Electronic Supplementary Material

New aspects of Size-dependent Metal-insulator Transition in Synthetic Single-domain Monoclinic Vanadium Dioxide Nanocrystals

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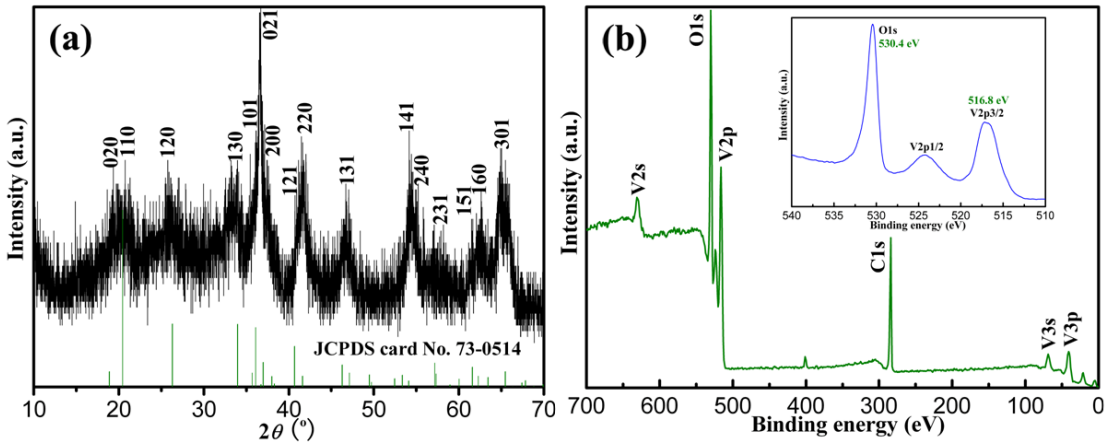

Figure S1. (a) XRD pattern and (B) XPS survey spectrum of 20 nm paramontroseite VO_2(P) nanocrystals. The panel a includes the corresponding standard pattern of JCPDS card No. 73-0514.

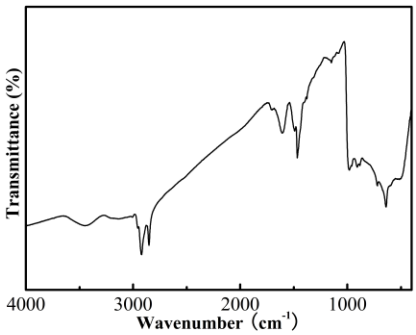

Figure S2. FT-IR spectrum of the as-synthesized 20 nm paramontroseite VO_2(P) nanocrystals.

The N-H mode of 1611 cm^{-1} in FT-IR spectrum indicates that the 20 nm paramontroseite VO_2 nanocrystals are capped with oleylamine.[1] The broad band at 3440 cm^{-1} could be assigned to the adsorbed water. The 2925 cm^{-1} and 2846 cm^{-1} belong to the C-H stretching vibrations. The band at 1473 cm^{-1} belongs to the CH_2 bending vibration mode. The peaks between 1000 and 400 cm^{-1} could be assigned to the vibration modes of paramontroseite VO_2.[2,3]

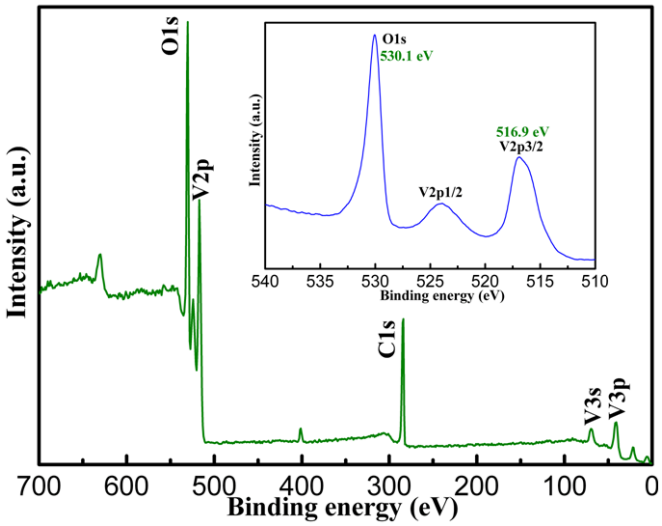

Figure S3. XPS survey spectrum of 20 nm monoclinic VO_2(M) nanocrystals. The panel a includes the corresponding standard pattern of JCPDS card No. 72-0514.

