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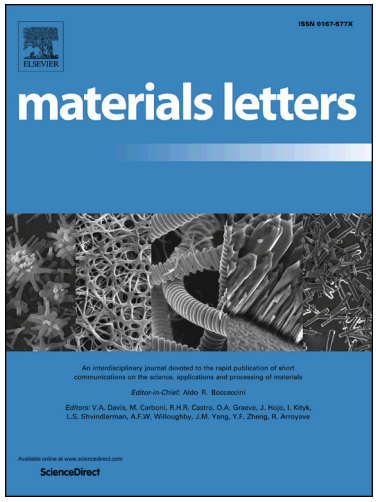

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Structural, Optical and Magnetic modulation in Mn and Mg co-doped $BiFeO_3$ films grown on Si substrates

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Abstract

Slightly Mn and Mg co-doped $BiFeO_3$ films ($BiFeO_3$, $BiFe_{0.95}Mg_{0.01}Mn_{0.04}O_3$, $BiFe_{0.94}Mg_{0.02}Mn_{0.04}O_3$ and $BiFe_{0.93}Mg_{0.03}Mn_{0.04}O_3$, xBFMMO, x=0, 0.01, 0.02 and 0.03) have been grown on Si (100) substrates by sol-gel technique. Rhombohedral lattice structure and phase transition is confirmed by x-ray diffraction and Raman spectroscopy. The improved surface morphology and decreased grain size of films can be observed in SEM micrographs due to the influence of Mn and Mg co-doping. Blue emissions of xBFMMO films can be found in Photoluminescence spectra, meanwhile the nonlinear shift of emission peaks imply the variation of bandgap. Room-temperature magnetization versus magnetic field (*M-H*) curves exhibit enhanced saturation magnetization compared with parental $BiFeO_3$, which can attribute to destroyed spin cycloid and released locked magnetization. These properties offer a great potential on the multiferroic information storage application.

Keywords: $BiFeO_3$; Sol-gel preparation; Thin films; Photoluminescence spectra; Magnetic materials.

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