Investigations on the Multiferroic properties of P(VDF-TrFE)/Ferrite Self-standing Films

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Abstract

Composite materials developed using poly(vinylidene fluoride trifluoroethylene) (P(VDF-TrFE)) and magnetic ceramics found substantial research attention due to their room-temperature multiferroics properties. Since the copolymer, P(VDF-TrFE) crystallizes mainly in the ferroelectric β configuration exhibits promising ferroelectric and piezoelectric characteristics. The use of the magnetic filler in the P(VDF-TrFE) matrix introduces magnetic ordering in the developed composites. In the present study, we have developed spinel ferrite nanoparticles loaded P(VDF-TrFE) films by a simple approach and studied their multifunctional properties. Interestingly, the developed composite samples exhibit room-temperature multiferroic nature and the strength of the coupling between the ferroelectric and magnetic orderings is greatly depends on the availability of the magnetic ceramic in the P(VDF-TrFE) matrix. Apart from the magnetoelectric property, dielectric constants of the composites were found to improve with ferrite nanoparticles loading. The use of polymer for developing the multiferroics also brings flexibility in the developed systems which is also beneficial for the device development.

Keywords: P(VDF-TrFE), Spinel ferrite, Composites, Multiferroics

References

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