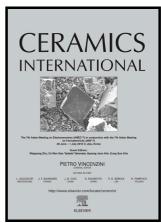
Author's Accepted Manuscript

Effect of CuO addition on magnetic and electrical properties of Sr₂Bi₄Ti₅O₁₈ lead-free ferroelectric ceramics

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www.elsevier.com/locate/ceri

PII: S0272-8842(15)02424-4

DOI: http://dx.doi.org/10.1016/j.ceramint.2015.12.126

Reference: CERI11921

To appear in: Ceramics International

Received date: 17 November 2015 Accepted date: 22 December 2015

Cite this article as: E. Elayaperumal and M. Malathi, Effect of CuO addition of magnetic and electrical properties of Sr₂Bi₄Ti₅O₁₈ lead-free ferroelectric e r a m i c s , *Ceramics International* http://dx.doi.org/10.1016/j.ceramint.2015.12.126

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$Effect\ of\ CuO\ addition\ on\ magnetic\ and\ electrical\ properties\ of\ Sr_2Bi_4Ti_5O_{18}\ lead-free$ $ferroelectric\ ceramics$

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Abstract

The effect of CuO addition on magnetic and electrical properties of Sr₂Bi₄Ti₅O₁₈ (SBT) lead-free bismuth layered structure ferroelectric ceramics have been studied and reported. Interestingly, the prepared samples exhibit multiferroic behavior with the coexistence of magnetic and ferroelectric phase transition temperature. Magnetic phase transition with Neel's temperature (T_N) of 657 K is observed at 0.75 mol %, which is higher than the well known multiferroic BiFeO₃ (643 K) and the ferroelectric phase transition with Curie temperature (T_C) of 587 K is observed at 1 mol %, which is relatively higher than the reported pure SBT ceramics (558 K). Further, the electrical properties such as dielectric, ferroelectric, piezoelectric, leakage current density characteristics and optical properties were investigated as a function of x (x = 0, 0.25, 0.5, 0.75 and 1 mol %). Presence of strong magnetic super-exchange interactions in CuO and the creation of oxygen vacancies play a vital role in the enhancement of magnetic and electrical properties of CuO doped SBT ceramics. Moreover, the present results indicate that, small amount (0.25 mol %) of CuO addition in SBT ceramics enhances the electrical properties significantly and vice versa, large amount (0.75 mol %) of CuO addition enhances the magnetic properties. Thus, the presence of magneto-electric coupling effect was observed in CuO doped Sr₂Bi₄Ti₅O₁₈ ferroelectric ceramics.

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