Abstract Submitted
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Low Power Dual Ion Beam Sputtered high endurance resistive switch with memristive behaviour[1] AMITESH KUMAR, MANGAL DAS, BRAJENDRA S. SENGAR, MD. ARIF KHAN, ABHINAV KRANTI, SHAIBAL MUKHERJEE, Indian Institute of Technology, Indore — The memory effects in a memristor can be realized through the switching behavior between two distinct resistance states, low resistance state (LRS) and high resistance state (HRS) driven by low pulse voltages. ZnO-based thin films such as undoped ZnO, Mg-doped ZnO and Mn-doped ZnO have attracted considerable interest as promising resistive switching materials. Gallium doping electrically modulates the behavior of ZnO to suit low power switching behavior. Non-lattice oxygen ions and oxygen vacancies as detected by XPS are found to play important role in imparting forming-free resistive switching behavior. I-V of Al/ZnO/Al (AZA) shows device with varying ramp rate exhibiting decreasing hysteresis with increasing ramp rate. Similarly I-V for Au/Ga-ZnO/Au (AuGZAu) conforms to zero crossing of I-V hysteresis loop and shrinking of loop area with increasing ramp rate. Device sets and resets to lower voltage as compared to AZA device. Ga doping increases conductivity of ZnO film and hence sets and resets at lower voltages. AuGZAu device depicts unipolar memristive behavior as it shows pinched hysteresis with varying frequency, whereas AZA behaves as an ideal bipolar memristor with good endurance and retention.

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