

Supporting information: High-performance planar thin film thermochromic window via dynamic optical impedance matching

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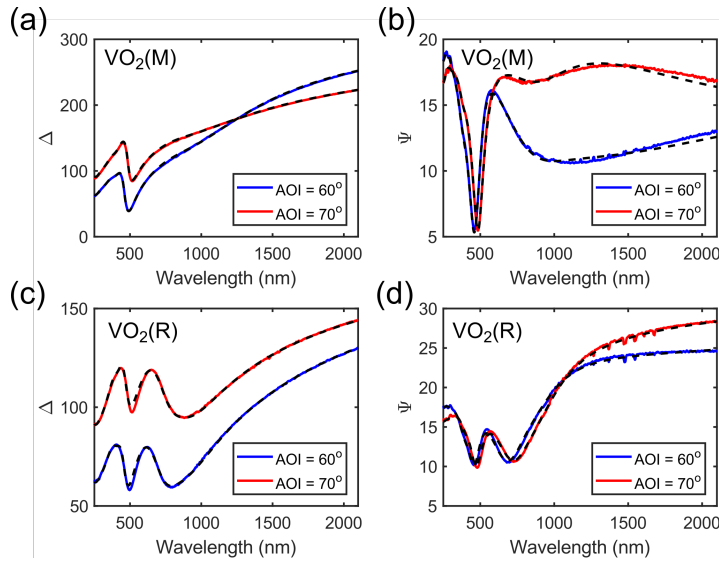


Figure S1: (a-d) Measured ellipsometric parameters Δ (a, c) and Ψ (b, d) for a single VO_2 thin film along with corresponding theoretical fitting for 96 nm thickness using $\text{VO}_2(\text{M})$ (a, b) and $\text{VO}_2(\text{R})$ (c, d) optical constants as shown in the main text for multiple angles of incidence (AOI) normal from the sample surface.

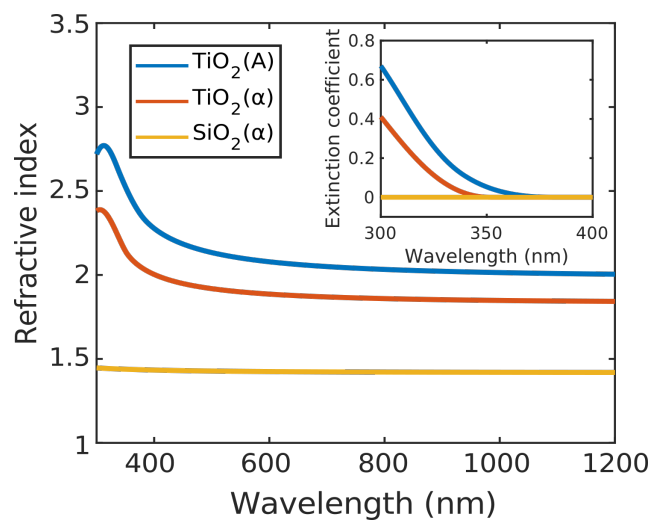


Figure S2: Optical constants of impedance matching layers as derived from ellipsometry.

