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Non-volatile resistive switching in novel bismuth based oxides

Non-volatile memory (NVM) can retrieve stored information even when power is switched off. Among various next-generation NVMs, Resistive Random Access Memory (RRAM) seems promising for future applications, due to its high-speed, high-efficiency, and energy-saving characteristics. In recent years, the performance of RRAM has been significantly improved through in-depth investigations in both materials and related switching mechanisms. Although silicon-based memory devices are being used since the last several decades for storage, these devices have limited scale-up ability to increase storage capacity. Thus, a continuous search for materials that exhibit better memory characteristics like low switching voltage, high stability, and low cost of fabrication is on-going.

In this regard, here we experimentally demonstrate non-volatile resistive switching (RS) in pulsed laser deposited $BiYO_3$ (BYO) and $BaBiO_3$ (BBO) thin films. The devices of these oxides are prepared in Au/oxide/Pt architecture for electrical measurements. Non-volatile resistance windows of ~10x (BYO) and ~8.5x (BBO) were achieved at room temperature. Detailed electrical and magneto-electrical measurements suggest that the advantage of Au/BYO/Pt devices for RRAM is its high thermal ($10\ K \leq T \leq 800\ K$) stability, while BBO devices are interesting for next generation non-volatile memories due to its magnetic functionality. The conduction mechanism of these devices is explained using space charge limited current (SCLC) and Ohmic conduction models.

Speaker Biography

Ratnamala Chatterjee has completed her PhD from Indian Institute of Technology Kanpur, India and her Post Doctoral training from Massachusetts Institute of Technology, USA. She is the professor of Indian Institute of Technology Delhi, India. She has over 200 publications that have been cited over 2500 times, and his/her publication H-index is 25.

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