which Bismuth Sodium Titanate (BNT) was found to be promising as an environmentally friendly alternative to PZT. The effects of sintering temperature and doping on structure, microstructure, dielectric, phase transition temperature and piezoelectric properties of $0.94(\text{Bi}_{0.5}\text{Na}_{0.5})\text{TiO}_3$ - 0.06BaTiO_3 (BNT-6BT) ceramics prepared by solid sintering technique at 1050-1200 °C were investigated. The X-ray diffraction patterns showed that all of the BNT-6BT modified ceramics exhibited a single perovskite structure with monoclinic phase. Fine and homogeneous grains were observed for samples sintered at 1100°C and 1150°C and the increase of the sintering temperature upto 1180°C-1200°C induces significant grain growth with the appearance of coarse grains. Co-doping of 1% Mg and Nb raised the dielectric constant while single doping with Nb lowered it. Increase in $(\text{Mg}_{1/3}\text{Nb}_{2/3})^{4+}$ concentration up to 15% increased the transition temperature from 275oC to 339oC and lowered the dielectric constant.

Biography

E A Zereffa obtained his BSc & MSc degrees from the University of Addis Ababa in Chemistry. He worked as a Chemistry Teacher for four years in Catholic Mission School after his first degree and as a Lecturer in Dilla university for four years after MSc. He has completed his PhD from Andhra University in chemistry and is presently working in the same university as an Assistant Professor and the Leader of Thematic Research on the subject of 'Low Cost High Quality Ceramic Materials for the Development of Innovative Small Scale Production Enterprises'.

enyewama@yahoo.com

Notes: