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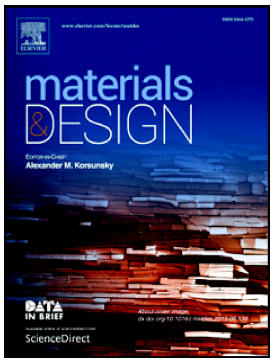

An approach to developing enhanced dielectric property nanocomposites based on acrylate elastomer

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An Approach to Developing Enhanced Dielectric Property Nanocomposites Based on Acrylate Elastomer

Sen–Qiang Wu, Jing–Wen Wang *, Jing Shao, Lei Wei, Ren–Kui Ge, Hua Ren

Abstract: High dielectric constant (high-*k*) polymeric materials suitable for electromechanical transducers should meet the requirements of low dielectric loss. This work introduced a ternary nanocomposite with acrylate elastomer (AE) as matrix, and chemically reduced graphene oxides (G) and poly(ionic liquid)s (PILs) as co-filler, of which AE was synthesized by solution polymerization. A unique hybrid (H) was fabricated by the ionic liquid monomers polymerized on the surface of graphene. Afterwards, hybrid of different filler contents was added into AE to prepare nanocomposites with solution casting method. The favorable π-π interaction between PILs and graphene made the co-filler a better dispersion in the matrix, which contributed to the enhanced dielectric property of the resultant nanocomposites. Dielectric constant of H/AE nanocomposite at 10^2 Hz was as high as 680 and the dielectric loss was only 0.34 when the filler content (1.69 vol%) approached to the percolation threshold (f_c), which was attributed to PILs anchored on the surface of graphene acting as spacers and PILs cut the leakage currents induced by the direct connection of graphene. Moreover, the composite was still flexible that could engender larger strain in area.

Keywords: Acrylate elastomer; Ionic liquid; Graphene; π-π interaction; Dielectric property

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