

**Hybrid Filamentary Switching in Fe_2O_3 —Incorporated TiO_2
Memristors for Memory and Neuromorphic Computing
Application**

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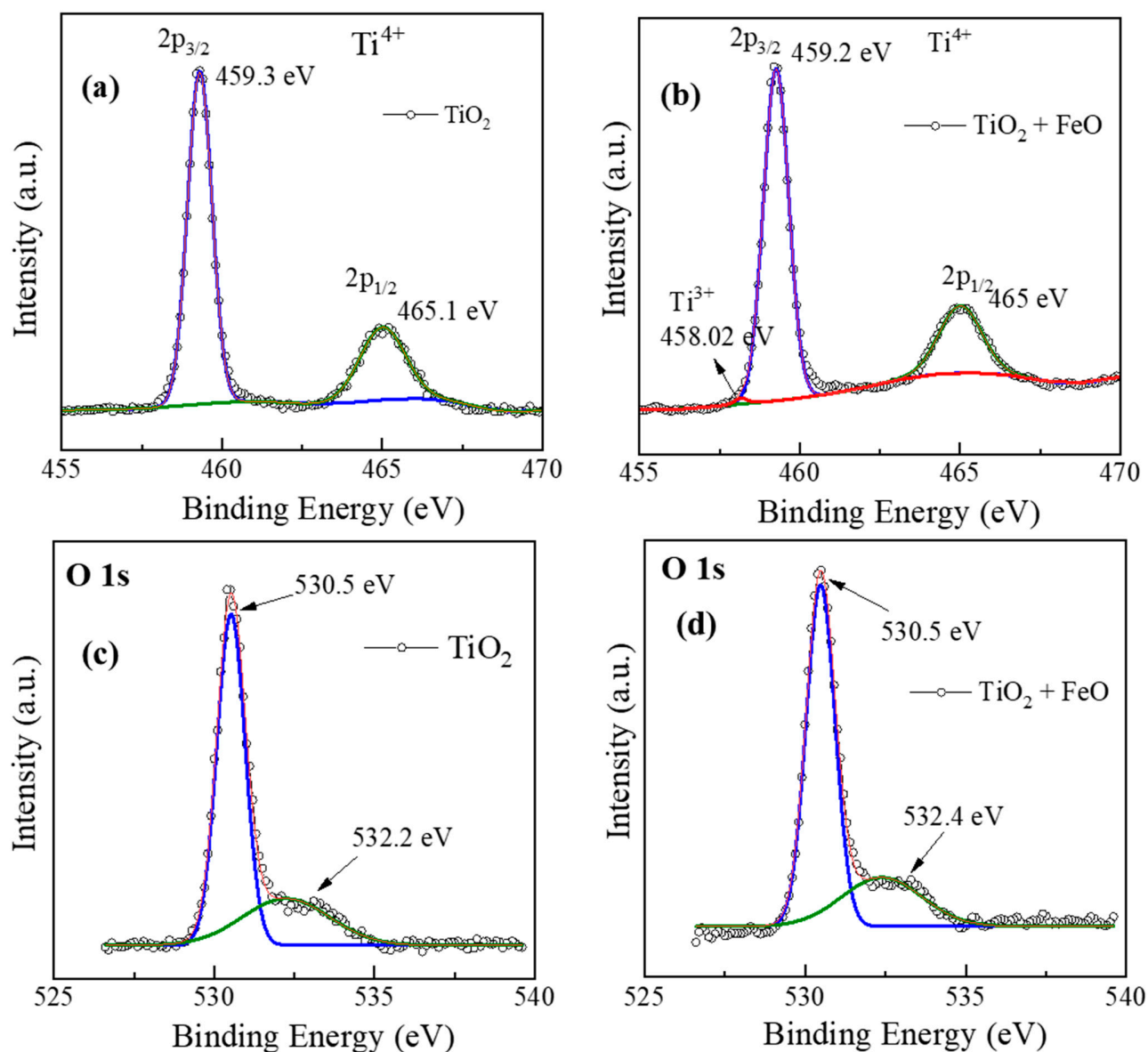


Figure S1: High-resolution Ti 2p core-level XPS spectra of (a) pristine TiO_2 and (b) Fe_2O_3 -incorporated TiO_2 thin films. The deconvoluted spectra reveal the characteristic Ti^{4+} states in both samples, while an additional Ti^{3+} component is observed in the Fe_2O_3 -incorporated TiO_2 film. High-resolution O 1s XPS spectra of (c) TiO_2 and (d) $\text{TiO}_2 + \text{FeO}$ thin films with peak deconvolution into lattice oxygen (≈ 530.5 eV) and oxygen-defect-related components.

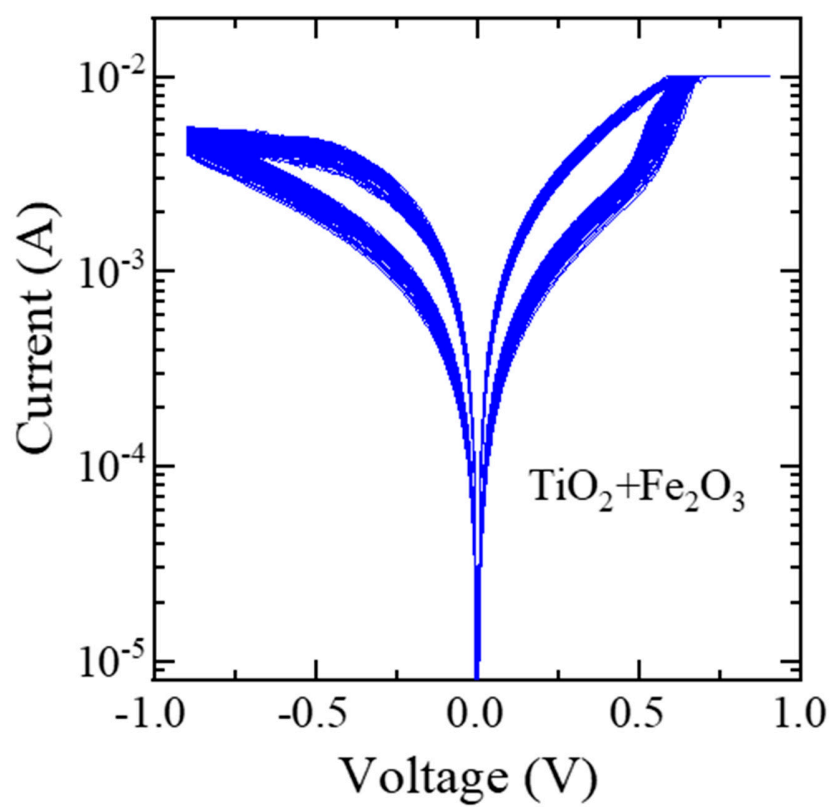


Figure S2: Semi-logarithmic I-V characteristics of Ag/ $\text{TiO}_2+\text{Fe}_2\text{O}_3$ /FTO device demonstrating gradual and continuous resistance change under higher compliance current of 10 mA.