POLEABLE NANOPARTICLES AS FILLERS TOWARDS NON-LINEAR OPTICALLY ACTIVE ACTUATORS

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Abstract

Research on dielectric elastomer actuators focuses mainly on the enhancement of the permit-tivity as it linearly increases actuation displacement. Most recent developments include the grafting of polar molecules onto the elastomer backbone to increase the intrinsic matrix permittivity. In the field of non-linear optics, the poling of polymers containing polar molecules is a well-established method to create non-linear optical materials. The alignment of the dipole in an amorphous polymer is done in a high electric field at temperatures above its glass transition temperature (Tg) followed by freezing of the oriented material by cooling below Tg while the electric field is maintained. Poleable elastomers can be realized by blending high Tg polymeric nanoparticles into an elastomer matrix.Synthesis and characterization of the nanoparticles, as well as preliminary results of a poleable DEA are being presented. It will be shown, that a material with a novel mixture of mechanical and optical prop-erties can be obtained using this route.

Keywords: Silicones, Actuators, DEAs, Poling, NLO

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