

Synthesis, Structural and Electrical Properties of $\text{Ba}_{0.5}\text{Bi}_{0.5}\text{Ti}_{0.5}\text{Fe}_{0.2}\text{Mn}_{0.3}\text{O}_3$ Compound

S. TRIPATHY¹, S.S. ROUT¹, A.N. PANI¹, B. B MOHANTY², P.S. SAHOO^{1†}

¹*Department of physics, Maharaja Sriram Chandra Bhanj Deo University, Baripada, Odisha*

²*Department of Physics, Betnoti College Betnoti, Mayurbhanj, Orissa, India*

[†]*Corresponding author. Tel.: +91 889507094*

E-mail address: ps_rilly@yahoo.com

Abstract: A $\text{Ba}_{0.5}\text{Bi}_{0.5}\text{Ti}_{0.5}\text{Fe}_{0.2}\text{Mn}_{0.3}\text{O}_3$, a single-phase ceramic is successfully prepared following Mixed Oxide Process and the formation of the compound is confirmed from X-Ray diffraction. The surface morphology of the ceramic sample is examined using scanning electron microscopy (SEM) and energy dispersive X-ray analysis (EDX). EDX analysis confirms the elemental composition of the sample, indicating the presence of all the constituent elements, including barium (Ba), bismuth (Bi), titanium (Ti), iron (Fe), manganese (Mn), and oxygen (O), in both weight and atomic percentages. The dielectric and ac-conductivity properties of the material are studied across a wide frequency range (1kHz to 1MHz) and temperature range (25°C to 500°C). The material shows Maxwell-Wagner-type dielectric dispersion, which is often linked to the heterogeneous nature of the material, and a thermally activated relaxation mechanism, indicating that the dielectric properties of the sample are influenced by temperature. The dielectric and conductivity properties supports the semiconducting nature of the material, suggesting that it could be useful in electronic and energy storage applications. Lastly, the material demonstrates a high dielectric constant and low tangent loss, which indicate that the material is suitable for capacitors, sensors, and actuators.