NanoThailand 2016



Contribution ID: 164

Type: Oral

Magnetic properties of Co-doped BiFeO3 nanoparticles

Monday 28 November 2016 13:55 (15 minutes)

In this study, we report the magnetic properties of BiFe1-xCoxO3 nanoparticles (with x = 0.05, 0.1, 0.2, 0.3) synthesized by a simple solution method. The prepared samples were characterized by means of X-ray diffraction (XRD), scanning electron microscopy (SEM), and X-ray absorption spectroscopy (XAS). The crytallize size calculated by using the Debye–Scherer equation decreases with increasing Co doping content. The magnetic properties of the nanoparticles were measured by a vibrating sample magnetometer (VSM). The M-H loops of all BiFe1-xCoxO3 nanoparticles exhibited ferromagnetic behavior at room temperature. The saturation magnetization (Ms) increased to be from 1.08 emu/g for BiFe0.95Co0.05O3 to 8.26 emu/g for BiFe0.7Co0.3O3. Co-doped BiFeO3 nanoparticles with smaller crystallite size also caused to the enhancement of the coercivity (Hc) and squareness (Mr/ Ms). The effect of Co doping on the structure and magnetic properties of BiFeO3 nanoparticles is discussed.

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Session Classification: Falcon 1

Track Classification: Nanomaterials & nanostructures