# Probing the Multi-Functional Performance of Magnetic Nanoparticles/Epoxy Resin Hybrid Nanocomposites

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Polymer matrix nanocomposites is an important class of engineering materials for various technological applications. Multifunctional performance is achieved by integrating various desirable and supplementary properties/responses in a materials' system [1-3]. The latter should be able to respond under various loading conditions. Mechanical/thermal properties, tunable electric conductivity, variable electric polarization/dielectric permittivity, adjustable magnetic response, thermally induced phase changes contribute to the overall multifunctional performance. In the present study, magnetic nanoparticles ($Fe_3O_4$, or $ZnFe_2O_4$ or $SrFe_{12}O_{19}$) with ferroelectric ($BaTiO_3$) particles or carbon nanotubes (CNTs) are used as fillers in a polymer matrix. $BaTiO_3$ particles provide functionality to the systems, via their thermally induced ferroelectric-to-paraelectric transition [4], while CNTs enhance mechanical endurance and electrical conductivity. Hybrid nanocomposites underwent structural, morphological characterization, and their thermo-mechanical, magneto-electric properties were investigated. The magnetic behaviour varying the employed magnetic filler type as well as the energy storing/retrieving ability of the studied systems is examined and discussed, aiming to determine the system exhibiting optimum performance.

## References

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**Acknowledgments**
The research work was supported by the Hellenic Foundation for Research and Innovation (H.F.R.I.) under the "First Call for H.F.R.I. Research Projects to support Faculty members and Researchers and the procurement of high-cost research equipment grant" (Project Number:2850).