Preface

Magnetoelectric composites, which simultaneously are ferroelectric and ferromagnetic, have recently stimulated a sharply increasing number of research activities for their scientific interest and significant technological promise in the novel multifunctional devices. Magnetoelectric responses of single-phase compounds are relatively weak and occur at temperatures too low for practical use. On the contrary, composites typically show giant magnetoelectric coupling response above room temperature and are ready for technological applications. In such composites, the magnetoelectric effect is a product property of a magnetostrictive and a piezoelectric substance. Achievement of high magnetoelectric voltage coefficients necessary for engineering applications has been enabled by the appropriate choice of phases with high magnetostriction and piezoelectricity. The authors of this book have attempted to bring together numerous contributions to modeling of ME composites. They present to readers new to the field modern approaches of the physics of composites, so that the potential of the field can be made transparent to the new generations of talent to advance the subject matter.

Interestingly, the coupling interaction between nanosized ferroelectric and magnetic oxides is also responsible for the magnetoelectric effect in nano-structures, as was the case in bulk composites. The availability of high-quality nanostructured composites makes it easier to tailor their properties through epitaxial strain and interfacial coupling. In this book, the authors discuss these magnetoelectric composites from both experimental and theoretical perspectives.

"Modeling of Magnetoelectric Effects in Composites" is an excellent text covering fundamentals of analytical modeling, material behavior, and experiments. The leading authors in this field provide an in-depth coverage of modeling principles for refining the performance of two-phase architectures over a wide frequency range. The book is a must read for researchers investigating new connectivity patterns in piezoelectric-magnetostrictive materials.

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