

## Supplementary Information

### **Mesoporous Multi-Shelled Hollow Resin Nanospheres with Ultralow Thermal Conductivity**

Ruilin Yuan,<sup>a</sup> Chun Wang,<sup>a</sup> Long Chen,<sup>a</sup> Han Cheng,<sup>a</sup> Wentuan Bi,<sup>a</sup> Wensheng Yan,<sup>b</sup> Yi Xie,<sup>a</sup> and Changzheng Wu<sup>\*a</sup>

<sup>a</sup> School of Chemistry and Materials Science, University of Science and Technology of China, Hefei, P. R. China.

<sup>b</sup> National Synchrotron Radiation Laboratory, University of Science and Technology of China, Hefei, P. R. China.

### **Corresponding Author**

\*E-mail: czwu@ustc.edu.cn

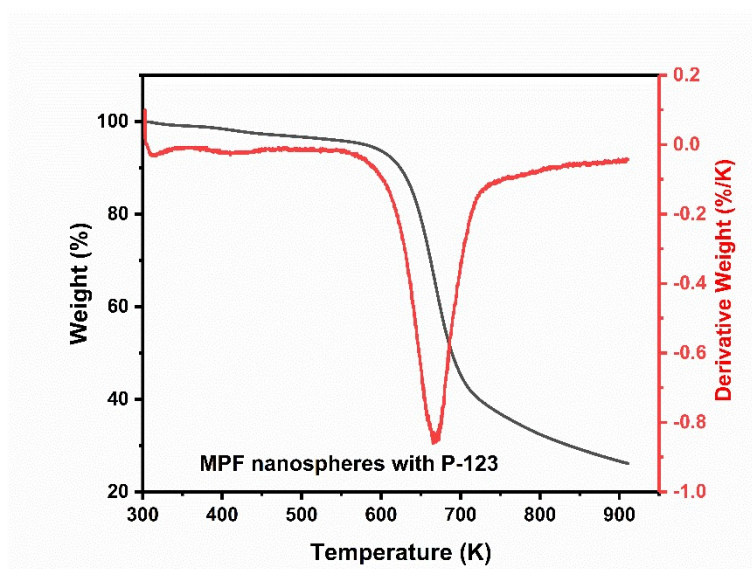


Figure S1. The thermogravimetry curve (black line) and corresponding derivative thermogravimetry curve (red line) of MPF nanospheres with P-123.

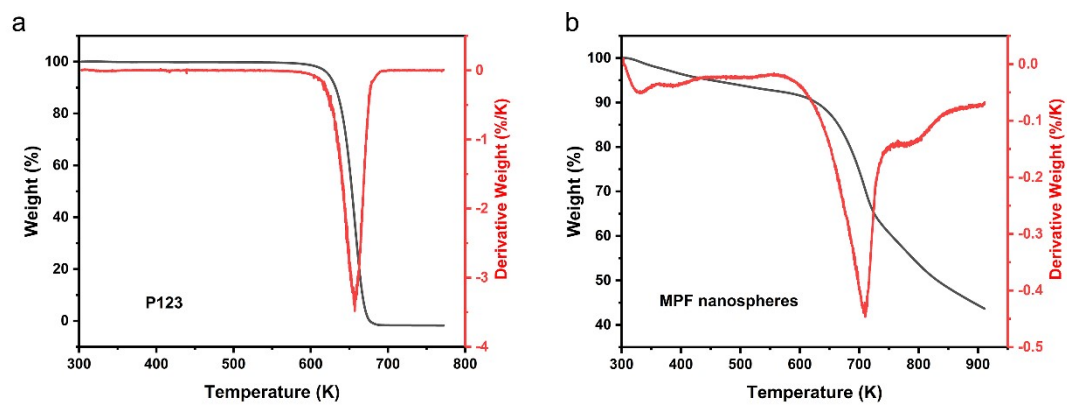


Figure S2. The thermogravimetry curve (black line) and corresponding derivative thermogravimetry curve (red line) of a) P-123 and b) MPF nanospheres.

