Polydimethylsiloxane Dielectric Elastomer Composites with Carbon-Based Fillers

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Currently, much attention is paid to the creation of dielectric elastomer actuators (DEA) used as drives, generators, sensors.[1] Typically, DEA consists of an elastomeric film between two thin, flexible electrodes. When a voltage is applied to the electrodes, a Maxwell voltage arises, leading to the displacement of the electrodes towards each other and a decrease in the film thickness, and its simultaneous expansion in the plane direction. The main problem limiting the rapid development of this field is a significant shortage of functional materials that can be used in the devices under development, since such materials must satisfy a wide range of requirements and, in addition to outstanding electrical characteristics, must have high stability, flexibility, biocompatibility, etc. The most promising and used materials for DEA are silicone elastomers due to their characteristics such as reproducibility of cycles, a slight tendency to aging, the ability to work in a wide temperature range.[2] However, the low dielectric constant of silicones (in region 3) requires the use of high voltage to activate them.

The creation of silicone composite materials with special electrophysical properties is achieved by introducing fillers into the polymer matrix. This work is devoted to the study of the effect of carbon fillers on the properties of a composite material based on polydimethylsiloxane (PDMS).

The results of a study of the effect of processing fillers (carbon black, graphite, carbon nanotubes and their mixtures) on the dielectric and mechanical characteristics of composites will present in the work.

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[2] L. Maffl i, S. Rosset, M. Ghilardi, F. Carpi, H. Shea, *Adv. Funct. Mater*. 2015, **25**, 1656.