

NANOPARTICLES TAILORED HIGH VOLTAGE INSULATION MATERIALS

Jinliang He

Tsinghua University, China

High voltage cables have been widely applied for large-scale power transmission. Polymeric insulation materials have been widely used in electric power systems for their low density, low dielectric strength, ease of processing and most importantly, low cost. As a cable insulation material, the thermal, mechanical, thermo-mechanical and electrical properties should be considered. In this presentation, the effect of various nanoparticles on the electrical properties of insulation polymers is presented. The introduction of nanoparticles can effectively suppress space charge accumulation in polymeric nanocomposites and increase the DC breakdown strength. The interface between nanoparticles and polymer matrix is considered to have an important effect on the properties of nanocomposites, this presentation also introduced the tuning effects of surface-modified nanoparticles on the aggregation structure and trapping property of the nanocomposites, the addition of nanoparticles can suppress the mobility of chain segments in the interfacial region, suppress crystallization and reduce the crystallinity, depending on the surface modification and loading levels of nanoparticles. The strong correlation between traps and the charge transport of nanocomposites and the mechanism of charge transport are discussed, the electrostatic force microscopy tests show that the addition of nanoparticles leads to a decrease in local permittivity, it is found the mobility of local chain segments in the interface suppressed by the nanoparticles can influence the dipolar polarization of chain segments in the interface and eventually results in a decrease in local permittivity



Biography

Jinliang He has received his PhD degree from Tsinghua University, Beijing, China, in 1994. He became a Lecturer in 1994 and an Associate Professor in 1996 in the Department of Electrical Engineering, Tsinghua University. From 2014 to 2015, he was a Visiting Professor in Stanford University. Currently, he is the Chair of the High Voltage Research Institute, Tsinghua University. His research interests include dielectric material, smart sensors and big data application. He is the author of 7 books and 600 technical papers and is an Associate Editor of IEEE Trans on Dielectrics and Electrical Insulation, IEEE Trans. on Power Delivery.

hejl@tsinghua.edu.cn