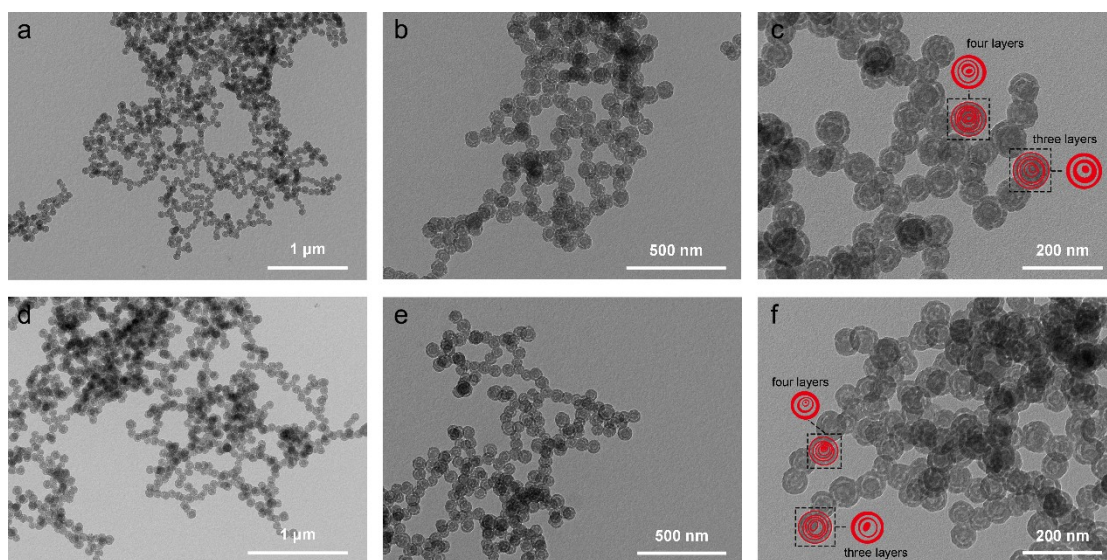


Figure S3. The TEM images of a)-c) MsH-MPF-H<sub>2</sub> and d)-f) MsH-MPF-H<sub>2</sub>O with different magnifications.

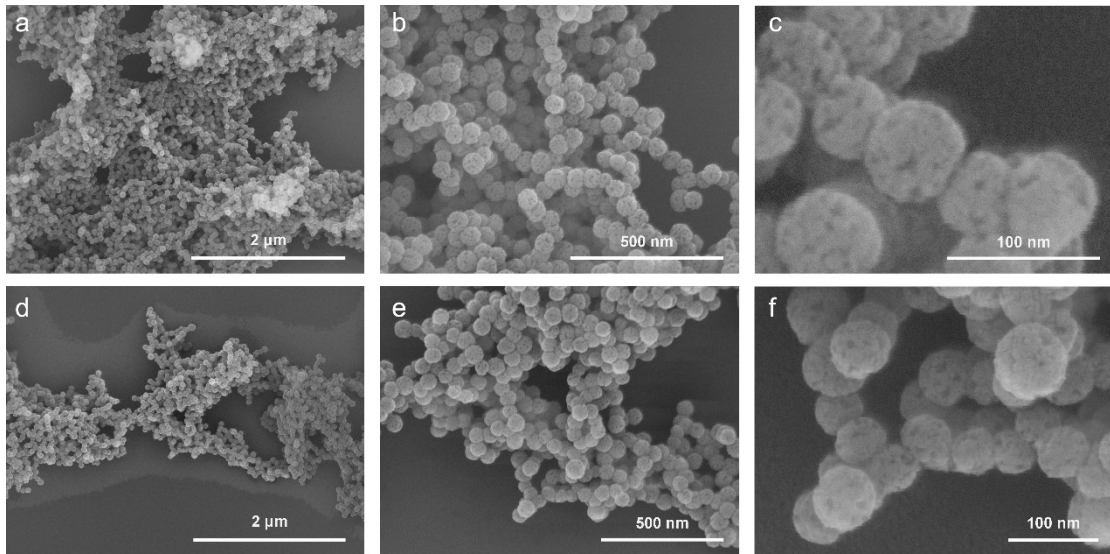


Figure S4. The TEM images of a)-c) MsH-MPF-H<sub>2</sub> and d)-f) MsH-MPF-H<sub>2</sub>O with different magnifications.

