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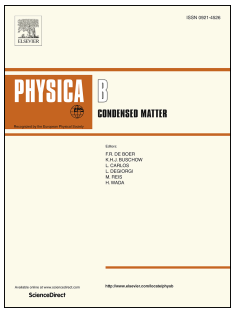

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Structural, optical, and magnetic properties of $SrFeO_{3-\delta}$-modified $Bi_{0.5}Na_{0.5}TiO_3$ materials

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Abstract

$SrFeO_{3-\delta}$-modified $Bi_{0.5}Na_{0.5}TiO_3$ materials were fabricated by a sol–gel method. $SrFeO_{3-\delta}$ materials existed as a well solid solution in $Bi_{0.5}Na_{0.5}TiO_3$ materials, resulting in the random distribution of Sr and Fe cations into the lattice of the host. The impurities of Sr and Fe cations preferred to substitute at the *A*-site and *B*-site in $Bi_{0.5}Na_{0.5}TiO_3$ materials, respectively. These cations distorted the structure of the host materials due to differences in the radius of the cations of impurity and the host. The modified materials showed reduced optical band gap and strongly induced ferromagnetism at room temperature. This work presents a new method for integrating room-temperature ferromagnetism in lead-free ferroelectric materials to overcome the limitations of single transition metals as dopants.

Keywords: lead-free ferroelectric; $Bi_{0.5}Na_{0.5}TiO_3$; $SrFeO_{3-\delta}$; ferromagnetism; optical.

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