**Supporting Information**

**Redox-active vanadium-based polyoxometalate as an active element in resistive switching based nonvolatile molecular memory**

*Sterin N. S., Nivedita Basu, Marc Cahay, Satyanarayan M. N., Sib Sankar Mal\*, Partha Pratim Das\**

Correspondence: malss@nitk.edu.in and daspm@nitk.edu.in



Figure S1: FTIR spectra of sodium decavanadate (Na6V10O28). The vibrational bands at wavenumbers 988 cm-1 and 956 cm-1 are attributed to V=O bond. The bands at 847 cm-1, 746 cm-1 and 521 cm-1 indicate the V-O-V bond in the SDV.[1]



Figure S2: UV-Visible spectrograph of sodium decavanadate. Bandgap calculated using Tauc equation [2,3] was found to be 2.7 eV.



|  |  |  |  |
| --- | --- | --- | --- |
| Element | Weight% | Atomic% |  |
|   |   |   |  |
| O K | 41.29 | 64.42 |  |
| Na K | 11.44 | 12.42 |  |
| V K | 47.27 | 23.16 |  |
|  |  |  |  |
| Totals | 100.00 |  |  |

Figure S3: Energy-dispersive X-ray spectroscopy (EDX) showing presence of different elements present in sodium decavanadate crystals.



Figure S4: A typical current-voltage (*I-V*) plot of our Glass/ITO/ Na6V10O28/Cr/Au RRAM cell recorded after 12 months. We observed only slight increase in set voltage; rest all switching behavior found to remain same.



Figure S5: Uniform and repetitive current-voltage (*I-V*) characteristics recorded for 50 cycles.



Figure S6: Cyclic voltammogram of Na6V10O28 showing only pair of peaks for redox behavior.

**References**

[1] Han‐Yi Chen, Grace Wee, Rami Al‐Oweini, Jochen Friedl, Kim Soon Tan, Yuxi Wang, Chui Ling Wong, Ulrich Kortz, Ulrich Stimming, and Madhavi Srinivasan, *ChemPhysChem*. 2014,15, 2162.

[2] Jennifer B. Coulter, Dunbar P. Birnie III *Physica Status Solidi (b)* 2018, 255, 1700393.

[3] S. Laidoudi, A. Y. Bioud, A Azizi, G. Schmerber, J. Bartringer, S. Barre, A. Dinia  *Semiconductor Science and Technology.* 2013, 28, 115005.