

Electronic Supplementary Material

New aspects of Size-dependent Metal-insulator Transition

in Synthetic Single-domain Monoclinic

Vanadium Dioxide Nanocrystals

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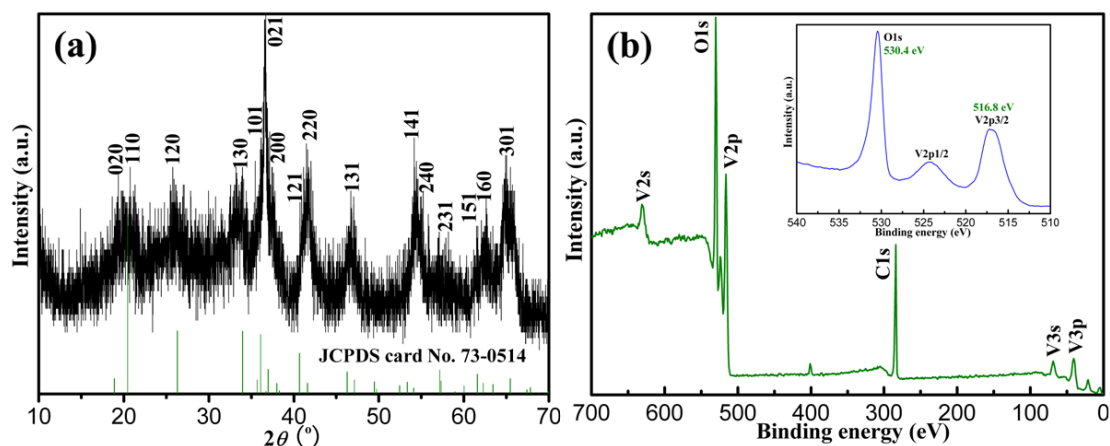


Figure S1. (a) XRD pattern and (B) XPS survey spectrum of 20 nm paramontroseite $\text{VO}_2(\text{P})$ nanocrystals. The panel a includes the corresponding standard pattern of JCPDS card No. 73-0514.

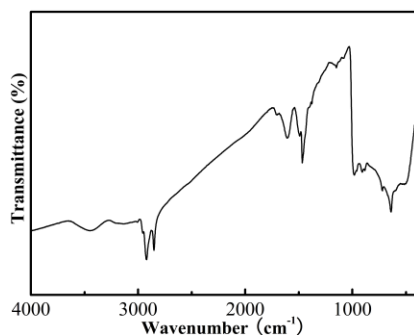


Figure S2. FT-IR spectrum of the as-synthesized 20 nm paramontroseite VO₂(P) nanocrystals.

The N-H mode of 1611 cm⁻¹ in FT-IR spectrum indicates that the 20 nm paramontroseite VO₂ 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 CH₂ bending vibration mode. The peaks between 1000 and 400 cm⁻¹ could be assigned to the vibration modes of paramontroseite VO₂. [2,3]

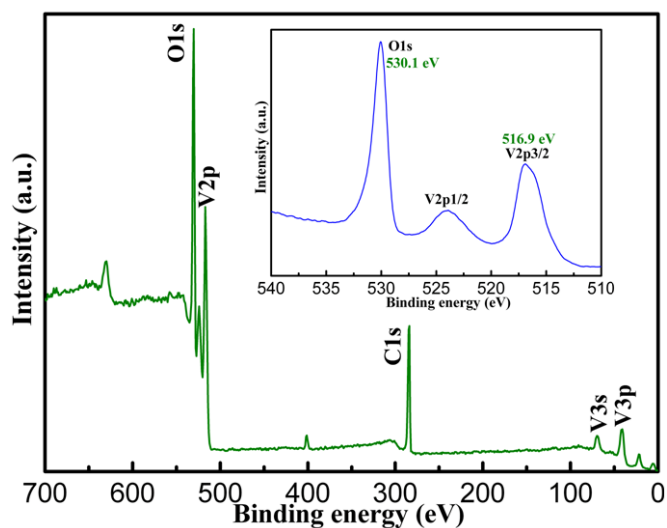


Figure S3. XPS survey spectrum of 20 nm monoclinic VO₂(M) nanocrystals. The panel a includes the corresponding standard pattern of JCPDS card No. 72-0514.