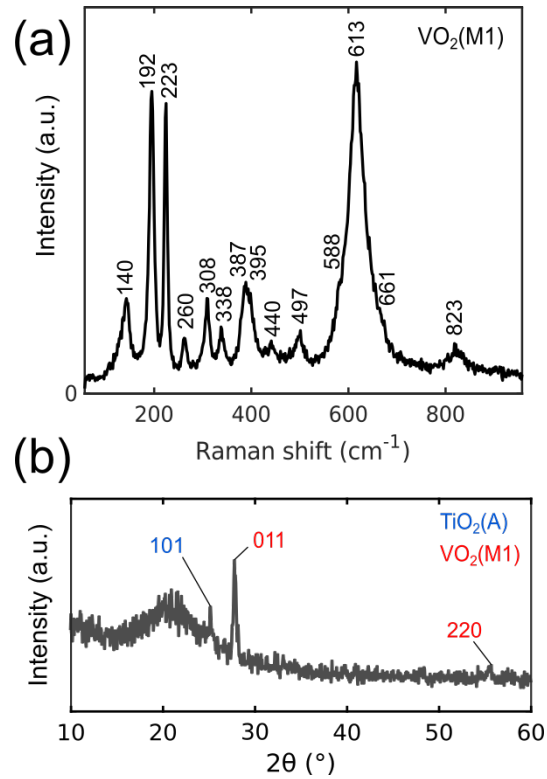


Figure S3: Identification of crystalline material phases within the sample. (a) Raman spectrum of sample. The peaks at $\sim 140, 192, 223, 260, 308, 338, 387, 395, 440, 482, 497, 588, 613, 661$ and 823 cm^{-1} are assigned to the $\text{VO}_2(\text{M1})$ phase[1, 2, 3]. The broad peak at $\sim 613 \text{ cm}^{-1}$ is a convolution of the peaks at $588, 613$ and 661 cm^{-1} . The low frequency phonons at 192 and 223 cm^{-1} correspond to lattice motion involving V-V bonds[4], whilst the peak at 140 cm^{-1} has previously been attributed to soft-phonon vibrations[2, 5]. The rest of the peaks are assigned to vibrational modes of V-O bonds[4, 6]. (b) X-ray diffraction spectrum of sample showing peaks for both $\text{TiO}_2(\text{A})$ (101)[7] and $\text{VO}_2(\text{M1})$ (011, 220)[8, 9].

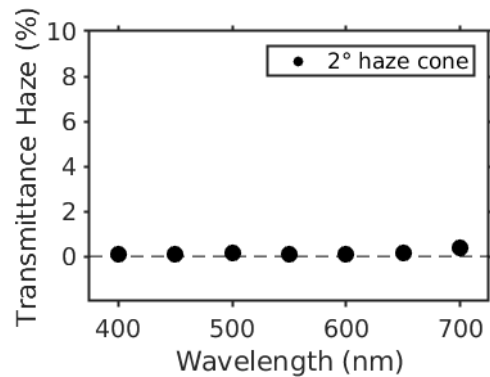


Figure S4: Characterisation of visible haze. Fraction of the transmitted light that is outside 2° from normal is below 0.5% across the full visible range.

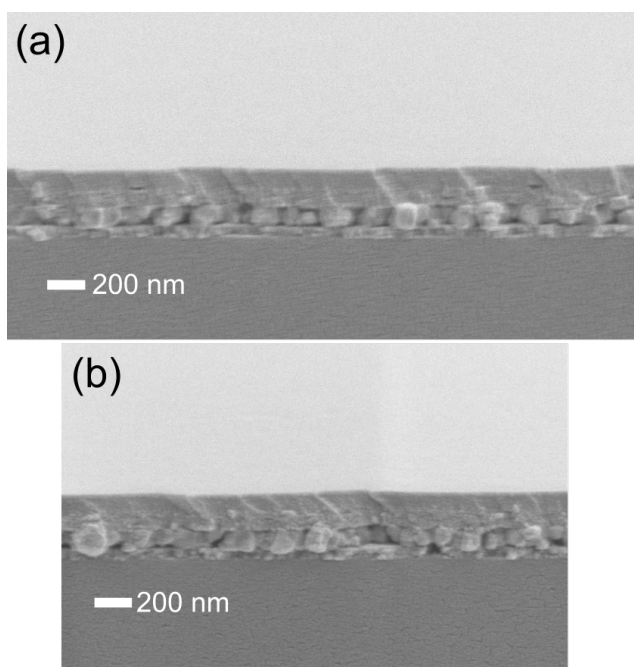


Figure S5: Additional electron microscopy images of fabricated structure. (a) Side-on image at 93000x magnification (b) Side-on image at 117000x magnification.

References

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