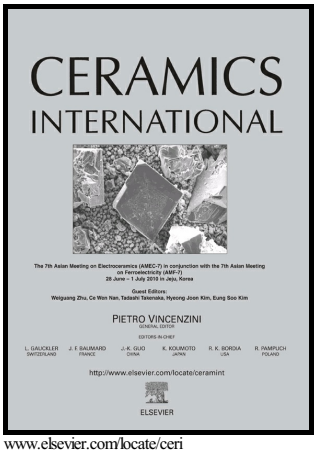

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PII: S0272-8842(18)30235-9
DOI: https://doi.org/10.1016/j.ceramint.2018.01.219
Reference: CERI17351

To appear in: *Ceramics International*

Received date: 23 November 2017
Revised date: 19 January 2018
Accepted date: 26 January 2018

Cite this article as: Alexander N. Bondarchuk, Alexander B. Glot and Alma R. Velasco-Rosales, Effects of Sb and Nb dopants on electrical and microstructural properties of low-voltage varistor ceramics based on SnO_2, *Ceramics International,* https://doi.org/10.1016/j.ceramint.2018.01.219

Effects of Sb and Nb dopants on electrical and microstructural properties of low-voltage varistor ceramics based on SnO_2

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Abstract

It is shown that an addition of Sb_2O_5 or Nb_2O_5 (0.05-0.15 mol.%) to the system SnO_2–CoO–Cr_2O_3–Bi_2O_3 leads to the enhancement of grain growth. This effect is associated with the presence of the liquid Bi-phase in ceramics during sintering. The obtained ceramics possess non-linear current-voltage characteristics and can be used for preparing low voltage varistors. The non-linearity coefficient α reaches 22 and the characteristic electric field 692 V/cm for Nb-doped materials and 11 and 421 V/cm respectively for Sb-doped ceramics materials. The results of dc and ac electrical measurements, as well as scanning electron microscopy are presented and discussed in terms of the known barrier model for varistors.

Keywords

B. Grain boundaries; Grain growth; Tin dioxide ceramics. C. Potential barrier; Low–voltage varistors.

1. Introduction