Polyoxometalates for Nonvolatile Memory Applications

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Polyoxometalates for Nonvolatile Memory Applications
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Proposed research effort:
- Fabrication of two terminal resistive random access memory (RRAM) device.
- Materials to be used as active switching layer: (a) conventional transition metal oxide (TMO) thin film (sputter deposited) and (b) polyoxometalates (spin-coated).
- To make typical charge transport measurements, both at room temperature and low temperature (down to 4.2 K) to study resistance switching phenomena.

Proposed device architecture:
- A thin film of TMO or polyoxometalate will be deposited using sputtering or spin-coating method on a conducting substrate which acts as bottom electrode. Top contacts (Au or Pt) will be deposited using dc sputtering method.
- I-V measurements will be carried out between top and bottom contacts.

Facilities needed:
- RF and DC sputtering, spin-coating unit.
- I-V measurement set-up.
- Low temperature charge transport measurements.
- Structural characterization: SEM, HRTEM, AFM, XPS, etc.

Facilities available at NITK:
- RF and DC sputtering chamber
- Spin-coating unit
- I-V measurement set-up

Fig. 1: Schematic diagram of a RRAM device.

Fig. 2: RF and DC sputtering chamber

Fig. 3: spin-coating unit.

Fig. 4: SEM image of POM.

Fig. 5: I-V plot showing resistive switching.

Preliminary results:
- POM (Na\textsubscript{6}V\textsubscript{10}O\textsubscript{28}) as switching layer:

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