

Impedance Spectroscopy of $\text{Ba}_4\text{SrGdTi}_3\text{V}_7\text{O}_{30}$ ceramic

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Abstract : $\text{Ba}_4\text{SrGdTi}_3\text{V}_7\text{O}_{30}$ ceramic belonging to tungsten bronze family was synthesized by a high-temperature solid-state reaction method. Preliminary structural analysis of the compound shows the formation of single-phase orthorhombic structures at room temperature. Surface morphology of the compound was studied by scanning electron microscopy. Detailed studies of impedance parameters provide a better understanding of the electrical properties and type of relaxation processes in the material. The effect of temperature on impedance parameters was studied using an impedance analyzer in a wide frequency range (10^2 – 10^6 Hz) at different temperatures. The temperature dependent plots of real and imaginary part of complex impedance traces semicircle(s) in the complex plane which reveal the presence of both bulk and grain boundary effects. The bulk resistance of the material decreases with rise in temperature exhibiting a typical negative temperature coefficient of resistance (NTCR) behavior of the material. The nature of variation of dc conductivity suggests Arrhenius type of electrical conductivity.

Keywords: Ceramics; X ray diffraction, TB structure, Solid-state reaction, electrical conductivity.

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