



Supplementary Materials

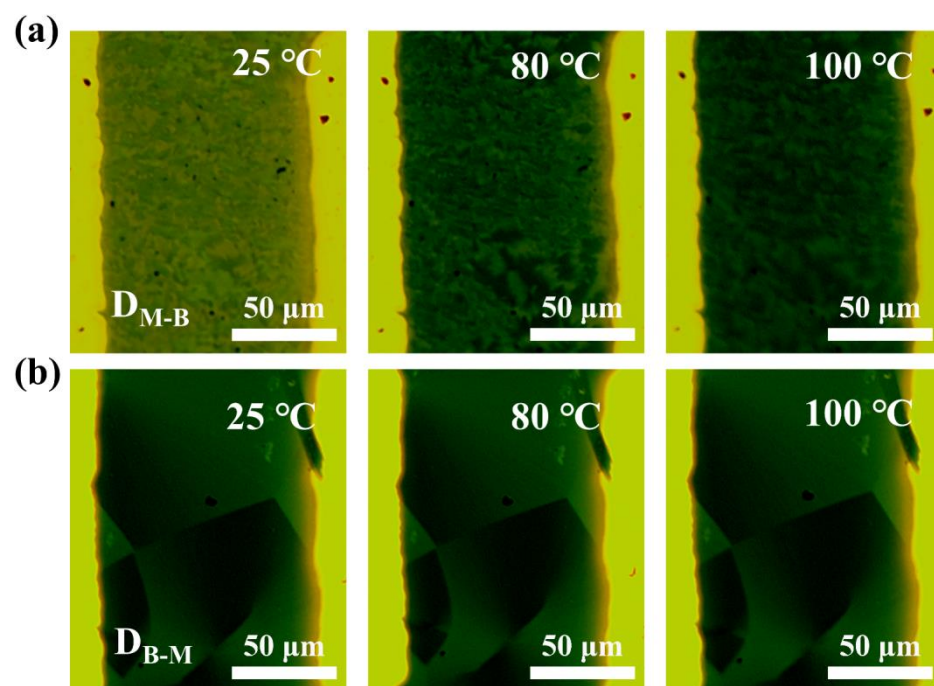
# Coexistent VO<sub>2</sub> (M) and VO<sub>2</sub> (B) polymorphous thin films with multiphase-driven insulator-metal transition

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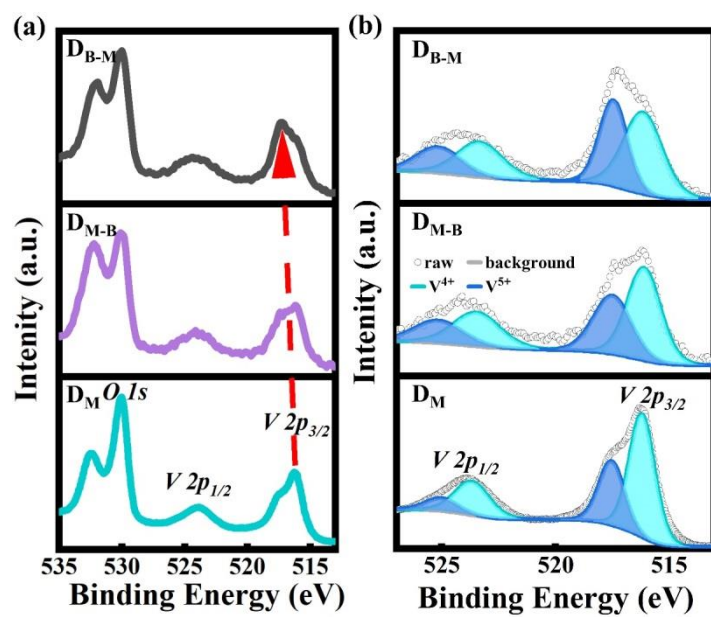
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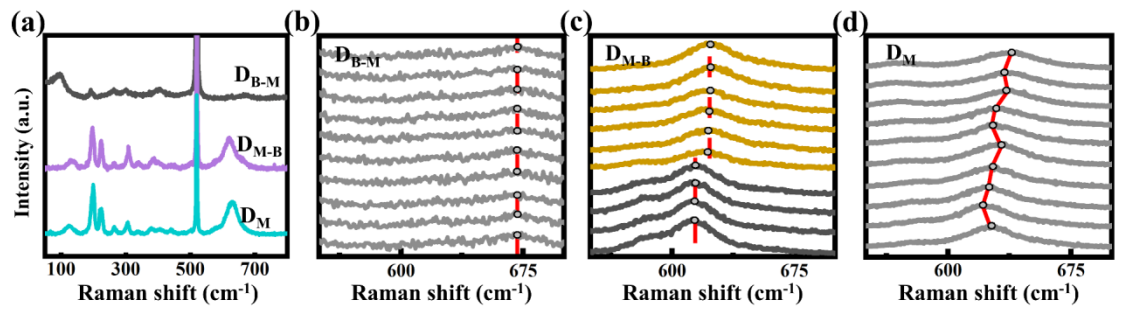
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**Figure S1** Temperature-dependent optical microscopy images for the  $D_{M-B}$  (a) and  $D_{B-M}$  (b) thin films at varied temperature.



