P339 - Dynamic magnetic and dielectric behavior of single crystal lead substituted barium hexaferrite

14. Multifunctional magnetic materials: magnetic shape memory materials, multiferroics including artificial/composite multiferroics, and perovskites

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M-type barium hexaferrites from the (Ba,Pb)$Fe_{12}O_{19}$ family show a dramatic influence of lead-doping on dielectric, magnetic, as well as optical properties. The parent compound $BaFe_{12}O_{19}$ is a well-known semiconducting ferrimagnet with broad range of application. On the other hand, the $PbFe_{12}O_{19}$ material shows both ferromagnetic and ferroelectric properties above the room temperature. Spin and charge of iron ions within the structure of this system suggest there might a coupling between magnetic and dielectric excitations.

We report on our investigation of dynamic magnetic and dielectric properties on single-crystalline lead-substituted hexaferrite (Ba,Pb)$Fe_{12}O_{19}$. On the basis of ac magnetic susceptibility and dielectric spectroscopy in radio-frequency range and low temperatures we show that the presence of lead in (Ba,Pb)$Fe_{12}O_{19}$, as compared to pristine $BaFe_{12}O_{19}$, leads to emergence of pronounced relaxations both in dielectric and magnetic sector. Their characteristic relaxation times and activation energies are similar which suggests a bi-relaxor nature of the chosen composition of (Ba,Pb)$Fe_{12}O_{19}$. We discuss the dispersion of these relaxations and their origin in the context of magnetic domains walls and the influence of doping on the crystal lattice dynamics of the M-type barium hexaferrite.

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