**Paper No: PU-SOE-PHY-05**

**Switching Behavior of Bulk, Fast Ion Conducting, Vitreous AgI‐Ag2O‐MoO3 Solids with Inert Electrode**

Biswas Tanujita, **G Sreevidya Varmab**, Sundarrajan Asokanc

a. Department of Instrumentation and Applied Physics, Indian Institute of Science, Bangalore, India

**b. Department of Physics, Presidency University, Bangalore, India**

c. Department of Instrumentation and Applied Physics, Indian Institute of Science, Bangalore, India

**Abstract**

Developing efficient, fast performing and thermally stable Silver iodide‐based fast ion conducting solids are of great interest for resistive switching applications, but still remain a challenge. Metallization in bulk, behavior of threshold voltage profile over composition, and corrosion reactions are few of the challenges. In this work, the switching behavior of bulk, fast ion conducting, vitreous (AgI)*x*‐(Ag2O)25‐(MoO3)75‐*x*, for 60 ≤ *x*≤ 40 solids, has been investigated in order to understand the switching mechanism with the inert electrodes. By using inert electrodes, the switching becomes irreversible, memory type. The switching mechanism is the electrochemical metallization process. The inert electrodes restrain ionic mass transfer but exhibit low barrier to electron transfer allowing the cathodic metallization reaction to reach Nernst equilibrium faster. Cations involved in this process transport through the free volume within the solid structure and follows Mott‐Gurney model for electric field‐driven thermally activated ion hopping conductivity model. This model along with the thermal stability profile provides a narrow region within composition with better switching performance based on swiftness to reach threshold voltage and less power loss. Traces of anionic contribution to metallization are absent. Moreover, anodic oxidation involves reactions that cause bubble formation and corrosion.

**Keywords:**

Electrochemistry, Glass-ceramics, Ionic conductivity, Oxides, Electrochemistry

**Publication Details:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Journal Name** | **Vol.** | **Month & Year** | **Page No.** | **Publisher** | **Scimago Ranking** |
| Journal of the American Ceramic Society | 102 (12) | Dec. 2019 | 7244- 7252 | Wiley-Blackwell | Q1 |