MAGNETOELECTRIC PROPERTIES OF $NdSc_3(BO_3)_4$

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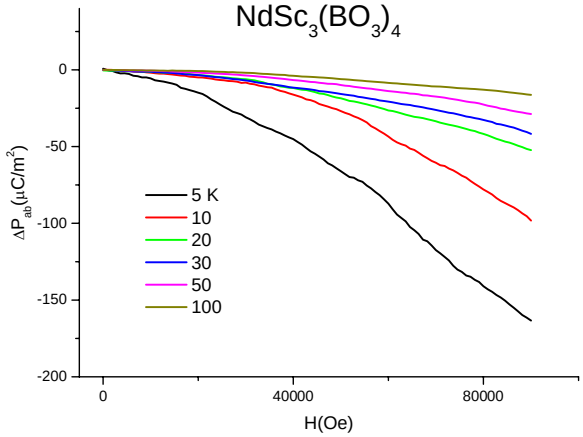
The great interest shown in recent decades to the crystals of trigonal rare-earth borates $RM_3(BO_3)_4$ was determined by their interesting multiferroic properties. These crystals have a noncentrosymmetric trigonal structure isometric to the huntite natural material $CaMg_3(CO_3)_4$ that crystallizes in the space group *R*32 of the trigonal system [1]. At first, some of the ferroborates below the antiferromagnetic ordering temperature $T_N \approx$ (30-40) K is observed spontaneous and/or induced by external magnetic field electric polarization, up to 300 $\mu C/m^2$ [2].

Recently, in the paramagnetic trigonal rare-earth aluminoborates $(Ho,Tm,Er)Al_3(BO_3)_4$ [3], induced magnetoelectric polarization has also been observed. It can reach values exceeding those previously measured in ferroborates, for example, the magnetoelectric polarization of $HoAl_3(BO_3)_4$ achieves 4500 $\mu K/m^2$ [4]. A sufficiently large induced magnetoelectric polarization was also observed in the holmium galloborate $HoGa_3(BO_3)_4$, up to 1000 $\mu C/m^2$ [5].

In this work, we report the data on the magnetoelectric properties of the $NdSc_3(BO_3)_4$ single crystal. In this compound, the system of small cations is presented by Sc^{3+} ions with a larger ionic radius as compared with Al^{3+} and different electronic structure. $NdSc_3(BO_3)_4$ single crystals were grown from bismuth trimolybdate-based fluxes. The crystal growth techniques used were described in detail in [**5**].

The magnetic and magnetoelectric properties were investigated on a PPMS-9 facility in the temperature range 3−300 K and magnetic fields up to 90 kOe.

The value of the magnetoelectric effect in $NdSc_3(BO_3)_4$ depends not only on the size an electronic structure of Sc^{3+} ions, but also on the conditions of heat treatment of the grown crystals.



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