

Composition-dependent structural, electrical, magnetic and magnetoelectric properties of (1-x)BaTiO₃-xCoFe(2)O(4) particulate composites

Por: [Padmapriya, D](#) (PADMAPRIYA, D.)^[1]; [Dhayanithi, D](#) (DHAYANITHI, D.)^[1]; [Rashid, A](#) (RASHID, A.)^[1]; [Rahul, MT](#) (RAHUL, M. T.)^[2]; [Kalarikkal, N](#) (KALARIKKAL, N. A. N. D. A. K. U. M. A. R.)^[3]; [Muneeswaran, M](#) (MUNEESWARAN, M.)^[4]; [Giridharan, NV](#) (GIRIDHARAN, N., V)^[1]

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Abstract

Multiferroic composite with the general formula (1 - x)BaTiO₃-xCoFe(2)O(4) (x= 0.05, 0.15, 0.25, 0.35 and 0.45) has been synthesized by a standard solid-state reaction route. Powder X-ray diffraction analysis confirms the existence of ferrite (spinel CoFe₂O₄) and ferroelectric (tetragonal BaTiO₃) biphase without any impurity phases in the sintered composites. Microstructure of the composite displays two different grain sizes and shapes studied from SEM analysis. The composites show both ferroelectric and ferromagnetic ordering: the saturation magnetization (M_s) and retentivity (M_r) of the composite are improved with the increase in ferrite phase, while leakage current, ferroelectric and dielectric properties of the composites show a drop. Existence of coupling between ferroelectric and ferromagnetic ordering measured through magnetodielectric (MD) and magnetoelectric (ME) studies reveal an increase in % MD and ME coefficients with an increase in ferrite content. An enhanced ME coupling coefficient of 17 mV cm⁻¹Oe⁻¹ has been realized at a dc magnetic field of 5 kOe with a ac frequency of 50 Hz in (1 - x)BaTiO₃-xCoFe(2)O(4) (x= 0.45) composite.

Palabras clave

Palabras clave de autor: [Barium titanate](#); [cobalt](#)

[ferrite](#); [composites](#); [multiferroic](#); [magnetodielectric](#); [magnetoelectric](#)

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Información del autor

Dirección para petición de copias:

National Institute of Technology Tiruchirappalli Natl Inst Technol, Adv Funct Mat Lab, Tiruchirappalli 620015, India.

Dirección correspondiente: Giridharan, NV (autor correspondiente)

+ Natl Inst Technol, Adv Funct Mat Lab, Tiruchirappalli 620015, India.

Direcciones:

+ [1] Natl Inst Technol, Adv Funct Mat Lab, Tiruchirappalli 620015, India

[2] Cochin Coll, Dept Phys, Kochi 682002, Kerala, India

+ [3] Mahatma Gandhi Univ, Int & Inter Univ Ctr Nano Sci & Nanotechnol, Kottayam 686560, Kerala, India

+ [4] Univ Chile, Dept Mech Engn, Adv Mat Lab, Santiago 8370448, Chile

Direcciones de correo electrónico: giri@nitt.edu

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INDIAN ACAD SCIENCES, C V RAMAN AVENUE, SADASHIVANAGAR, P B #8005,
BANGALORE 560 080, INDIA

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