

**Forming-Free Resistive Switching
Characteristics of 15-nm Thick Zr-Based
Metallic Glass Oxide**

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The characteristics and mechanism of Zr-based metallic glass oxide (ZMGO) resistive switching (RS) memory device are addressed. The Pt/ZMGO/Pt resistive random access memory device shows unipolar RS properties. The experimental results show forming-free RS properties with good resistance ratio. The amorphous ZMGO thin film with the excellent memory performances, including lower operation voltage ($< 1.7V$), good endurance, long retention time and thin film thickness (15nm), without heating are demonstrated. The absence of grain boundaries in the amorphous ZMGO films helps us attribute the switching mechanism of Pt/ZMGO/Pt device to the possible redistribution of defects related to oxygen vacancies along the filamentary paths during the resistive switching process.