

The degradation phenomena of SLS glass doped ZnO based varistor ceramics

ABSTRACT

A stability loss of varistor is subjected to any of variety extreme conditions such different stresses AC or DC, temperature, pulse, pressure, humidity, etc. This causes degradation phenomenon and leads to thermal runaway or failure of varistor. The investigation of degradation phenomena is an important subject for prolonging their lives. In this study, we investigate the degradation process of $\text{ZnO}_{1-x}\text{-CoO}_{2.0}\text{-SLS}_x$ varistor ceramics where $x = 0.5, 1.0, 1.5,$ and 2.0 mol % by using conventional solid state method at sintering temperature of $1100\text{ }^\circ\text{C}$ for 2 hour. The stability of their nonlinear properties was investigated under prolonged application of DC electric field at different SLS glass concentration. The degradation process was speeded up by applying direct current (DC) 85 % of electric field for 12 hours at temperature of $85\text{ }^\circ\text{C}$. A concentration of 2 mol % SLS glass doped ZnO varistor shows the best degradation properties as its nonlinear coefficient has increased by 3.56 %, the breakdown field has increased by 3.85 %, and the leakage current density (JL) increased by 2.40 % in comparison to its initial value.