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**Conductance bistability in metal oxide junctions** ZHONGKUI TAN, VIJAY PATEL, ESTEBAN MONGE, SHIH-SHENG CHANG, SHAWN POTTORF, JAMES LUKENS, KONSTANTIN LIKHAREV, Department of Physics and Astronomy, Stony Brook University — We are exploring conductance bistability (memory) effects in junctions based on metal oxides, in the context of their possible applications in hybrid CMOS/nanoelectronic (e.g., CMOL [1]) circuits. So far, we have investigated $CuO_x$, $NbO_x$ and $TiO_x$ formed by thermal and plasma oxidation, with or without rapid thermal post-annealing (at 200 to 800°C for 30 to 300 seconds). Conductance switching effects have been observed for all these materials. Particularly high endurance (over 1000 switching cycles) has been obtained for $TiO_x$ junctions plasma oxidized in 15mTorr oxygen and then post-annealed at 700°C. However, the ON/OFF conductance ratio for these junctions is only about 5, and the sample-to-sample reproducibility is much lower than required for integrated circuit applications. Our plans are to extend our studies to a-Si junctions with one Ag electrode, and multilayer $TiO_x$ junctions, with the main goal to improve device reproducibility. The work is supported in part by AFOSR.

[1] K. K. Likharev, "Hybrid CMOS/Nanoelectronic Circuits," accepted for publication in *J. Nanoelectronics and Optoelectronics*, Nov. 2008.

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