Investigation of the multiferroics properties of the substitution ofSrin the $BiFeO_3$matrixe

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Abstract

Multiferroic materials have renewed interest in recent years, in which both ferromagnetic andferroelectric properties exist in the same phase [1]. As a result they have spontaneous magnetizationwhich can be switched by an applied field, spontaneous polarization which can be reoriented by anelectric field, and often some coupling between the two. Special device application which hasbeen suggested for such materials include multiple state memory elements, electric field controlledferromagnetic resonance devices, and transducers with magnetically modulated piezoelectricity [2]-[3]. Many efforts have been devoted to find new materials with and to find multiferroic propertiesin known compounds. However, almost all those gigantic magnetoelectriceffectects occur essentiallybelow liquid-nitrogen temperature.$BiFeO_3$ is an interesting candidate as magnetoelectric materials because the ferroelec-tricity and antiferrimagnetic order present simultaneously at room temperature. G-type antiferro-magnetic ordering takes place at 640 K, while ferroelectric order appears at a higher temperatureof 1100K [4]. One problem for BFO as a room-temperature multiferroics is its intrinsic antiferro-magnetic ordering. In order to improve the properties of BFO ceramics, some attempts have beenmade including doping rare earth (RE) or Mn, respectively, on the Bi sites or Fe sites, andfabricating strained films [5]. However, little improvement in the magnetic properties of BFOhas been achieved by element substitution, and the role of strain in magnetization also requiresfurther investigation.The crystal and magnetic structure of polycrystalline $Bi_{1-x}Sr_xFeO_{3-\delta}$ pour x = 0.1prepared bya solid-state reaction method. The sample is characterized by usingvarioustechniques: X-ray diffraction (XRD) study is carried out for phase determination andlattice parameter calculations (a= b=31.00000A° et c=41.00000A°). The magnetization measurement performed at room temperature showed a perfect hysteresisloop with large remnant magnetization.

References

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