**Figure S2** (a) The V 2p and O 1s XPS spectra and (b) the fitted V 2p XPS spectra for the  $D_M$ ,  $D_{M-B}$  and  $D_{B-M}$  thin films with coexistent  $VO_2$  (M) and  $VO_2$  (B) phases.



**Figure S3** a) Raman spectra for the polymorphous  $\text{VO}_2$  thin films with Coexistent  $\text{VO}_2$  (M) and  $\text{VO}_2$  (B) phases, and details at around 640  $\text{cm}^{-1}$  for the  $D_{B-M}$  (b),  $D_{M-B}$  (c) and  $D_M$  (d) thin films.

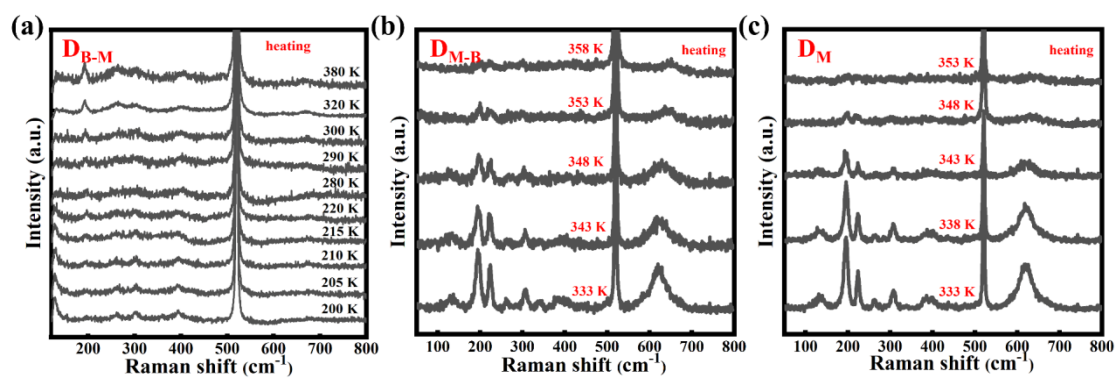
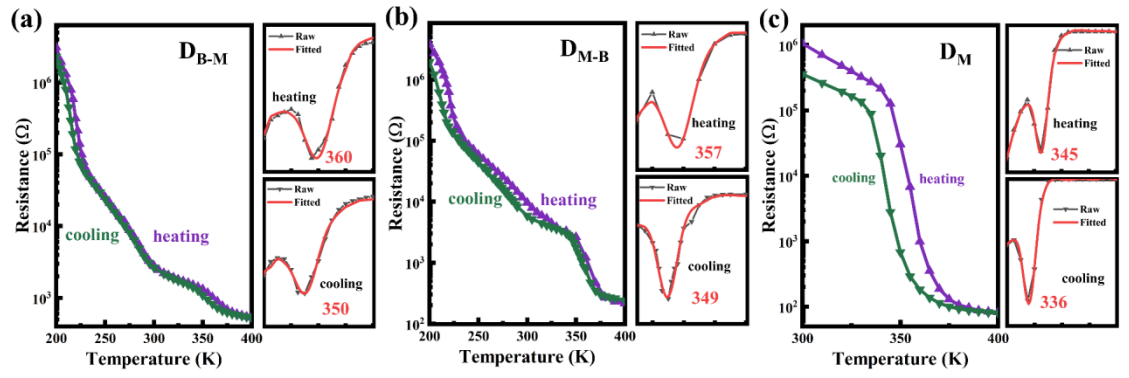


Figure S4 Temperature-dependent Raman spectra for the  $D_{B-M}$  (a),  $D_{M-B}$  (b) and  $D_M$  (c) thin films.



**Figure S5** Temperature-dependent resistance curves and their derivative curves for the  $D_{B-M}$  (a),  $D_{M-B}$  (b) and  $D_M$  (c) thin films.