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The Fabrication and Characterization of Flexible TiO_2 Memory Devices LAURIE STEPHEY, NADINE GERGEL-HACKETT, BARBARA DUNLAP, CURT RICHTER, NIST — Recently, work was published demonstrating the physical realization of a device with electrical properties consistent with a memristor, the theoretical missing fourth circuit element. Memristors can be switched from a low resistance state to a high state and will remain in this state until the opposite polarity bias is applied. Memristors also demonstrate unique electrical behaviors, including multi-state/analogue switching. In this study, devices with memristor characteristics were fabricated inexpensively on a flexible substrate and electrically characterized. Potential applications of these devices include serving as inexpensive memory for disposable electronics. Two different sizes of flexible memristors (2 mm x 2 mm and 100 μm x 100 μm) with various film thicknesses were fabricated and characterized. A correlation between film thickness and the threshold switching bias was observed. Parameters including charge magnitude, current magnitude, bias magnitude, and resistance were also investigated to search for potential trends in switching behavior. Preliminary analysis indicates that charge magnitude may be a contributing factor to switching and also that switching mechanisms may display some area-dependence.

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