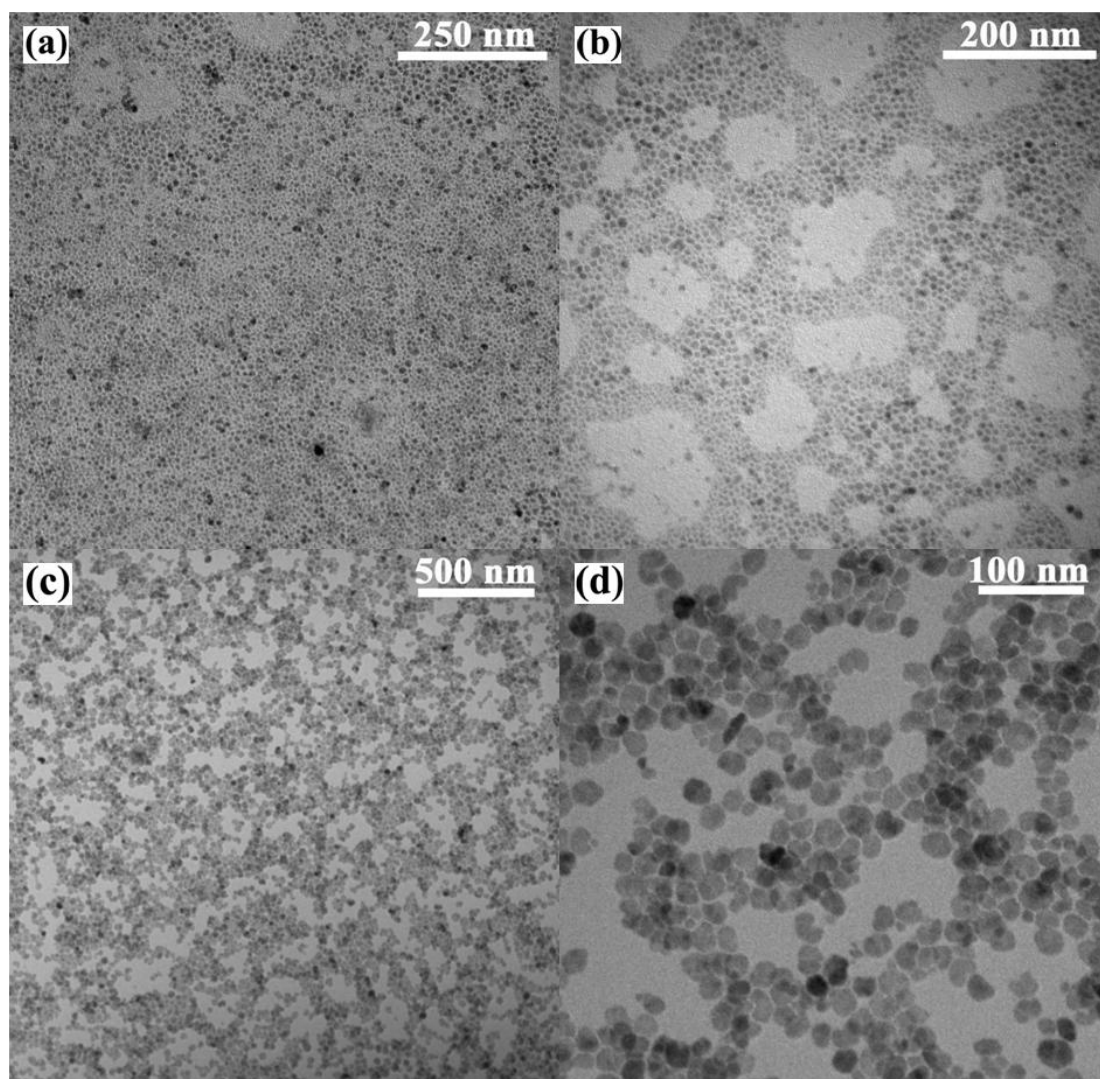


Figure S4. (a, b) Low and high magnified TEM images of 10 nm paramontroseite VO₂(P) nanocrystals; (c, d) low and high magnified TEM images of 30 nm paramontroseite VO₂(P) nanocrystals.

