

Electronic Supplementary Information

Defect-mediated phase transition temperature of VO₂ (M) nanoparticles with excellent thermochromic performance

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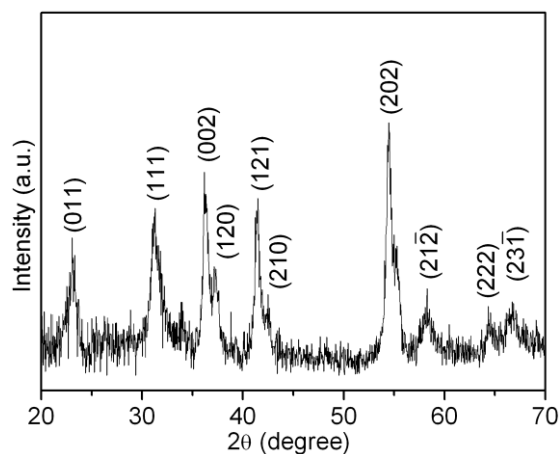


Fig. S1 XRD pattern of the as-prepared VO₂ (D) NPs after hydrothermal reaction at 220 °C for 36 h.

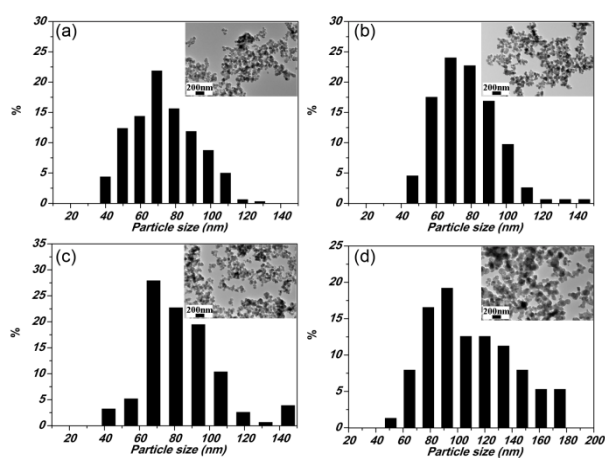


Fig. S2 Size distribution histograms of VO₂ (M) NPs obtained after annealing at temperature of (a) 300, (b) 350, (c) 400 and (d) 450 °C with the average size of 74, 77, 85 and 109 nm, respectively. The particle size distributions were obtained by measurement of about 150 nanocrystals from corresponding TEM images (upper right corner).

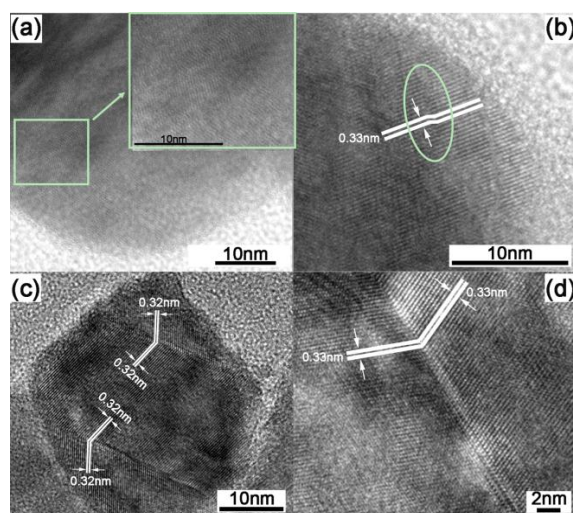


Fig. S3 TEM images of (a) lattice distortion and (b) grain boundary in VO₂ (M) NPs that obtained at 300 °C for 1h, the inset is corresponding enlargement of the lattice distortion; (c) grain boundaries and (d) twin boundary correspond to NPs obtained at 400 °C for 1h.

