Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Green synthesis of nanobelt-membrane hybrid structured vanadium oxide with high electrochromic contrast

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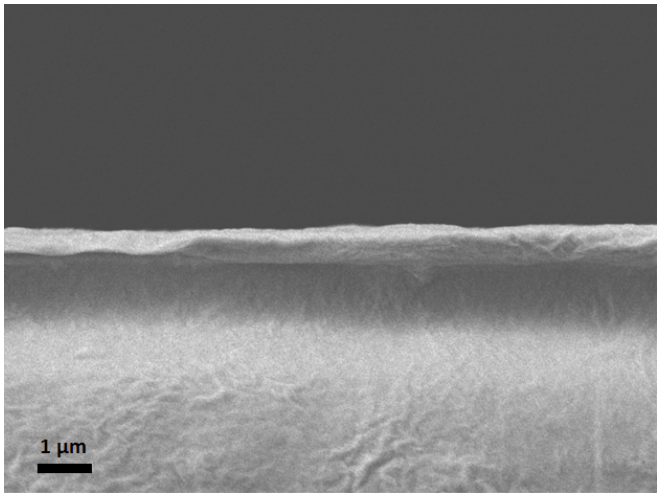
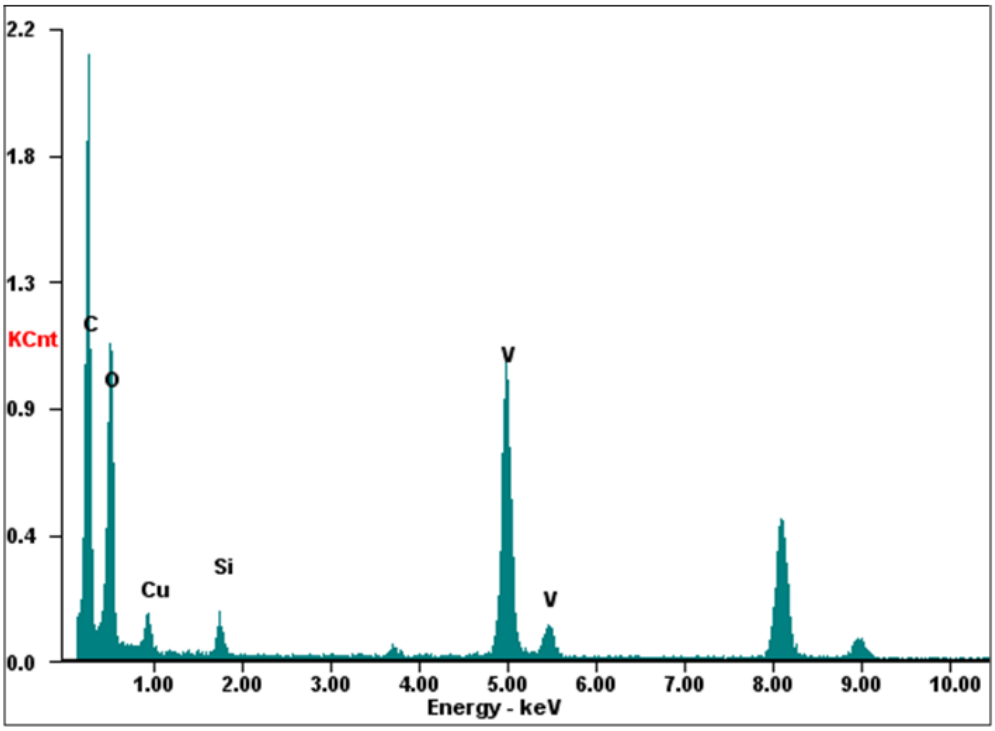
Sample preparation

After the hydrothermal synthesis and centrifuge washing, the whole final product is mixed with 50 ml DI water. Based on the amount of precursor used and final product composition as determined by the XRD data, the V_2O_5 hydrate forms a 0.2 wt% suspension. The suspension is bath-sonicated and drop-casted onto an ITO glass covering a 7*35 mm^2 area.
To investigate the thickness, the film is drop-casted in the same way described above onto a regular glass covering the same area to maintain the film thickness. As can be seen below in the cross sectional image, the film is around 712 nm thick.