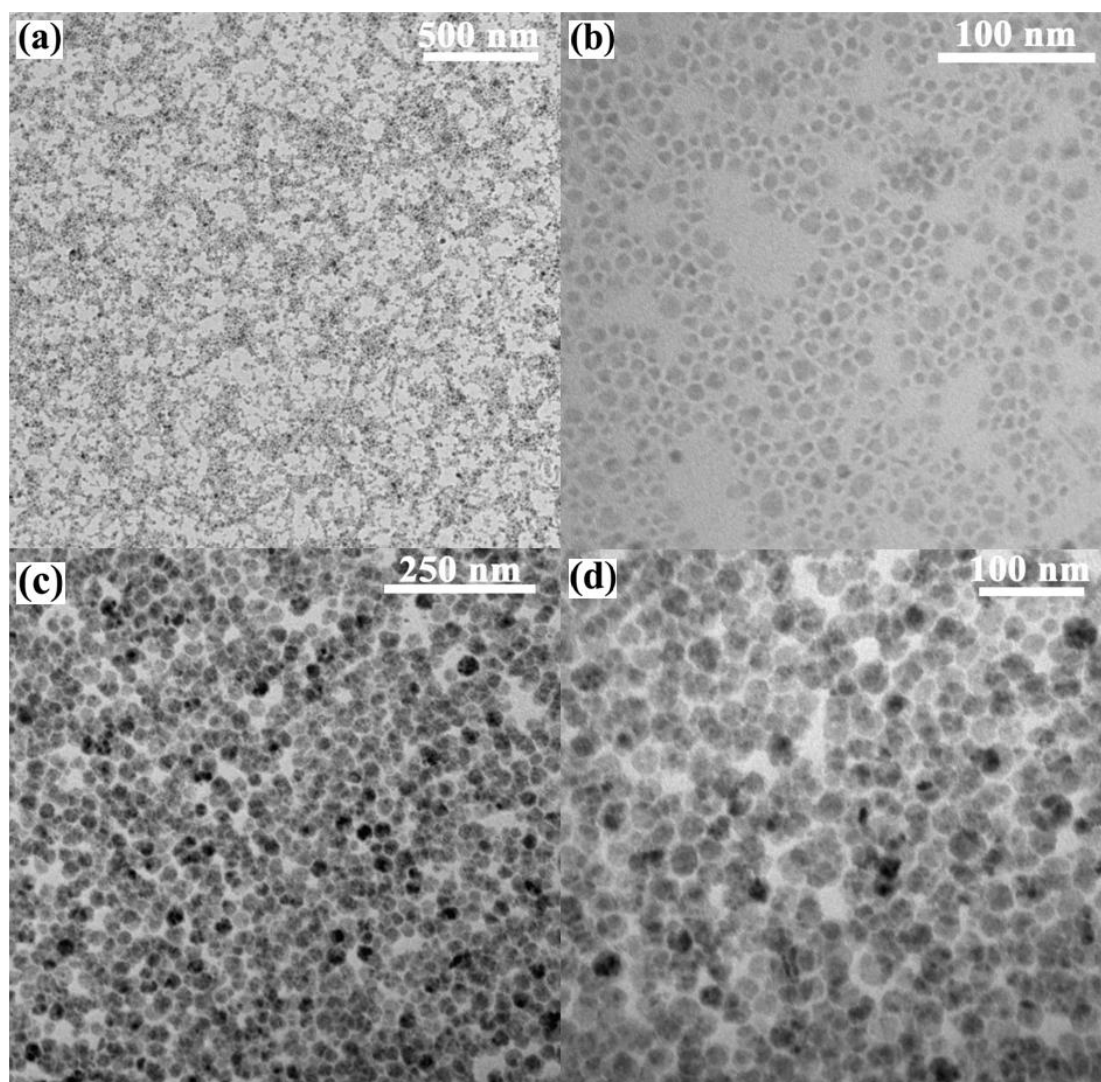


Figure S5. (a, b) Low and high magnified TEM images of 10 nm monoclinic $\text{VO}_2(\text{M})$ nanocrystals; (c, d) low and high magnified TEM images of 30 nm monoclinic $\text{VO}_2(\text{M})$ nanocrystals.

