

Accepted Manuscript

Multiferroic and magnetoelectric properties of $\text{BiFeO}_3\text{-CoFe}_2\text{O}_4$ -poly(vinylidene-fluoride) composite films

Nidhi Adhlakha, K.L. Yadav, Marco Truccato, Manjusha, Piu Rajak, Alfio Battiato, Ettore Vittone

PII: S0014-3057(16)31541-5

DOI: <http://dx.doi.org/10.1016/j.eurpolymj.2017.03.026>

Reference: EPJ 7775

To appear in: *European Polymer Journal*

Received Date: 21 November 2016

Revised Date: 27 February 2017

Accepted Date: 11 March 2017

Please cite this article as: Adhlakha, N., Yadav, K.L., Truccato, M., Manjusha, Rajak, P., Battiato, A., Vittone, E., Multiferroic and magnetoelectric properties of $\text{BiFeO}_3\text{-CoFe}_2\text{O}_4$ -poly(vinylidene-fluoride) composite films, *European Polymer Journal* (2017), doi: <http://dx.doi.org/10.1016/j.eurpolymj.2017.03.026>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Multiferroic and magnetoelectric properties of BiFeO₃-CoFe₂O₄-poly(vinylidene-fluoride) composite films

Nidhi Adhlakha¹, K.L.Yadav², Marco Truccato¹, Manjusha², Piu Rajak³,
Alfio Battiato¹, Ettore Vittone¹

¹*Elettra-Sincrotrone Trieste S.C.p.A, Area Science Park, I-34012 Trieste, Italy.*

²*Smart Materials Research Laboratory, Department of Physics, Indian Institute of Technology Roorkee,
Roorkee- 247667, India.*

³*Department of Metallurgical and Materials Engineering, Indian Institute of Technology (IIT) Madras, Chennai
600036, India*

*Corresponding Author: Tel.: +91 1332 285744; Fax: + 91 1332 273560
E-mail: klyadav35@yahoo.com

Abstract

Multiferroic thick nanocomposite films of (1-x)(0.3CoFe₂O₄-0.7BiFeO₃)-xPolyvinylidene difluoride (CFO-BFO/PVDF) with x variations 0.20, 0.30 and 0.40 were synthesized using hot press method. Detailed measurements of structural, dielectric, magnetic and magnetoelectric data have been reported. Structural characterization reveals the presence of all the three distinct phases viz. CFO, BFO and PVDF. The dielectric loss as low as 0.05 has been observed for composite film with 40 mol% of PVDF. The AC conductivity ($5.9 \times 10^{-8} \text{ ohm}^{-1}\text{cm}^{-1}$) of composite film (x=0.40) is found to be much lower as compared to CFO-BFO ceramic. The electric poling of composite film (with x=0.30) leads to substantial increase in saturation (2M_s) and remnant magnetization (2M_r). A significant magnetoelectric effect with magnetoelectric voltage coefficient (α_{ME}) ~22.128 mV/cm Oe has been observed for composite film with x=0.40, which is possibly a consequence of implicit mechanical interaction between CFO and BFO through PVDF matrix. Hence these nanocomposite films hold a great potential to be promising candidates for multiferroic devices.

Keywords: Composite Films; Magnetoelectric Effect; Dielectric Response; Magnetic Measurements; Microstructure.

Download English Version:

<https://daneshyari.com/en/article/5159615>

Download Persian Version:

<https://daneshyari.com/article/5159615>

[Daneshyari.com](https://daneshyari.com)