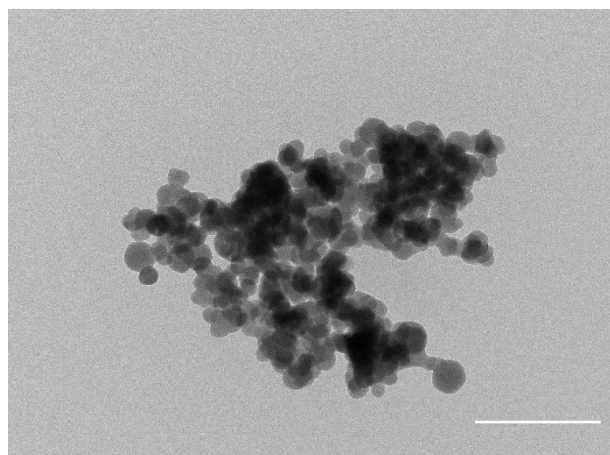


Figure S5. TEM image of Mesofree-MPF with scale bar of 500 nm.

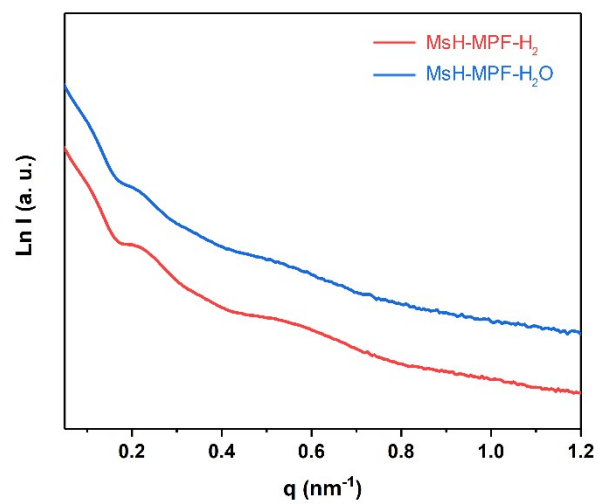


Figure S6. The SAXS patterns of MsH-MPF-H<sub>2</sub> and MsH-MPF-H<sub>2</sub>O.

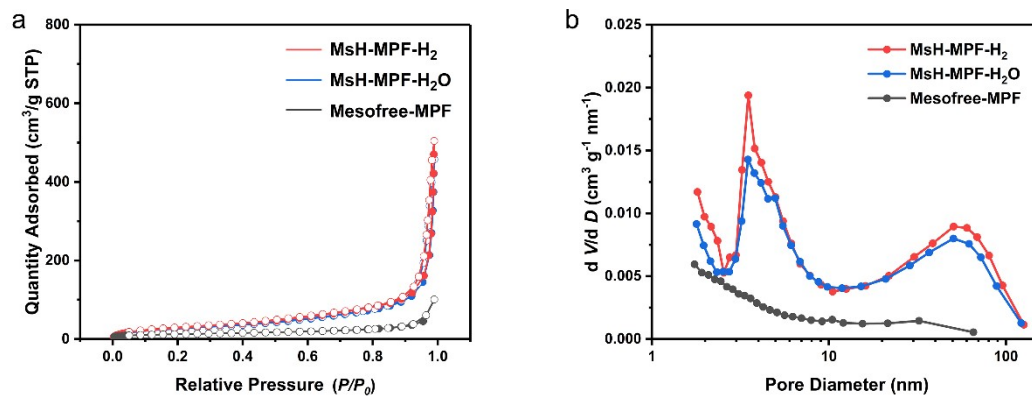


Figure S7. a) N<sub>2</sub> adsorption-desorption isotherm of MsH-MPF-H<sub>2</sub>, MsH-MPF-H<sub>2</sub>O and mesofree-MPF. b) Corresponding pores size distribution curve. dV/dD, differential pore volume distribution; V, pore volume; D, pore diameter.



