

Influence of Interphase on the Electrical Properties of Silicone Nanocomposites

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Abstract—It is well known that the interface between filler and matrix has long been a critical problem that affects the properties of polymer composites. In this work, we report on a systematic study of the effects of interphase on the permittivity and dissipation factor of filled silicone nanocomposites. Because of the high ratio of surface to volume for nanoparticles, dispersion plays a predominant role in nanocomposites.

Silicone rubber composites filled with three kinds of nano silica were prepared and the effect of filler contents on the dielectric properties are investigated. The bonding between the silica and silicone was characterized using dielectric spectroscopy. The spectroscopy measurements are carried out in the frequency range of 10-4 Hz to 10 kHz, at various excitation levels from 20V to 2000V. Both the effect of high field and frequency are taken into consideration. The interphase layer of composite plays an important role than the nature of the particles themselves. The paper provides a qualitative explanation for the trends observed.