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Fabrication of nanostructures in oxide films by electric field and resistive switching effect

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Due to the simple structure, fast speed, high endurance, good scalability and low power consumption characteristics, resistive switching memories (or RRAM) have been attracting great amount of attention for novel information applications. Generally, ion transport related filamentary conduction are considered as the primary mechanism for RRAM by both the academic and industrial communities. In this presentation, we summarize our past effort in elucidating the existence, location, chemical composition and shape of the conductive filaments (CFs) *via* C-AFM, depth-profiling XPS and low temperature transport measurements. Then the newest results of obtaining quantized conductance through controlling the CF evolution dynamics is emphasized for multilevel storage and multi-value logic applications. Finally, we also introduce our recent work on modulating the magnetic properties of resistive switching materials by ion transport approach.

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