

## Supplementary Information

### Controlled growth of pyrite $\text{FeS}_2$ crystallites by a facile surfactant-assisted solvothermal method†

De-Wei Wang, Qi-Hua Wang\* and Ting-Mei Wang

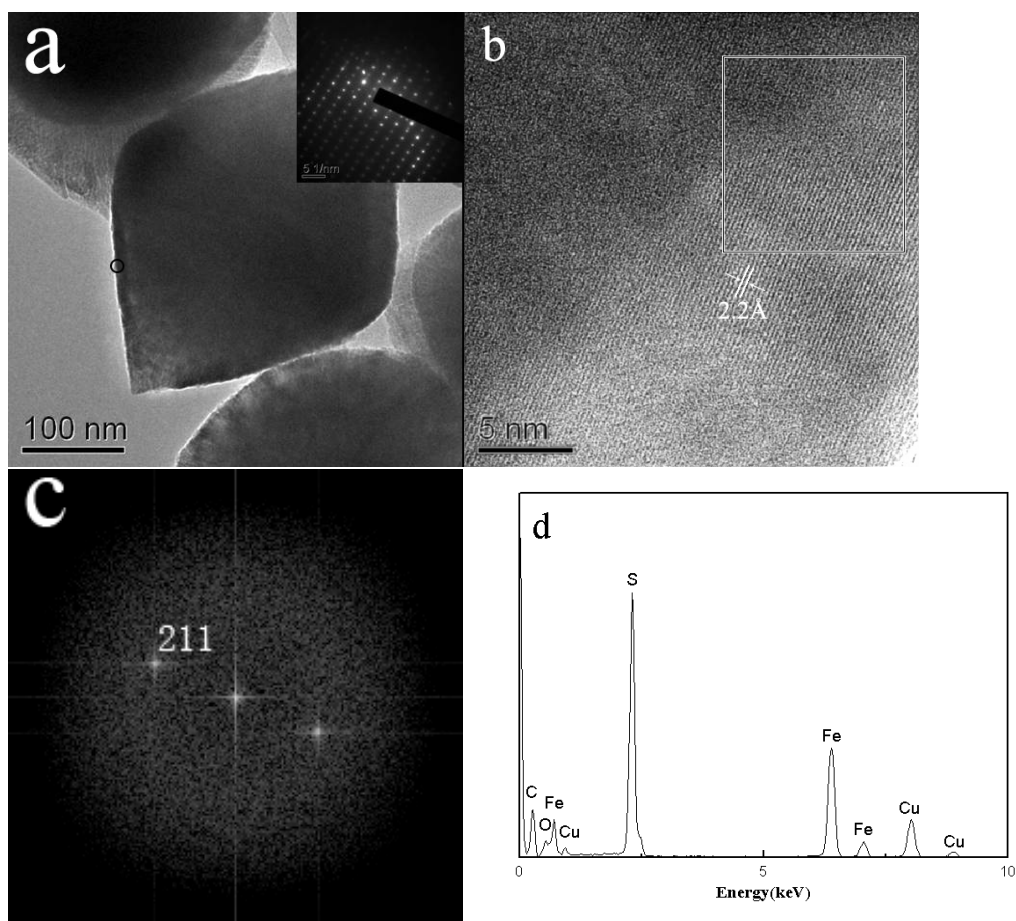
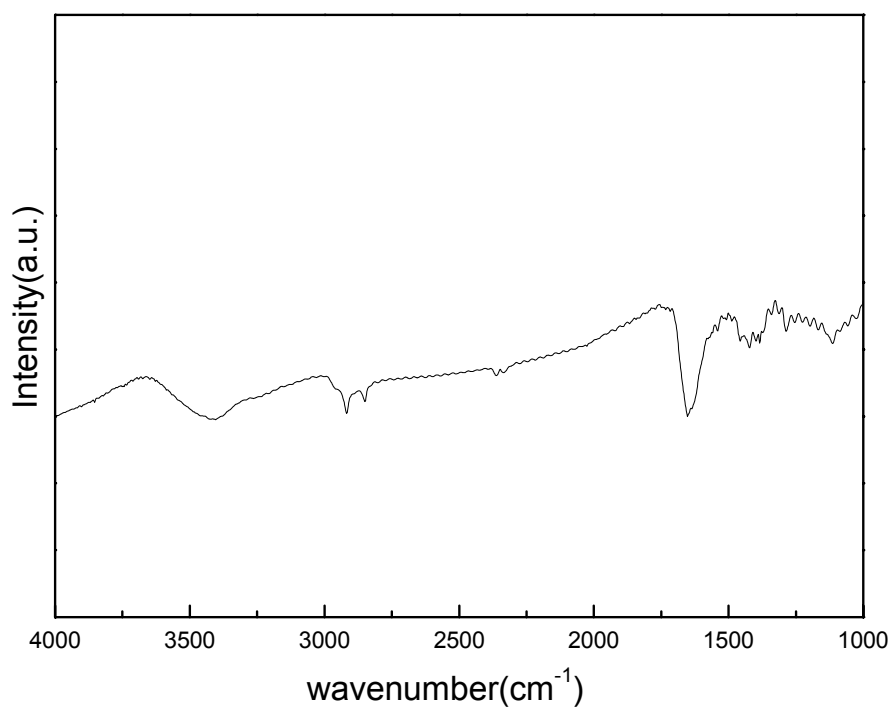
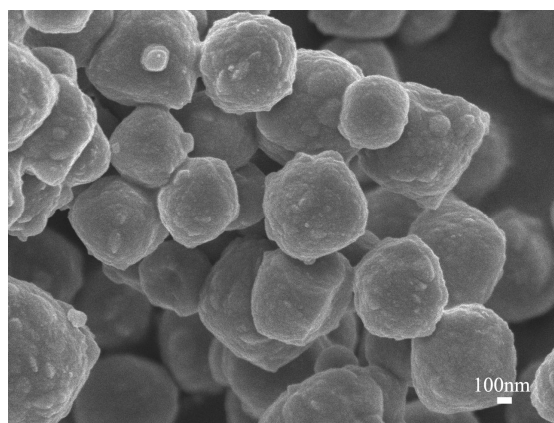


