The Influence of ZnO Nanoparticles on the Dielectric Properties of Epoxy Resin

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Abstract. Interesting electrical properties represent the epoxy nanocomposites, because the addition of nanofillers to a pure epoxy resin demonstrate several advantages opposite to pure epoxy resin without nanofillers. In the last 20 years, the dielectric properties (the complex permittivity and dissipation factor) of epoxy nanocomposites had been evaluated and the results clearly show that they are lower than that of base epoxy and microcomposites when insulating oxides were used as the fillers. Nowadays the epoxy and epoxy based composites are preferred insulating materials for many electrical applications. The influence of the various concentrations of ZnO nanoparticles in epoxy resin Vukol 022 on the changes of the complex permittivity and dissipation factor has been measured at the temperature range from 20 °C to 120 °C by a capacitance method in the frequency ranges from 1 mHz to 1 MHz. In this contribution, we present a study of the influence of 1,0 wt.% and 5,0 wt. % concentrations of ZnO nanofillers on the dielectric properties of the epoxy resin. From the frequency dependence of dissipation factor, α-relaxation process and its shift to lower frequencies with ZnO fillers were observed.