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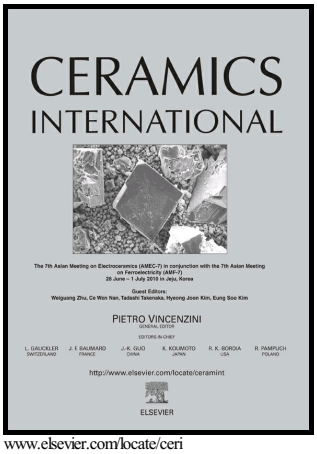
Guo-Zhong Zang, Xiao-Fei Wang, Li-Ben Li, Dan-Dan Wang



www.elsevier.com/locate/ceri

PII: S0272-8842(17)30472-8
DOI: http://dx.doi.org/10.1016/j.ceramint.2017.03.100
Reference: CERI14869

To appear in: *Ceramics International*

Received date: 9 March 2017
Revised date: 16 March 2017
Accepted date: 16 March 2017

Cite this article as: Guo-Zhong Zang, Xiao-Fei Wang, Li-Ben Li and Dan-Dan Wang, The effect of Sm_2O_3 on the microstructure and electrical properties of SiO_2-doped SnO_2-Zn_2SnO_4 ceramic varistors, *Ceramics International*, http://dx.doi.org/10.1016/j.ceramint.2017.03.100

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Guo-Zhong Zang, Xiao-Fei Wang, Li-Ben Li, Dan-Dan Wang

School of Physics and Engineering, Henan University of Science and Technology, Luoyang 471003, China

E-mail: zangguozhong@sina.com

Abstract:

In this work, Sm_2O_3- and SiO_2-codoped SnO_2-Zn_2SnO_4 ceramic varistors were prepared through traditional ceramic processing, and the effect of Sm_2O_3 on the resulting microstructure and electrical properties was investigated. The results demonstrated that the ceramics were composed mainly of SnO_2 and Zn_2SnO_4, and Sm was distributed homogeneously in the grains and along the grain boundaries. With 0.2 mol% Sm_2O_3 doping, the grain growth was obviously promoted. Further increases in Sm_2O_3 to 0.4 mol% resulted in trace amount of SiO_2 and segregations containing elemental Sm via X-ray diffraction patterns and microstructure photos, respectively. In the sample doped with 0.3 mol% Sm_2O_3, optimal electrical characteristics of α=9.4, E_B=10 V/mm, J_L=46 μA/cm^2 and ε'=1.2×10^4 were obtained. Simultaneously, the sample doped with 0.3 mol% Sm_2O_3 had the lowest conductance activation energy of 0.16 eV at temperatures lower than 110°C. This good performance indicates that Sm_2O_3- and SiO_2-codoped SnO_2-Zn_2SnO_4 composite ceramics are viable candidate for the manufacture of capacitor-varistor functional devices.

Key words: varistors; electroceramics; dielectric properties