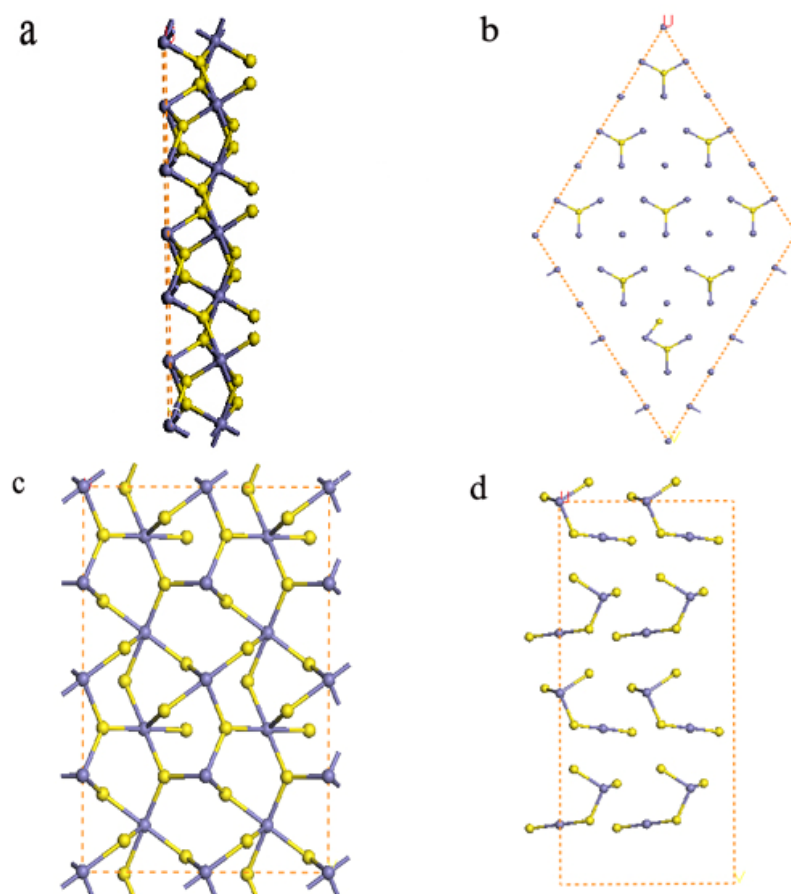
Fig. S1 (a) TEM image, insert is SAED pattern, (b) HRTEM image of edge of the microoctahedron, taking from the circle area in (a); (c) the corresponding FFT taking from the rectangular and (e) EDS spectrum of the  $\text{FeS}_2$  microoctahedrons obtained at 453 K for 12 h in the presence of PVP.