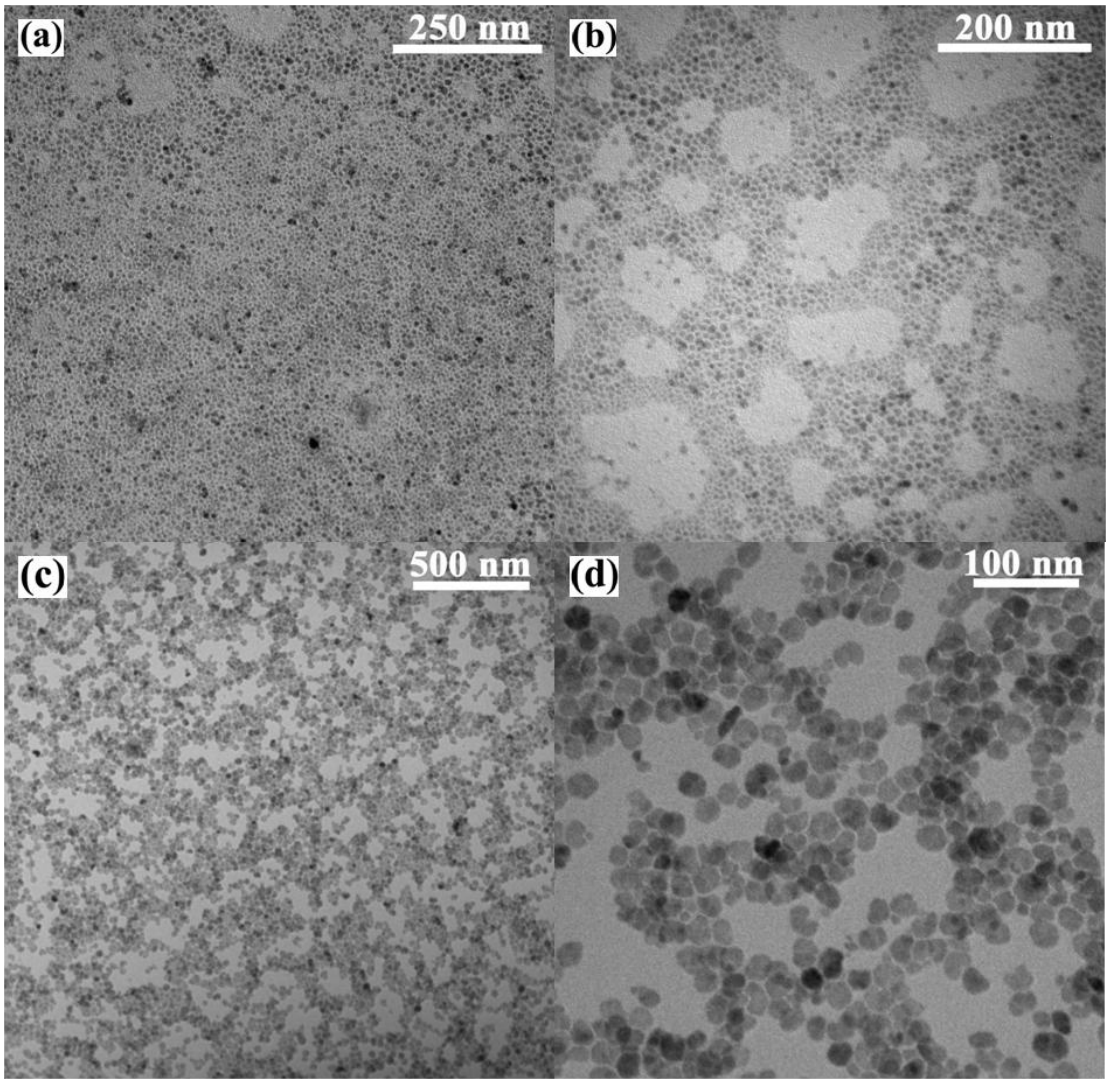

Figure S4. (a, b) Low and high magnified TEM images of 10 nm paramontroseite VO_2(P) nanocrystals; (c, d) low and high magnified TEM images of 30 nm paramontroseite VO_2(P) nanocrystals.

