

Dopant effects on the structural, optical and electromagnetic properties in multiferroic $\text{Bi}_{1-x}\text{Y}_x\text{FeO}_3$ ceramics

Minh N.V., Thang D.V.

Center for Nano Science and Technology, Hanoi National University of Education, 136 Xuan-Thuy Road, Hanoi, Viet Nam

Abstract: Multiferroic $\text{Bi}_{1-x}\text{Y}_x\text{FeO}_3$ ($x = 0.00, 0.05, 0.1, 0.15, 0.2$) ceramics were prepared by conventional solid-state-reaction method. X-ray diffraction measurement was carried out to characterize the crystal structure and to detect the impurities existing in these ceramics. The substitution of rare earth Y for Bi was found to decrease the impurity phase in BiFeO_3 ceramics. There is strong evidence that both lattice constants a and c of the unit cell unusually change at Y content of about $x = 0.10$. The effect of introducing Y^{3+} is shown to increase the optical band gap for doped sample $\text{Bi}_{1-x}\text{Y}_x\text{FeO}_3$. Additionally, the Raman measurement performed for the lattice dynamics study of $\text{Bi}_{1-x}\text{Y}_x\text{FeO}_3$ samples reveals a strong band centered at around $1150\text{-}1350\text{ cm}^{-1}$ which is associated with the resonant enhancement of two-phonon Raman scattering in the multiferroic $\text{Bi}_{1-x}\text{Y}_x\text{FeO}_3$ samples. The impedance spectroscopy indicates that, the Y dopant has improved the grain impedance. The enhancement of magnetization was observed in Y-doped samples compared to pure BiFeO_3 . ?? 2010 Elsevier B.V. All rights reserved.

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Correspondence Address: Minh, N. V.; Center for Nano Science and Technology, Hanoi National University of Education, 136 Xuan-Thuy Road, Hanoi, Viet Nam; email: minhsp@gmail.com

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Authors with affiliations:

1. Minh, N.V., Center for Nano Science and Technology, Hanoi National University of Education, 136 Xuan-Thuy Road, Hanoi, Viet Nam
2. Thang, D.V., Center for Nano Science and Technology, Hanoi National University of Education, 136 Xuan-Thuy Road, Hanoi, Viet Nam

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