

Performance and Processing Simulation of Magnetoelectric Composites

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ABSTRACT

Magnetoelectric composites are metamaterials in that they provide effects that are not found in nature at comparable strength. ME composites transform magnetic energy into electrical work and vice versa without using a coil, and some are amenable for solid-state miniaturization. ME composites can perform as sensors, actuators, and energy harvesters, while their mechanical response can be tailored for load carrying. Thus, they are also multifunctional. Performance simulation of ME composites leads to useful information about constituent material selection, volume fractions, microstructure, preferred polarization directions and so on. It also highlights desirable expectations for processing, particularly for sintering and deformation of phases in particulate ME composites. Thus, processing simulation is necessary to anticipate the desirable variables and values for processing such as relative size of powder precursors and so on. This presentation will touch upon some of the simulation techniques used and results that are now available as well as directions for further work.