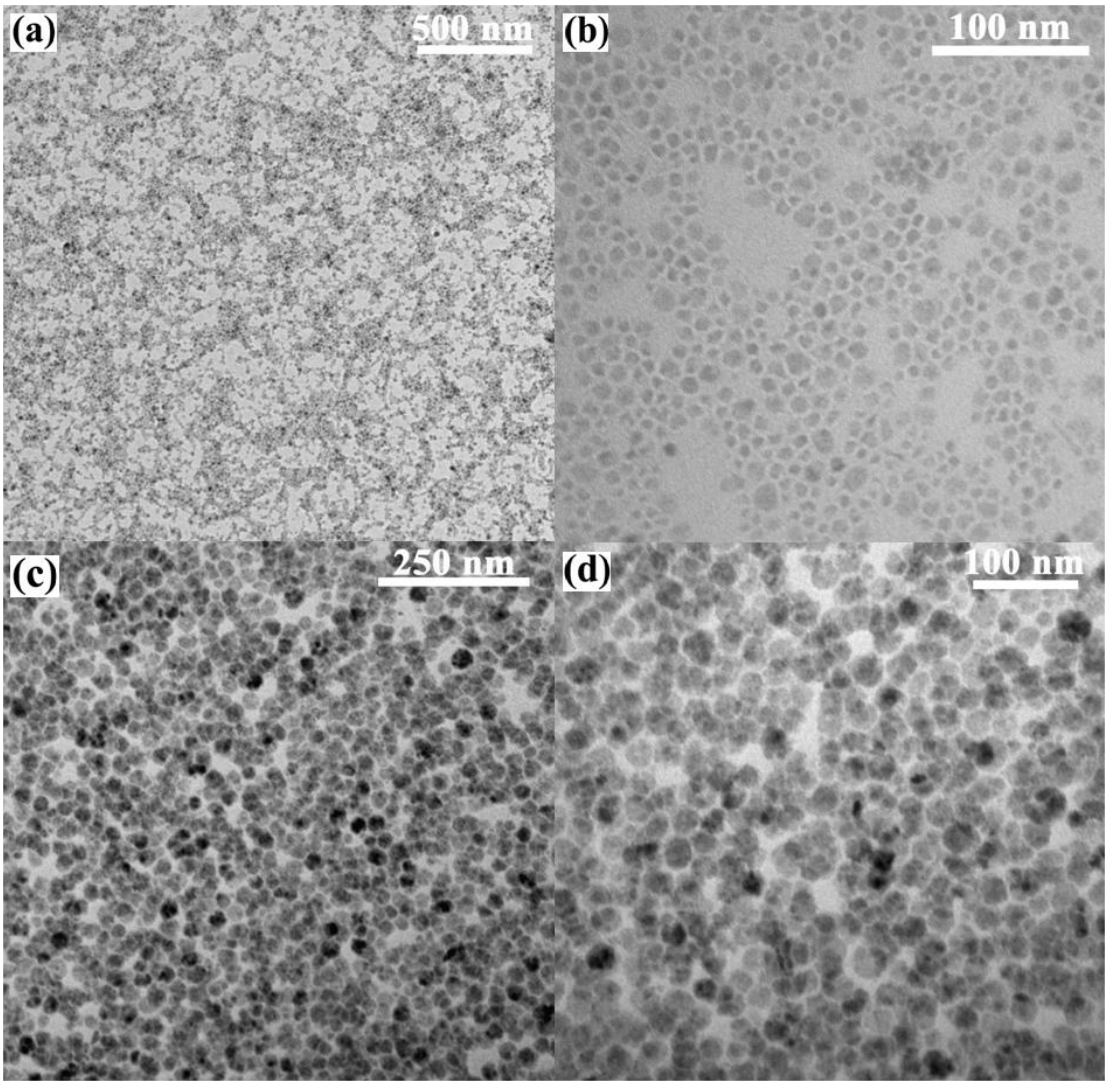

Figure S5. (a, b) Low and high magnified TEM images of 10 nm monoclinic VO_2(M) nanocrystals; (c, d) low and high magnified TEM images of 30 nm monoclinic VO_2(M) nanocrystals.

