STRUCTURE OF BATI1-XFEXO3- MULTIFERROICS USING X-RAY ANALYSIS (SCI)

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TÓM TẮT:

BaTiO3 (BTO) and BaTi0:88Fe0:12O3 (BTFO) polycrystalline samples were investigated to understand the role that Fe dopant and oxygen vacancy play on their various properties. Their structures were examined using X-ray diffraction and X-ray absorption spectroscopy. Their optical and conduction properties were also characterized at room temperature. Our results show that BTO is a tetragonal-phase ferroelectric material with a wide band gap Eg ≈ 3:51 eV while BTFO is a hexagonal-phase multiferroic material with smaller band gap Eg ≈ 3:40 eV. Fe doping ions, which exist in both Fe3+ and Fe4+ forms, give rise to positively-charged oxygen vacancies to create donor impurity levels in the forbidden band. The UV-VIS absorption spectrum of BTFO exhibits a broadening in the visible region. The red shift is observed in both the absorption and photoluminescence spectra relative to those of BTO. The leakage current is larger in BTFO than in BTO. BaTiO3 (BTO) and BaTi0:88Fe0:12O3 (BTFO) polycrystalline samples were investigatedto understand the role that Fe dopant and oxygen vacancy play on their variousproperties. Their structures were examined using X-ray diffraction and X-ray absorptionspectroscopy. Their optical and conduction properties were also characterized at room temperature.Our results show that BTO is a tetragonal-phase ferroelectric material with a wideband gap Eg ≈ 3:51 eV while BTFO is a hexagonal-phase multiferroic material with smallerband gap Eg ≈ 3:40 eV. Fe doping ions, which exist in both Fe3+ and Fe4+ forms, give riseto positively-charged oxygen vacancies to create donor impurity levels in the forbidden band.The UV-VIS absorption spectrum of BTFO exhibits a broadening in the visible region. Thered shift is observed in both the absorption and photoluminescence spectra relative to thoseof BTO. The leakage current is larger in BTFO than in BTO.