

## Electrical conductivity analysis of BaBi<sub>2</sub>V<sub>2</sub>O<sub>9</sub> ceramic compound

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### Abstract

The ceramic compound BaBi<sub>2</sub>V<sub>2</sub>O<sub>9</sub> (BBV) having Aurivillius type structure was synthesized by solid state reaction technique. The X-ray analysis shows the orthorhombic crystal structure at room temperature. The electrical quantities were calculated using an LCR meter in a wide range of frequencies and temperatures. The conductivity data have been calculated through empirical relation and found to obey Jonscher's universal power law as well as Arrhenius equation. The compound exhibits the negative temperature coefficient of resistance (NTCR). The activation energy have been calculated from the ac and dc conductivity plot and lies in the range of 0.34-0.64eV.

**.Keywords:** Solid state reaction; XRD; Conductivity properties, activation energy.

### 1. Introduction

The Aurivillius structure materials were first reported by Aurivillius [1] which is the family of layered bismuth oxides ceramics. The Bismuth Layer-Structured Ferroelectrics (BLSF) materials have been proved to be good candidate for nonvolatile Ferroelectric Random Access Memory (FRAM) application [2, 3]. There are various BLSF compounds containing Strontium(Sr) with Tantalate and Niobium (Nb) which is one of the good replacement of lead free compositions and having FRAM characteristics[4]. The important common chemical formula for Bismuth Layered Structure Ferroelectrics family is (Bi<sub>2</sub>O<sub>2</sub>)<sup>2+</sup> (A<sub>m-1</sub>B<sub>m</sub>O<sub>3m+1</sub>)<sup>2+</sup> in which 'A' may be mono-valent or di-valent or tri-valent ion for example metals, non-metals and rare-earth and B represents transition metal ions such as Ti<sup>4+</sup>, Cr<sup>3+</sup>, Nb<sup>5+</sup>, Ta<sup>5+</sup>, Fe<sup>3+</sup>, W<sup>6+</sup> with comparatively charge is maximum [5]. The hieroglyph 'm' denotes the number of pseudo perovskite layers interspersing with bismuth-oxide layer (Bi<sub>2</sub>O<sub>2</sub>)<sup>2+</sup>. The value of 'm' vary from one to ∞. The paramount of Bismuth-Oxide is most focused in this family as it is used various field such as non-volatile random access memories, photoconductivity in thin films, bio-medicals etc due to their outstanding electrical and

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