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ELECTRIC FIELD INDUCED CAPACITANCE CHANGE OF AN AIR-GAP CAPACITOR FILLED WITH SILICONE OIL/CARBON BLACK SUSPENSION

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To continue a research of an electric field induced electroconductive aligned network formation in silicone oil (SO)/carbon black (CB) suspensions [1], electric field induced capacitance change of an air-gap capacitor filled with the SO/CB suspension was researched in this work. Although relatively viscous (1000 mPa·s) SO was used to prepare the suspension, applaying DC electric field (strength 100V/cm) to the SO/CB suspension containing 0.3wt% of the CB, rapid (approx. 1.3% s^{-1}) capacitance increase was observed (Fig.1). Simultaneously measured AC conductance showed even much faster, non-linear increase (Fig.1). During the first 300 s of the CB filler alignment in the silicone oil, both – the capacitance and the conductance did not reach a saturation and continued to increase (the CB particle alignment process takes longer time to accomplish). Other SO/CB suspensions with different CB concentrations are going to be investigated at different AC frequencies in this work. The obtained results will be used for modeling and elaboration of polymer/nanoparticle composites with anisotropic properties.

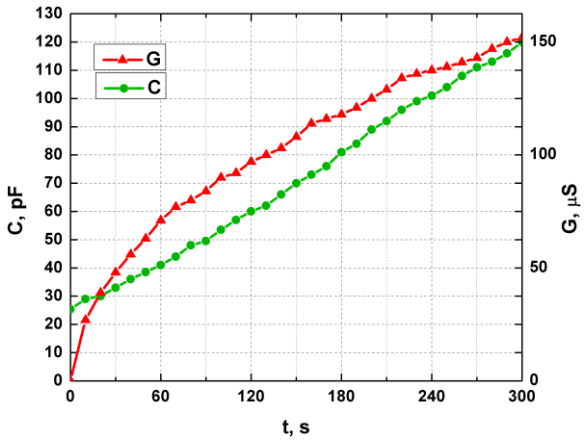

Fig.1 Electric field (100v/cm) induced capacitance and conductance (f = 1 kHz) change versus time for the air-gap capacitor filled with the silicone oil/carbon black (0.3wt%) suspension.

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