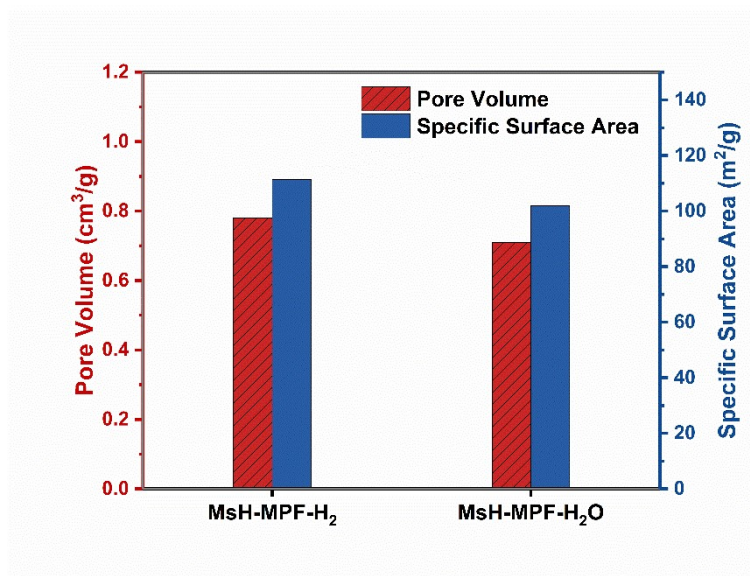


Figure S8. The pore volume and the specific surface area of MSH-MPF-H<sub>2</sub> and MSH-MPF-H<sub>2</sub>O, respectively.

