In-Situ Study of Resistive Switching in a Nitride-based Memristive Device

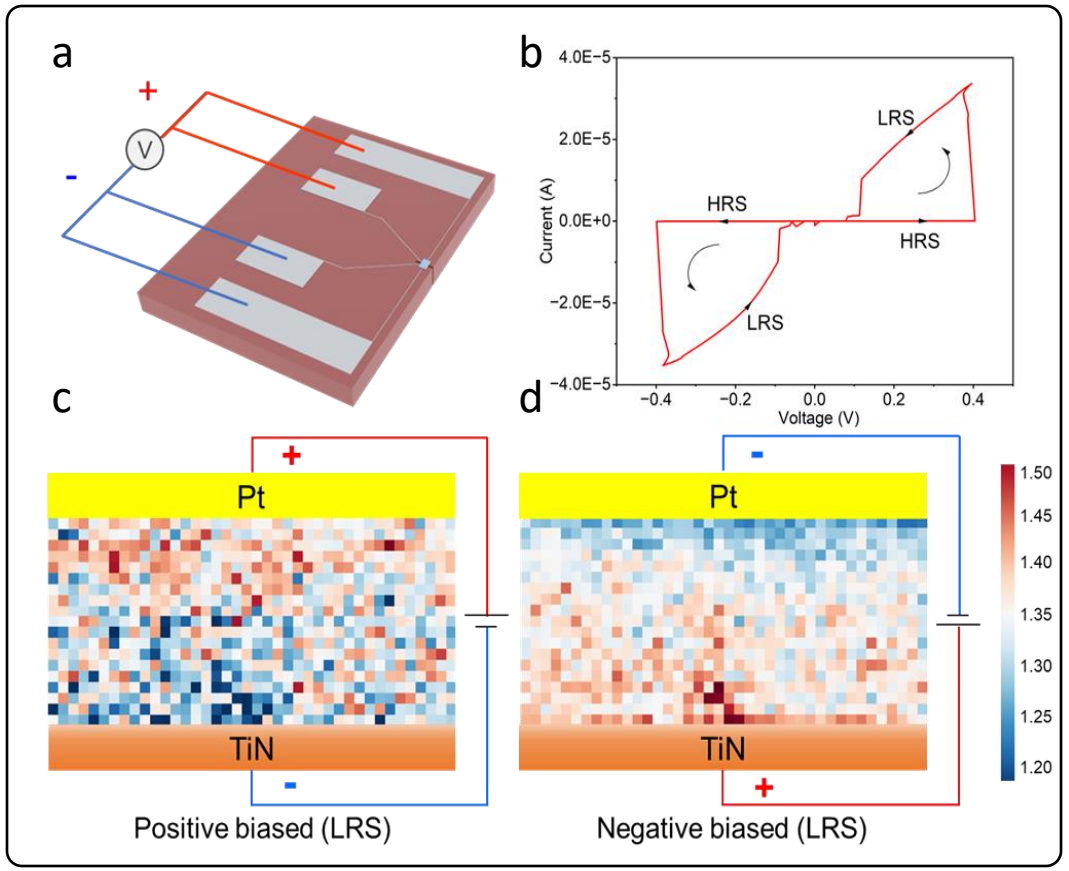

Figure: (a) MEMS-based *E*-chip and electrodes connection for *in situ* TEM biasing experiment. (b) *I-V* characteristic curve of the lamella device. (c,d) Ti L_2/L_3 intensity ratio maps of the MIM device at positive and negative biased conditions.

Scientific Achievement

Resistive switching (RS) mechanism of a nitride-based memristive device revealed through in-situ transmission electron microscopy (TEM) and electron energy loss spectroscopy (EELS) experiments, as well as finite elements simulation analyses.

Significance and Impact

This study presents a new perspective of the interface-dominated RS process for fabricating novel CMOS-compatible memristive devices for energy-efficient microelectronic device applications.

Research Details

- Metal/TiOx/TiN/Si memristive devices fabricated using a one-step pulsed laser deposition method.
- In-Situ TEM and EELS biasing experiments performed to probe the oxygen vacancies migration in the lamella device under DC biases.
- Finite element simulation indicates non-filamentary RS mechanism.

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