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Dielectric Response of Nano Aluminium Tri-hydrate Filled Silicone Rubber

Chao Wu[a], Xidong Liang[a,*], Leonard A. Dissado[b], Nikola M. Chalashkanov[b], Stephen J. Dodd[b], Yanfeng Gao[c], Sen Xu[d]

[a] Dept. of Electrical Engineering, State Key Lab of Power System, Tsinghua University, Beijing, 100084, China

[b] Department of Engineering, University of Leicester, Leicester, LE1 7RH, UK

[c] State Grid Jibei Electric Power Co. Ltd. Research Institute, Beijing, 100045, China

[d] China Electric Power Research Institute, Beijing, 100192, China

[*]Corresponding Author: lxd-dea@tsinghua.edu.cn, +86 136 2118 6029

ABSTRACT: The dielectric response of a nano-ATH (Aluminium Tri-hydrate) filled silicone rubber is investigated over the frequency range 10^{-4} to 10^{3} Hz and compared with that of the micro-ATH composite. An equivalent circuit has been used to decompose the dielectric response into: a loss peak process, a quasi-dc (Q-DC) process, a dc-conductance and constant high frequency capacitance. It was found that the Q-DC and loss peak were a result of the ATH filler with the loss peak more clearly resolved in the nano-ATH filled material than in the micro-ATH material where it is weaker and partly obscured by the Q-DC process. In contrast to the micro-ATH material the characteristic frequencies of all the dielectric responses in the nano-ATH filled samples have the same activation energy. The physical mechanisms of the Q-DC process and loss peak are discussed in terms of long range transport between nano-ATH clusters and the dipolar behavior of isolated clusters respectively.

*K*eywords**:** A. Polymer-matrix composites, A. Nano particles, B. Electrical properties, B.