Multiferroic and magnetoelectric materials-novel developments and perspectives

Kleemann W., Borisov P., Bedanta S., Shvartsman V.V.

Angewandte Physik, Universität Duisburg-Essen, Duisburg, Germany; Institut für Festkörperforschung, Forschungszentrum Jülich, Jülich, Germany; Institut für Materialwissenschaft, Universität Duisburg-Essen, Essen, Germany

Abstract: Magnetoelectric (ME) materials are of utmost interest in view of both fundamental understanding and novel desirable applications. Despite its smallness, the linear ME effect has been shown to control spintronic devices very efficiently, e.g., by using the classic ME antiferromagnet Cr 2O3. Similar nano-engineering concepts exist also for type-I multiferroic single phase materials like BiFeO3 and BiMnO 3. Record high ME response has been realized in stress-strain coupled multiphase magnetoelectrics like PZT/FeBSiC composites, enabling applications in sensors. In type-II multiferroics, whose ferroelectricity is due to modulated magnetic ordering, the ME coupling is of fundamental interest. Higher-order ME response characterizes disordered systems, which extend the conventional multiferroic scenario toward ME multiglass (e.g., Sr1-xMn xTiO3). © 2010 IEEE.

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Authors with affiliations:

1. Kleemann, W., Angewandte Physik, Universität Duisburg-Essen, Duisburg, Germany
2. Borisov, P., Angewandte Physik, Universität Duisburg-Essen, Duisburg, Germany
3. Bedanta, S., Institut für Festkörperforschung, Forschungszentrum Jülich, Jülich, Germany
4. Shvartsman, V.V., Institut für Materialwissenschaft, Universität Duisburg-Essen, Essen, Germany