Thermal shock effect in ageing behaviour of thick-film manganite-based electroceramics

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Abstract

Thick-film NTC thermistors, manufactured by traditional printing technology from transition-metal oxides are widely used for thermal stabilization, compensation, temperature sensing and control, etc. It is known that value of relative resistance drift at certain ageing temperature is a typical measure of their stability. The essence of this work is the experimental study of thermally induced degradation processes in thick-film NTC electroceramics based on Cu0,8Ni0,1Co0,2Mn1,9O4 and Cu0,1Ni0,8Co0,2Mn1,9O4 spinel-type chemical compositions. The obtained results (degradation tests were performed at 443 K) show clearly the sufficient resistance increase in the investigated films on the first stage of thermal exposure during 50 hours of ageing. This effect can be defined as thermal shock effect in degradation of thick-film electroceramics, it being not observed previously for these thermistor materials. The maximal resistance changes for Cu0,8Ni0,1Co0,2Mn1,9O4 film were registered near 12 % and, while for Cu0,1Ni0,8Co0,2Mn1,9O4 near 10 %. The anomalous behaviour of thermal degradation kinetics in the investigated thick-film electroceramics is supposed to be associated with incomplete intergranular contacts formed during technological route.