

Effect of soda lime silica glass doping on ZnO varistor ceramics: dry milling method

ABSTRACT

There is a lack of reports where dry milling methods have been used in the preparation of varistor based ceramics. Dry milling methods have been demonstrated to be able to produce fine and homogeneous sample powders. Soda lime silica (SLS) glass powder have also been used as dopants in ZnO varistor ceramics. This work focuses on the effect of dry milling on the microstructural and electrical properties of $\text{ZnO}_{0.98-x}\text{SLS}_x\text{CoO}_{0.02}$. The sample mixtures were prepared via a solid state method with $x = 0.5, 1.0, 1.5,$ and 2.0 mol%. XRD managed to detect Zn_2SiO_4 as secondary phase in the sintered samples. The results show that the average grain size decreased from 26.1 to $21.6 \mu\text{m}$ and densities of the varistor samples increased as x increased. The varistor sample that was sintered at 1100°C and doped with 2 mol% SLS glass powder shows good electrical properties with nonlinear coefficient, $(\alpha) 6.97$, breakdown voltage 261.1 V/cm and leakage current (JL) $4.87 \mu\text{A/cm}^2$.

Keyword: Grain size; Leakage current; Milling; Varistor; Zinc oxide