



Abstract

Domains in Multiferroics

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Materials with a coexistence of at least two forms of ferroic order are a hot topic of contemporary condensed-matter research because of the multifunctionality and the cross-correlations resulting from the coexistence. This is particularly valid for compounds uniting ferroelectric and (anti-) ferromagnetic order in the same phase: They exhibit particularly pronounced magnetoelectric cross-coupling effects up to the induction of magnetic phase transitions by electric fields (or vice versa).

At its microscopic roots any such magnetoelectric interaction is based on the coupling between the magnetic and ferroelectric domains. Unfortunately, domains in multiferroics are quite evasive: It is difficult to observe them and even more difficult to observe the coupling between different types of domains and the corresponding coupling dynamics.

Here I will discuss techniques for visualizing domains in multiferroics and give an overview on some of the magnetoelectric domain-coupling phenomena that have been observed. I will put special emphasis on nonlinear optical techniques since they allow one to observe domains associated to different types of ferroic order in the same experiment and thus study their interaction.