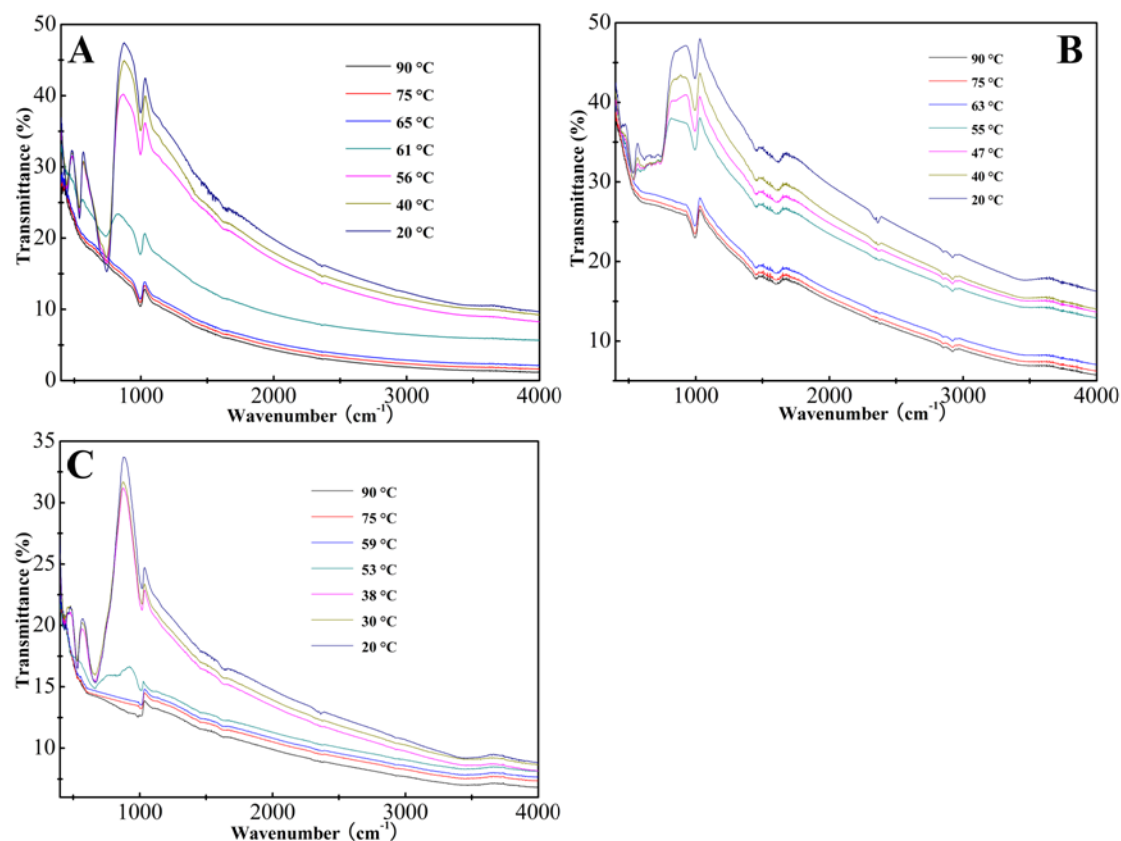


Figure S6. Variable-temperature FT-IR spectra for the synthesized (a) 10 nm, (c) 20 nm and (e) 30 nm VO₂(M) nanocrystals at various temperatures during cooling processes.

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.