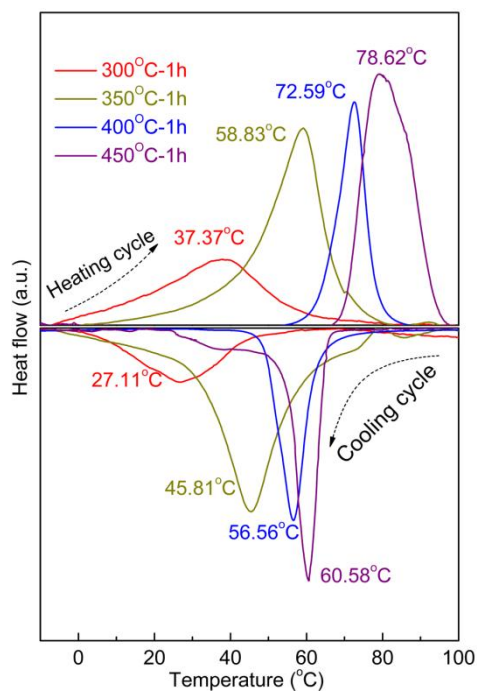


Fig. S4 DSC curves of VO₂ (M) NPs annealed at 300, 350, 400 and 450 °C for 1h under vacuum of about 20 Pa.

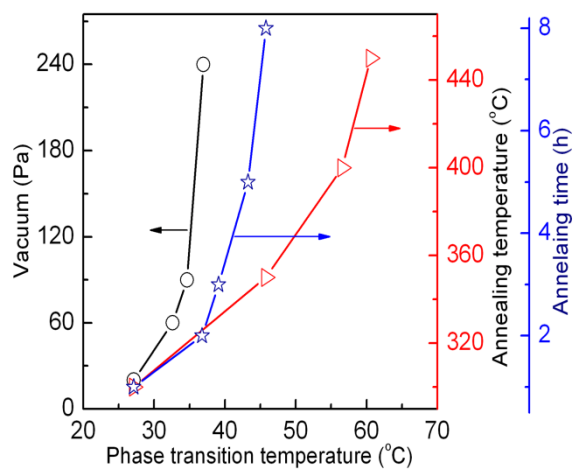


Fig. S5 Dependence of phase transition temperature of VO₂ (M) NPs on selected vacuum (300°C, 1h), annealing temperature (20Pa, 1h) and thermal treatment time (300°C, 20Pa) in cooling cycle in DSC measurement.

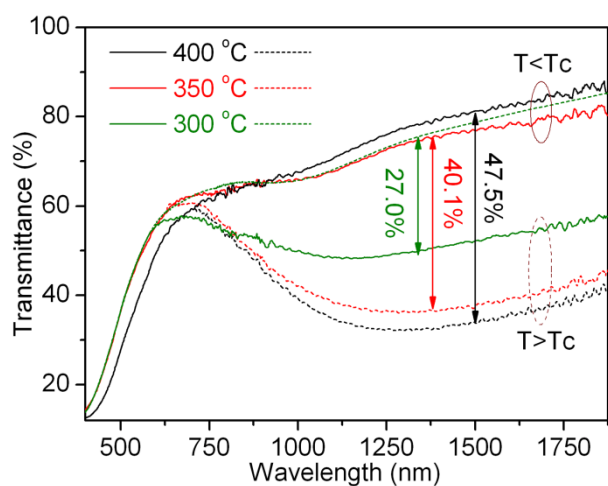


Fig. S6 Variable-temperature optical transmittances of VO₂ (M) NPs thin films prepared by spin-coating 300, 350 and 400 °C annealed VO₂ (M) NPs with a infrared modulation of about 27.0, 40.1 and 47.5 % at the wavelengths of 1.5 μm, respectively.

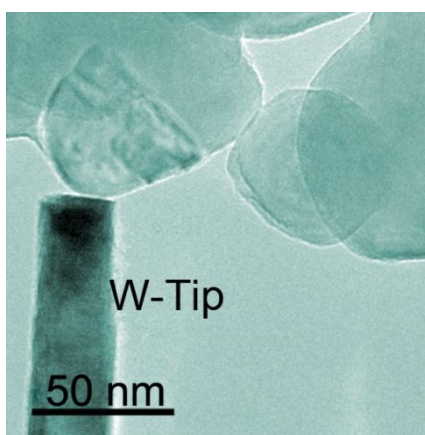


Fig. S7 TEM image of a tungsten tip and the corresponding VO₂ (M) NPs under the *in-situ* electrical test.