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 tempetarure (down to 4.2 K) to study resistance swiching 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.

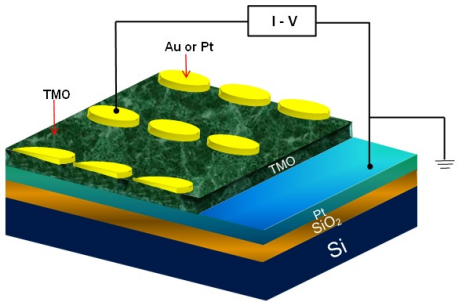

Fig. 1: Schematic diagram of a RRAM device.

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:

Fig. 2: RF and DC sputtering chamber

Fig. 3: spin-coating unit.

Preliminary results:

POM ($Na_6V_{10}O_{28}$) as switching layer:

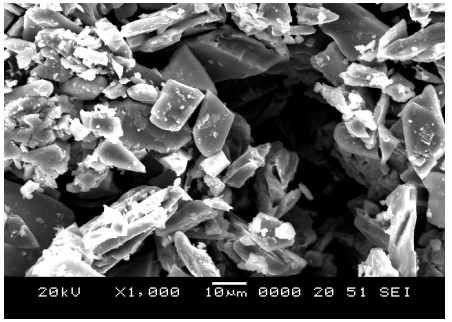

Fig. 4: SEM image of POM.

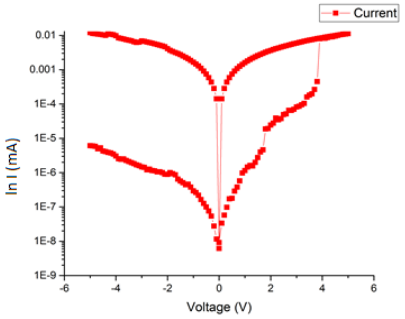

Fig. 5: I-V plot showing resistive switching.

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