Supporting Information

Biomolecule-Assisted Synthesis, Fluorescence and Electrochemical Hydrogen Storage of Bi₂S₃ Flower-Like Patterns with Well-aligned Nanorods

Bin Zhang, Xingchen Ye, Weiyi Hou, Yu Zhao and Yi Xie*

*Department of Nanomaterials and Nanochemistry, Hefei National Laboratory for Physical
Sciences at Microscale, University of Science and Technology of China, Hefei, Anhui 230026,
China. E-mail: yxie@ustc.edu.cn*

1. TEM images of the obtained Bi_2S_3 nanostructures prepared in different conditions.

Figure S1. Representative TEM images of as-prepared Bi_2S_3 samples at different conditions: a) Nanorods prepared from 0.485 g $\text{Bi}(\text{NO}_3)_3 \cdot 5\text{H}_2\text{O}$, 0.28 g L-cysteine and 10 mL H_2O at 150 °C, pH 11. The corresponding FESEM image is shown in Figure 4a. b) Flakes prepared from 0.485 g $\text{Bi}(\text{NO}_3)_3 \cdot 5\text{H}_2\text{O}$, 0.28 g L-cysteine and 10 mL H_2O at 120 °C, pH 1. The corresponding FESEM image is displayed in Figure 4b. c-d) Nanoflakes produced from 0.485 g $\text{Bi}(\text{NO}_3)_3 \cdot 5\text{H}_2\text{O}$, 0.15 g L-cysteine and 10 mL H_2O at 150 °C, pH 1. The corresponding FESEM image is shown in Figure 4c. e-f) Nanorods bundles fabricated from 0.485 g $\text{Bi}(\text{NO}_3)_3 \cdot 5\text{H}_2\text{O}$, 0.35 g L-cysteine and 10 mL H_2O at 150 °C, pH 1. The corresponding FESEM image is shown in Figure 4d. The image in Figure S1d and S1f are the higher magnifications TEM image of Figure S1c and S1e, respectively.

2. TEM images of the intermediates obtained in the formation of Bi_2S_3 flower-like pattern with well-aligned nanorods.

Figure S2. Typical TEM images of Bi_2S_3 samples with different reaction time. a) 1 h, b) 4 h, c) 24h. These samples were prepared from the mixture of 0.485 g $\text{Bi}(\text{NO}_3)_3 \cdot 5\text{H}_2\text{O}$, 0.28 g L-cysteine and 10 mL H_2O at 150 °C.

3. The charge-discharge curves of the obtained Bi_2S_3 uniform nanoflakes.

Figure S3. Charge-discharge curves of the obtained Bi_2S_3 uniform nanoflakes (the SEM image shown in Figure 4c) electrodes at the charge-discharge of 50 mA/g.

4. Cyclic voltammograms of the porous nickel and uniform Bi₂S₃ nanoflakes electrodes

Figure S4. Cyclic voltammograms of the different electrodes in 5 M KOH at a sweep rate of 50mV/s. (a) porous nickel; (b) uniform Bi₂S₃ nanoflakes (the SEM image shown in Figure 4c) supported porous nickel substrate.