Electronic Supplementary Information

Synthesis of AgBiS$_2$ microspheres by templating method and their catalytic polymerization of alkylsilanes

Jiaqiang Wang,* Xikung Yang, Wenbing Hu, Bin Li, Jiangmei Yan, and Jingjing Hu

Department of Applied Chemistry, Key Laboratory of Medicinal Chemistry for Natural Resource, Ministry of Education, Yunnan University, Kunming 650091, P. R. China

**Synthesis of AgBiS$_2$ microsphere:** A modified process based on Ref.5 and Ref.1 was described as follows: Reaction mixtures of 0.1 mmol of PEG, 5 mmol of AgNO$_3$ and 5 mmol of Bi(NO$_3$)$_3$•5H$_2$O were dissolved in 30 mL of EG. The mixture experienced 10 min. of supersonic (20 kHz) agitation in a pulverizer at a power of 400 W to ensure that all of the reagents were dispersed homogeneously in the solution and left to rest at 35°C for 3 h. Then 20 mmol of thiourea was added to the above solution, which was then hydrothermally treated at 180 °C for 20 h in a Teflon-lined autoclave. The black product was collected and cleaned with hot water and absolute alcohol three times to remove the remaining PEG and then dried at 60 °C. Similarly, AgBiS$_2$-Bi$_2$S$_3$ microspheres were generated under the same conditions, except that the mole weight of AgNO$_3$ and Bi(NO$_3$)$_3$•5H$_2$O was 3.33 and 6.67 mmol, respectively.
Characterizations: XRD experiments were conducted on a D/max-3B diffractometer with Cu Kα radiation. SEM was carried out in a SEM (JSM-6700F, 5.0 kV) instrument. TTIR measurements were performed on a Nicolet 8700 instrument. XPS measurement was performed on a PHI5500ESCA analyzer. The main parameters were as follows: Mg Ka, 200 W, vacuum ~10⁻⁷ Pa.

![SEM image of AgBiS₂ microspheres](image)

**Fig. SI-1** SEM image of AgBiS₂ microspheres
**Fig. SI-2** TEM images of AgBiS$_2$ microspheres dispersed in ethanol via ultrasonic treatment (Transmission electron microscopy imagines were taken on a Hitachi H-800, 150 kv).

**Fig. SI-3** TEM images of the products prepared by refluxing AgBiS$_2$ with C$_{18}$H$_{37}$SiH$_3$ in the presence of small amounts of water dispersed in ethanol via ultrasonic treatment.
Fig. SI-4 SEM images of the as-prepared samples by refluxing the mixture of AgBiS$_2$-Bi$_2$S$_3$ microspheres with C$_{18}$H$_{37}$SiH$_3$ in the presence of small amounts of water.

Fig. SI-5 TEM images of the mixtures of AgBiS$_2$-Bi$_2$S$_3$ microspheres dispersed in ethanol via ultrasonic treatment.
**Fig. S1-6** SEM images of the as-prepared products by refluxing Bi$_2$S$_3$ microspheres incorporated with (a-c) and without (d) PVP-capped silver nanorods and C$_{18}$H$_{37}$SiH$_3$ in the presence of small amounts of water.
**Fig. SI-7** TEM images of the products prepared by refluxing Bi$_2$S$_3$ with C$_{18}$H$_{37}$SiH$_3$ in the presence of small amounts of water dispersed in ethanol via ultrasonic treatment.

**Fig. SI-8** O1s XPS spectra of as-synthesized products prepared by refluxing AgBiS$_2$ with C$_{18}$H$_{37}$SiH$_3$ in the presence of small amounts of water.