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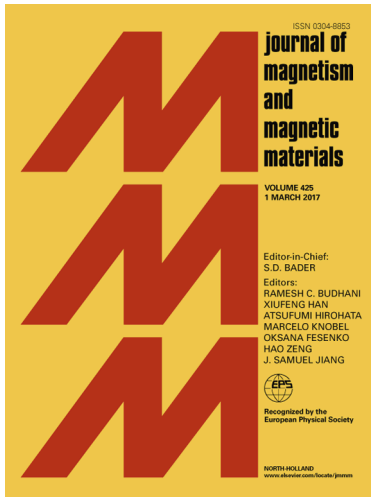

Research articles

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ACCEPTED MANUSCRIPT

MAGNETOELECTRIC PROPERTIES OF EPITAXIAL FERRITE GARNET FILM

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Abstract

Magnetoelectric properties of ferrite garnets are of great interest due to possibility of electric control of micromagnetic structures at room temperatures promising for applications in advanced technologies. However, the governing mechanisms underlying magnetoelectric coupling and origin of ferroelectricity in these materials remain under discussion. In this article, we appeal to polar mechanism related to electric dipole moments of Fe^{3+} and rare earth ions in order to explain ferroelectricity of epitaxial ferrite garnet film. We show that existence of electric dipole moments of *'d'* (Fe^{3+}) ions and *'f'* (rare earth) ions is allowed by the local symmetry of the environments and calculate electric polarization related to electric dipole moments of the *'d'* and the *'f'* ions in inhomogeneously magnetized ferrite garnet film. Our results suggest that magnetoelectricity of iron garnets is attributed to polarizability of Fe^{3+} and rare earth ions; the conducted calculations demonstrate the difference between polarization impacts given by electric dipole moments of rare earth and iron ions. Polarization depend on ground state of the ions, local symmetry of the ions environments and the type of magnetic inhomogeneity.

PACS: 75.80.+q, 75.70.Cn

Keywords: magnetoelectric effect, multiferroics, epitaxial film

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