**Fig. S2** FT-IR spectrum of the as-prepared FeS<sub>2</sub> microoctahedrons. The absorption peaks of the O-H group at 3421; the peaks at 2914 and 2849 are the vibration model of CH<sub>2</sub>; at 1650 is the vibration model of C=O;

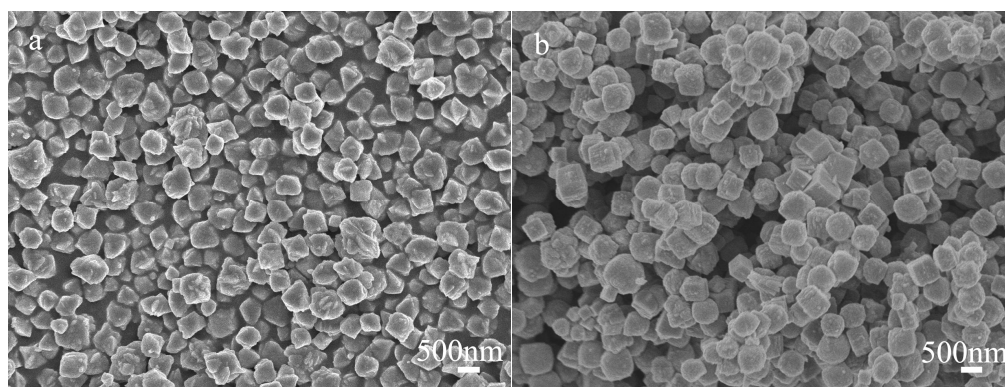


**Fig. S3** FESEM image of the particles synthesis at 453 K for 12 h in the absence of any surfactant.

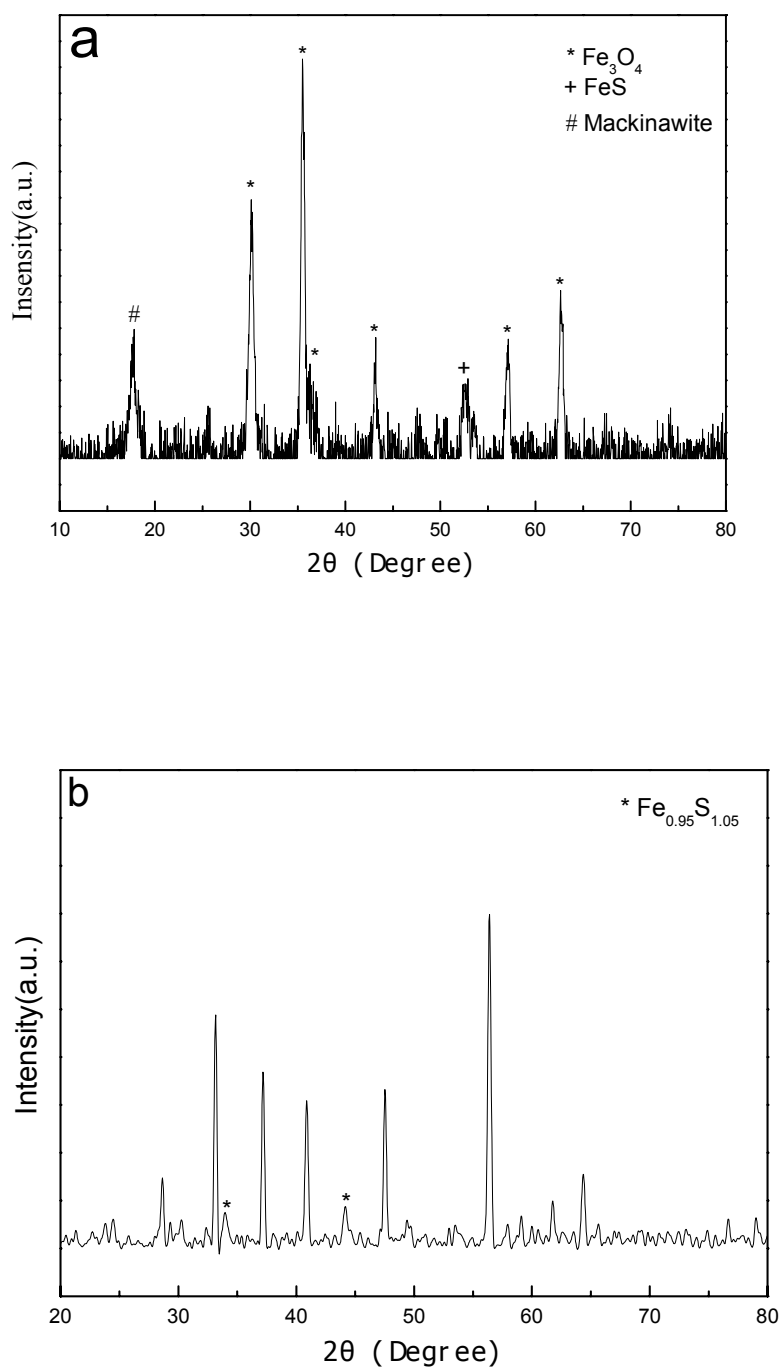


**Fig. S4** Crystal structure of FeS<sub>2</sub>, view along of the (a) [001] direction, (b) [111] direction, (c) [110] direction and (d) [210] direction. Blue spheres represent Fe and the yellow spheres represent S.