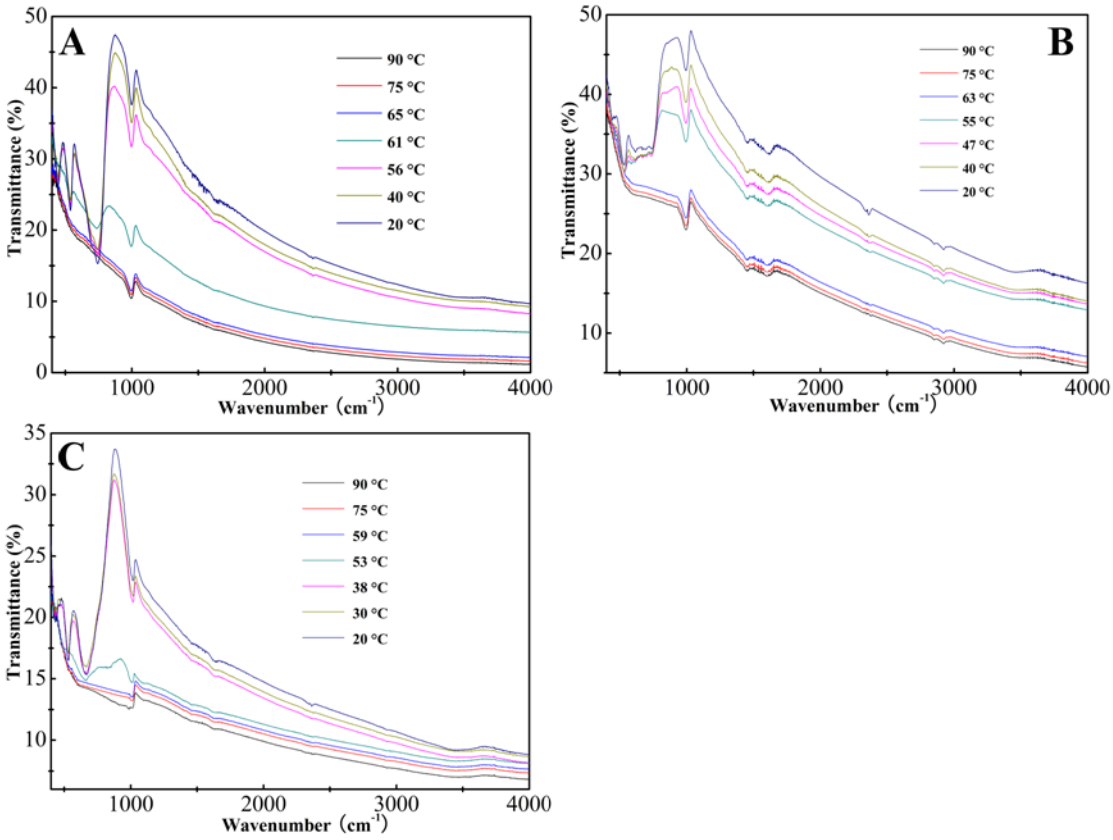

Figure S6. Variable-temperature FT-IR spectra for the synthesized (a) 10 nm, (c) 20 nm and (e) 30 nm VO_2(M) nanocrystals at various temperatures during cooling processes.

References

[1] Z. C. Xu, C. M. Shen, Y. L. Hou, H. J. Guo and S. H. Sun, *Chem. Mater.* 2009, **21**, 1778.

[2] K. C. Kam and A. K. Cheetham, *Mater. Res. Bull.* 2006, **41**, 1015.

[3] W. Chen, J. F. Peng, L. Q. Mai, H. Yu and Y. Y. Qi, *Solid State Commun.* 2004, *132*, 513.