High breakdown-strength composites from liquid silicone rubbers

In this paper we investigate the performance of liquid silicone rubbers (LSRs) as dielectric elastomer transducers. Commonly used silicones in this application include room-temperature vulcanisable (RTV) silicone elastomers and composites thereof. Pure LSRs and their composites with commercially available fillers (an anatase TiO2, a core–shell TiO2-SiO2 and a CaCu3Ti4O12 filler) are evaluated with respect to dielectric permittivity, elasticity (Young’s modulus) and electrical breakdown strength. Film formation properties are also evaluated. The best-performing formulations are those with anatase TiO2 nanoparticles, where the highest relative dielectric permittivity of 5.6 is obtained, and with STX801, a core–shell morphology TiO2-SiO2 filler from Evonik, where the highest breakdown strength of 173 V μm⁻¹ is obtained.

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