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Effect of chromium doping on the structure and band gap of $\text{Bi}_{3.15}\text{Nd}_{0.85}\text{Ti}_3\text{O}_{12}$ thin films

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ABSTRACT

The $\text{Bi}_{3.15}\text{Nd}_{0.85}\text{Ti}_3\text{O}_{12}$ (BNdT) and Cr-doped BNdT films on quartz substrates were prepared by a sol-gel process and the effects of Cr doping on the structure and band gap of BNdT were examined. Cr-doping does not change the three-layered perovskite structure of BNdT but transforms the grain morphology from equiaxed grains to rectangular grains. The utilization of visible light is increased by Cr doping and the large band gap reduction (~ 1.1 eV) was obtained, which is analyzed from the electronegativity and the distortion caused by substitution. The present work provides an available way to make ferroelectric (FE) BNdT getting more extensively applied in the new photovoltaic cells and other novel optoelectronic devices.

Keywords: Bismuth neodymium titanate; Band gap; Films; Sol-gel

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