Ceramic Inclusions/Epoxy Resin Hybrid Nanodielectrics: Development, Characterization and Multi-Functional Performance

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In our days the scientific impact and technological demand of nanostructured and stimuli responsive materials is high and globally appreciated. Multifunctionality is the combination of various desirable properties in a material or materials’ system, targeting to develop a single material/system exhibiting all necessary responses under various loading conditions. Mechanical sustainability, suitable thermal response, tunable electric conductivity, variable electric polarization/dielectric permittivity, magnetic properties, thermally induced phase changes could be parts of the overall multi-functional behaviour [1-3].

The challenge of the present study concerns the development of a material/device exhibiting thermo-mechanical endurance, variable polarization/tunable dielectric response, adjustable conductivity, varying magnetic performance, and energy storing/recovering efficiency. For this reason, hybrid nanodielectrics of polymer matrix/ferroelectric particles (BaTiO$_3$)/magnetic nanoparticles (Fe$_3$O$_4$, or ZnFe$_2$O$_4$ or SrFe$_{12}$O$_{19}$) were developed and studied under various loading conditions/external stimuli.

References


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