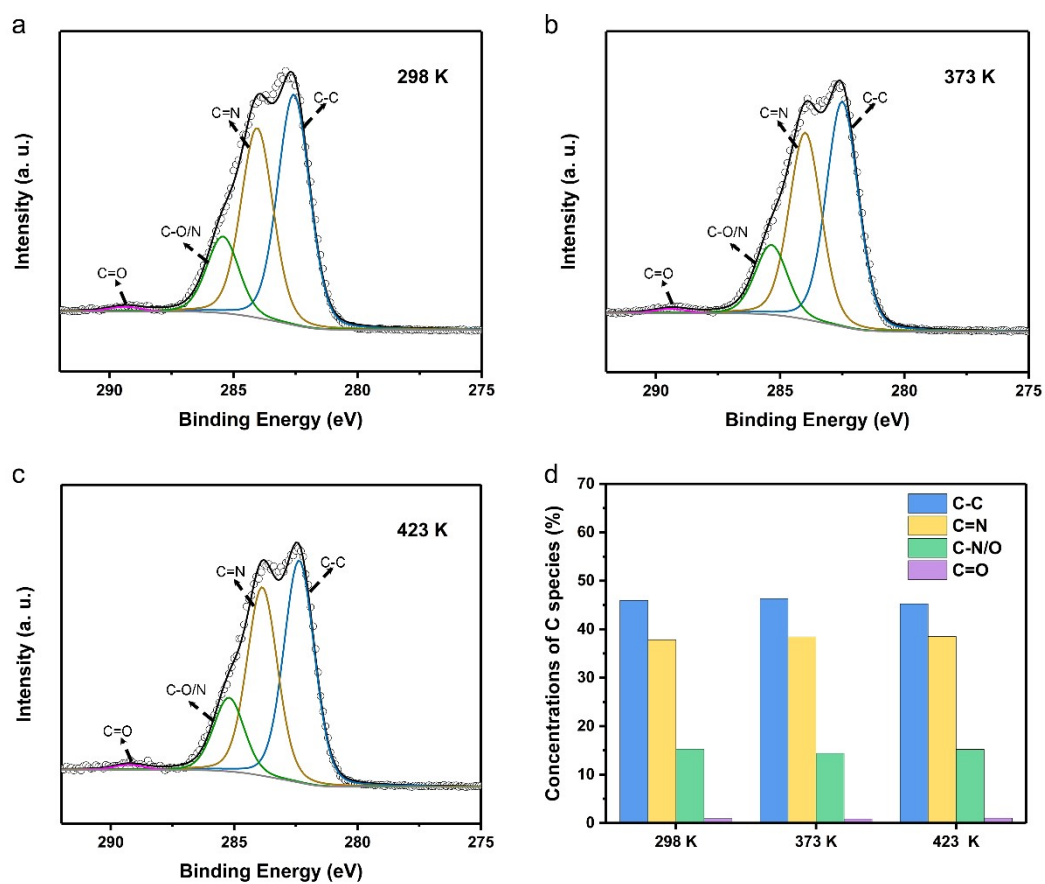


Figure S9. a), b) and c) are the C XPS spectrum of MsH-MPF-H<sub>2</sub>O at 298 K, 373 K and 423 K, respectively. d) Concentrations of C species in MsH-MPF-H<sub>2</sub>O at different temperatures according to XPS spectrum.

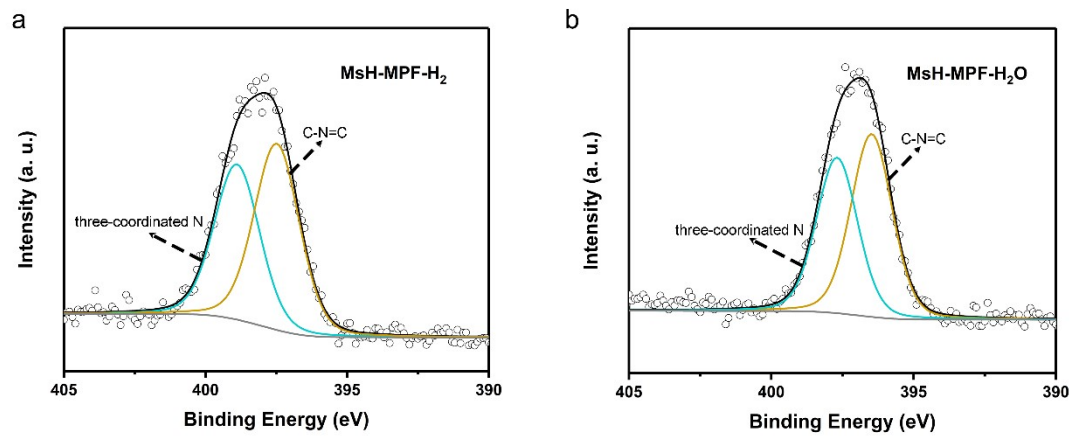


Figure S10. a) and b) are the N XPS spectrum of MsH-MPF-H<sub>2</sub> and MsH-MPF-H<sub>2</sub>O, respectively.

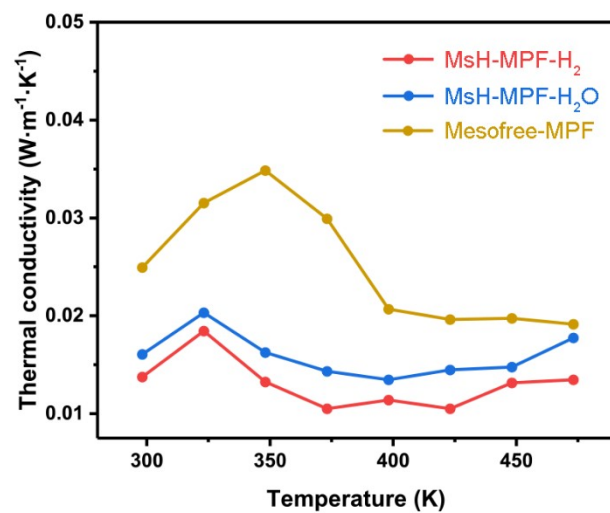


Figure S11. The thermal conductivity of MsH-MPF-H<sub>2</sub>, MsH-MPF-H<sub>2</sub>O, and Mesofree-MPF from 298 K to 473 K.