Synthesis, optical and magnetic behavior of (BiFeO3)1−x(α-Fe2O3)x nanocomposites

ABSTRACT

(BiFeO3)1−x(α-Fe2O3)x nanocomposites were synthesized from dried gels of BiFeO3 and α-Fe2O3. Samples with x = (0.00 (BiFeO3), 0.25, 0.50 and 1.00 (α-Fe2O3)) were studied using X-rays diffractions (XRD), UV–vis spectroscopy, photoluminescence spectroscopy (PL), electron spin resonance (ESR) and vibrating sample magnetometer (VSM). Amounts of α-Fe2O3 phase were 23 and 35% for samples x = 0.25 and 0.50, respectively. Microstrain of BiFeO3 phase tended to decrease with increasing α-Fe2O3. Optical band gap reduced from 2.42 eV for BiFeO3 to 2.35 eV for sample x = 0.25 and then increased to 2.56 eV for sample x = 0.50. From PL, intensity of near band emission peak of BiFeO3 increased with increasing α-Fe2O3 content. From ESR and VSM, the g-value and magnetization saturation were enhanced with embedding of α-Fe2O3 into BiFeO3.

Keyword: BiFeO3; α-Fe2O3; Nanocomposite; Microstrain; Band gap; Magnetization