Dielectric properties of strontium titanate filled mullite composites at 10 Hz - 1 MHz

ABSTRACT

This research was designed to form better dielectric composite material using one steady state dielectric (mullite) with a good dielectric material (strontium titanate). Distinct dielectric composites were successfully produced using locally sourced kaolinite clay. The samples were made using mullite as the base matrix and strontium titanate (ST) added at varying ratios. Strontium titanate was synthesized via solid-state reaction using strontium carbonate and rutile titanium (IV) oxide sintered at 1300℃. Local white kaolinite was used to fuse the strontium titanate material at varying weight ratios. The powders were dry-mixed and made into pellets for calcination at 1000℃. XRD and SEM characterizations were made. The dielectric measurements were carried out using the HP 4192A LF Impedance Analyzer dielectric setup in the frequency range of 10 Hz to 1 MHz. Three samples were prepared, namely ST 60%, ST 70% and ST 80%. The dielectric measurements were carried out in a controlled LT furnace at 30℃ - 400℃. Measurements showed distinct varying interfacial encapsulation and dipolar relaxation for all composite samples.