

Influence of temperature on the magneto-dielectrics effect of oil-based ferrofluid

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Magneto-dielectrics effect of the transformer oil-based ferrofluid with magnetic nanoparticles upon the effect of an external magnetic field and temperature were studied by dielectric spectroscopy. The frequency dependence of complex permittivity and dissipation factor were measured within the frequency range from 1 mHz to 10 kHz by a capacitance method. The dielectrics parameters were measured as a function of the external magnetic field in the range of 0 – 200 mT, parallel to the direction of the electric field and as a function of temperature in the range of 15 – 35 °C. In the presence of the magnetic field the interaction between the magnetic field and magnetic moments of nanoparticles led to the aggregation of magnetic nanoparticles to new structures which had influence on dielectric parameters. The dependence of these parameters at constant magnetic field on angle between the direction of the electric and magnetic fields (anisotropy) has been measured, too.

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