Effect of water absorption on the dielectric properties of neat and nanosilica filled impregnating resins

Abstract:

Impregnating resins in high voltage machines are exposed to harsh environmental conditions characterized by high operating temperatures and high electric field. During maintenance humidity in the environment may lead to uptake of water and thus to a change of the material properties. In this study the impact of water uptake on the dielectric properties is investigated for neat epoxy- and UP-resins as well as for UP-resins with nano-scale silica fillers. Plate specimens were immersed in water at 50 °C. This leads to an uptake of moisture and thus an increase in weight. At regular intervals mass, loss tangent and relative permittivity are measured until weight as well as dielectric properties have reached steady state condition. It is shown, that the uptake of water varies with the type of polymer. Loss tangent and permittivity are rising with the content of water whereby the rise characteristic depends on the type of polymer. The effect of filler on water uptake as well as on dielectric properties is marginal.