

Investigation Seebeck effect of industrial high voltage transformer oil towards industrial insulator oil condition detection

ABSTRACT

Transformer oil serves as the main dielectric and interacts with solid insulation, encounters the environment, and conveys a lot of information. However, undesirable contamination of transformer oil like water or moisture in the transformer oil will reduce the transformer's effectiveness. This study is the first investigation of the potential of using the thermoelectric effect for transformer oil condition testing towards high voltage insulator oil condition detection. This study has found that the used oil sample with various percentages of water content produced a different Seebeck coefficient which shows the potential of using the thermoelectric effect as a simple, cheap, and versatile method to test industrial oil insulator conditions. The results of the Seebeck coefficient for each condition are 0.0003 mV/K (original), 0.0107 mV/K (4 % of water added), and 0.0131 mV/K (40 % of water added), respectively. The industrial oil shows different Seebeck magnitude between oil before and after thermal aging which show a significant decrease of Seebeck magnitude of the industrial oil insulator with an increase of thermal ageing.