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Resistive Switching in ALD ZnO and TiO2 Films TODD WAGGONER, JOHN CO, Oregon State University, ELECTRICAL ENGINEERING AND COMPUTER SCIENCE TEAM — Resistive switching in metal oxide thin films has recently become a major scientific interest due to the possibility of producing low power, non-volatile resistive random access memory (ReRAM). Theories proposed for the switching mechanism typically involve the migration of oxygen vacancies under an applied electric field. Resulting from local increases in vacancy concentration, conducting filaments can form between device electrodes. The process is reversible by either applying a stronger voltage bias across the device to burn out the filaments or by reversing the applied field. This allows for the design of devices with unipolar or bipolar operation. A material comparison of ZnO and TiO2 thin films grown by atomic layer deposition (ALD) demonstrate different switching behavior in our devices. ALD TiO2 films have been prepared in the past but results typically show a wide variance. Here ZnO and TiO2 are directly compared utilizing Al electrodes. So far most work has been done using Pt electrodes on TiO2 thin films. Investigations show that device yield, performance, cycle endurance, and stability appear to differ significantly as a result of the chosen dielectric.

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