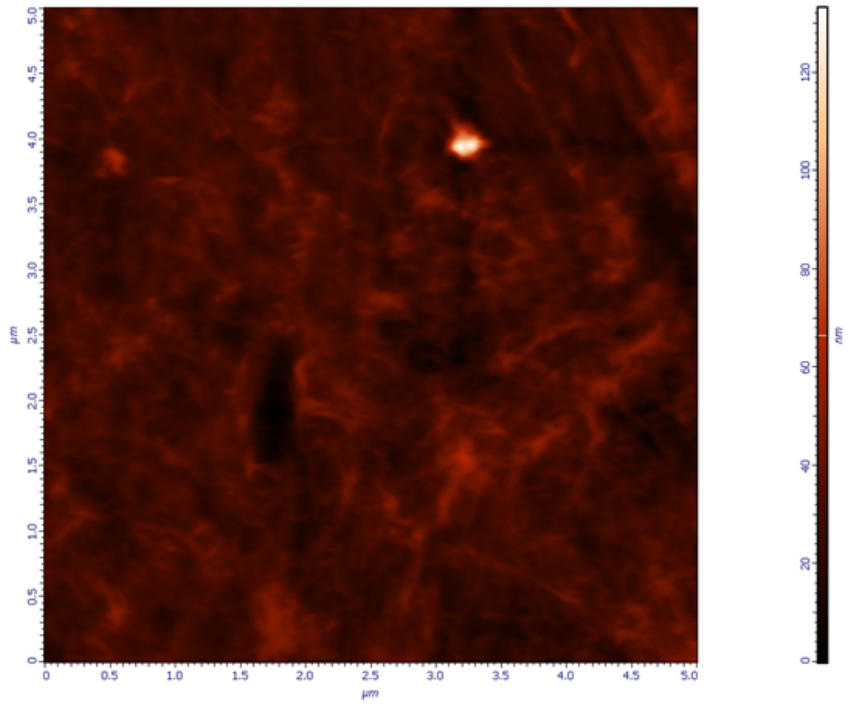
FS1. Cross sectional FESEM image of the drop-casted film.

Characterization

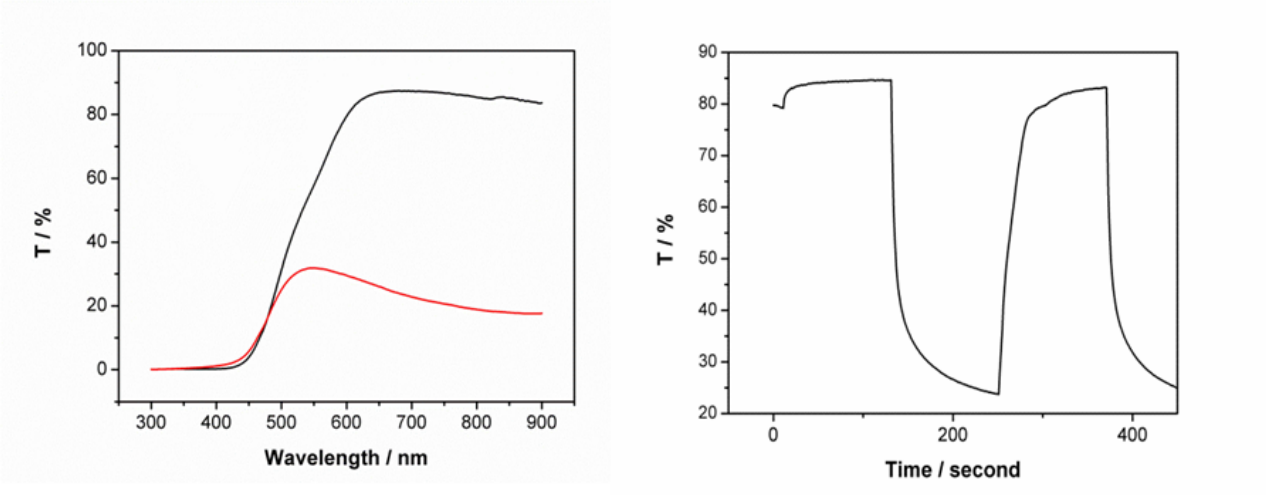


FS 2. EDX spectrum of the hybrid structured vanadium oxide

The wt% of V and O is 51.6 and 48.4 % respectively, which corresponds to atom percent of V and O 25.1, 74.9 % respectively.



FS 3. AFM image of a 5 by 5 µm region for RMS testing, which suggests a very smooth surface with RMS of 7.72 nm.



FS 4. Electrochromic contrast and switching test under two electrode condition. The film is polarized between -2.0 V and +2.8 V in $LiClO_4$ electrolyte. The contrast obtained at 700 nm is 64%. $T_{bleaching}$ and $T_{coloring}$ measurement takes the same standard as described before, which leads to $T_{bleaching}$ = 32.5 s and $T_{coloring}$ = 46.6 s