

The Effect of Surface Modification on the Dispersion Stability of Alumina Nanoparticles in Transformer Oil

조강옥*, 송현우¹, 최 철¹, 오제명¹
충남대학교; ¹한전 전력연구원
(choko1004@nate.com*)

The transformer oils with dispersed nano-sized (<20nm) alumina particles were prepared by mechanical milling and hydrophobic surface modification. The agglomerated alumina nanopowders, diameters from μm to mm , were ground in a vertical super-fine grinding mill and surface-treated with oleic acid. The surface characteristics of modified nanoparticles were analyzed by FTIR spectroscopy. It showed that the hydrophobicity of nanoparticles was caused by esterification between hydroxyl groups on the particle surface and functional groups of the oleic acid. The dispersion stability of modified nanoparticles in oils was investigated by stability analyzer which was performed with the centrifugal force. The results indicated that the dispersion stability was highly affected by the surface modification conditions. In the surface modification procedure, elimination of H_2O as a byproducts of esterification and excess oleic acid which did not form stable chemical bonds with powder surface is very important to get a high dispersion stability.