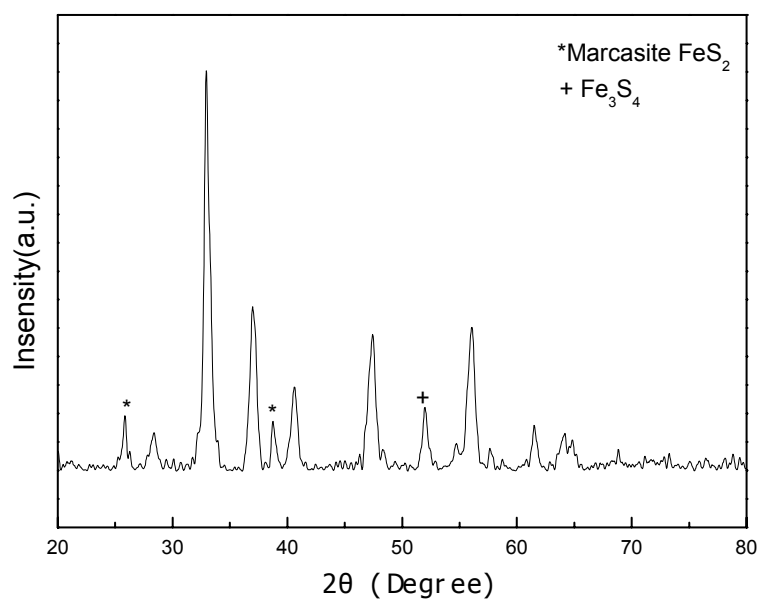




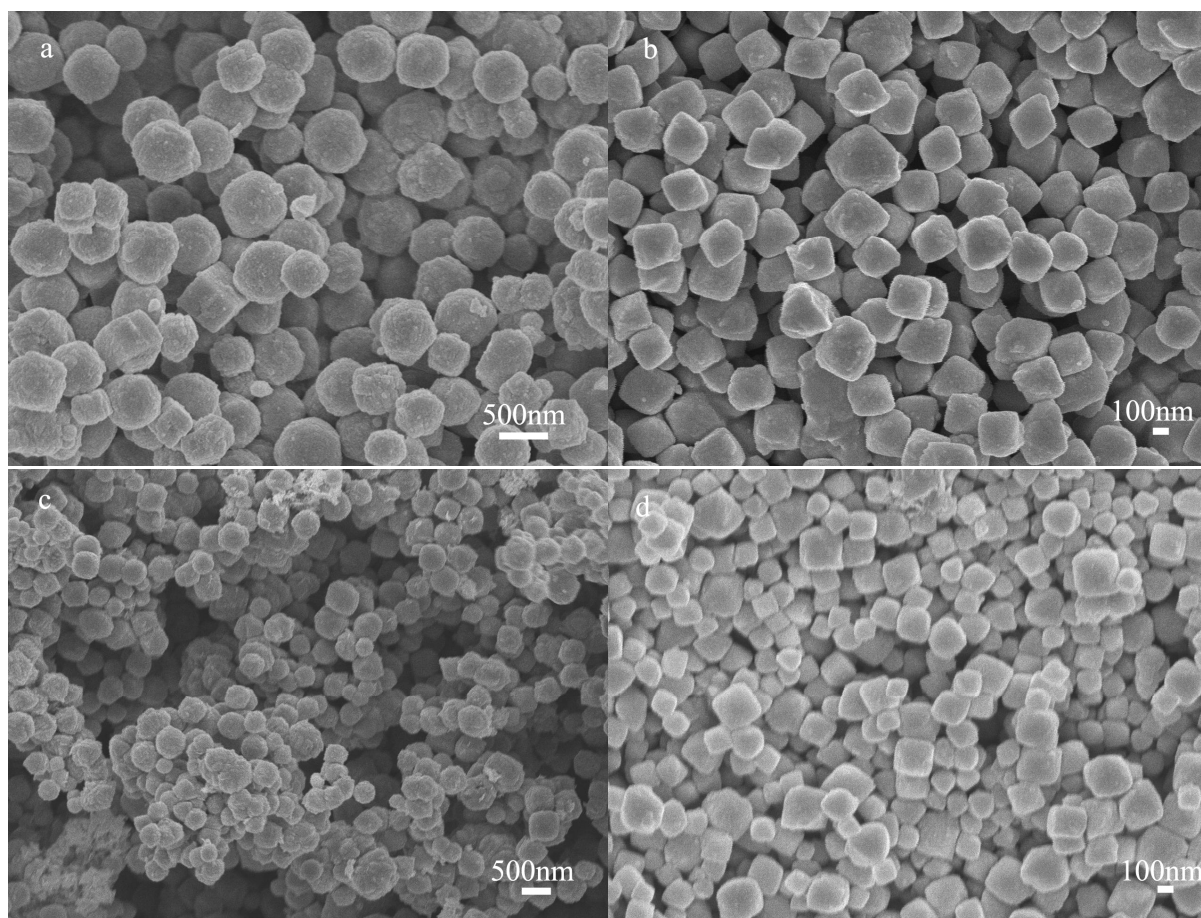
**Fig. S5** FESEM images of the products with different amount of surfactant (a) 0.3 g of PVP and (b). 5 ml of TX.



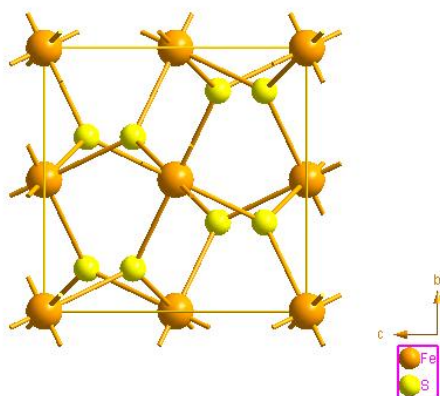
**Fig. S6** XRD patterns of the products prepared with different sulfur sources. (a) Tu and (b) TAA.



**Fig. S7** XRD pattern of the products prepared with 0.16g of S.



**Fig. S8** FESEM images of the products synthesis at different temperature. (a) and (b) 443 K. (c) and (d) 433 K. ; (a) and (c) in the presence of 8 ml of TX, (b) and (d) in the presence of 0.7 g of PVP.



**Fig. S9** Crystal structure of FeS<sub>2</sub>, view along of the [100] direction. Orange spheres represent Fe and the yellow spheres represent S.