Supporting Information

Synthesis of Bismuth Sulfide Nanobelts for High Performance Broadband Photodetector

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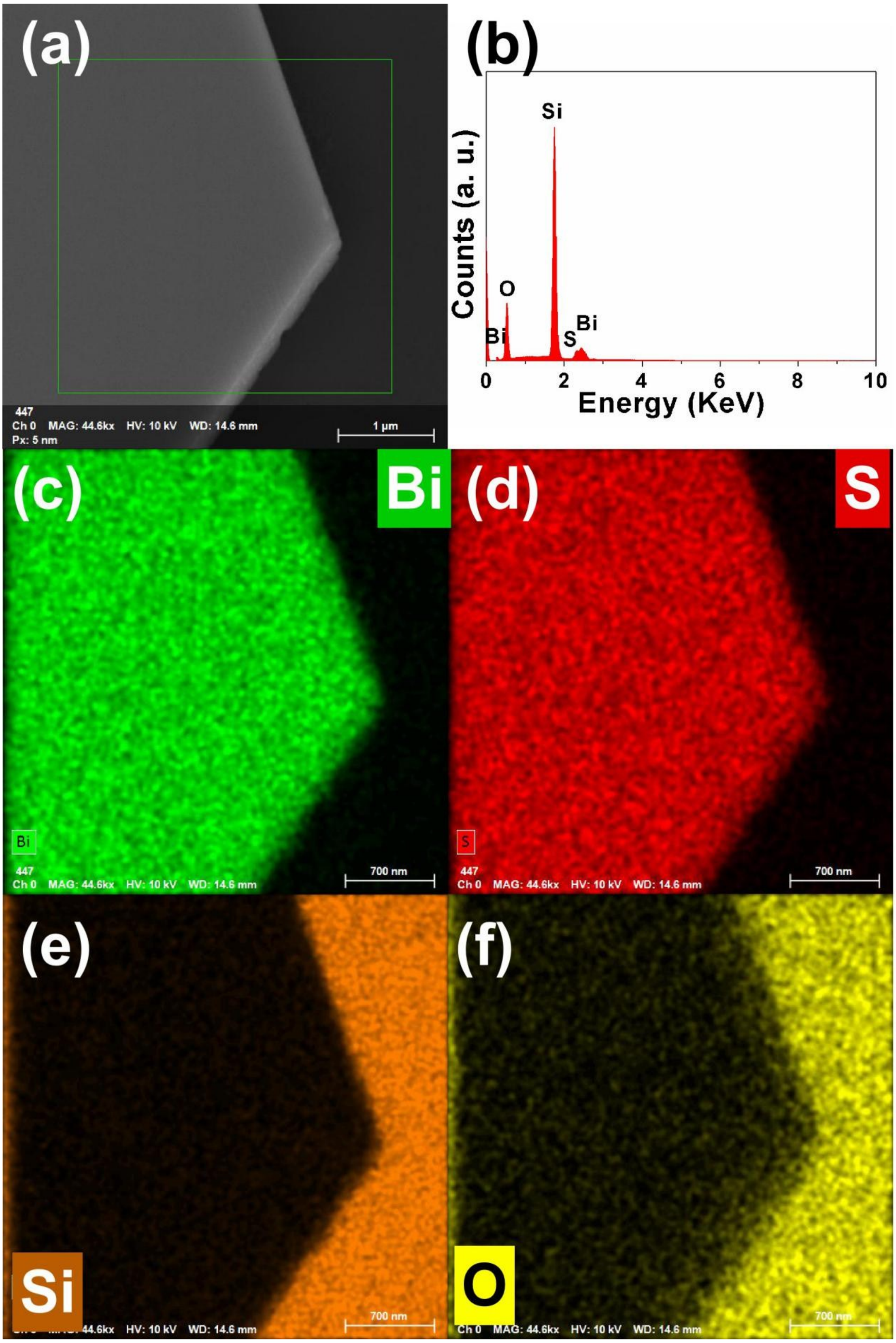

Fig. S1 a) SEM image of the edge of a Bi_2S_3 nanobelt. b) EDS spectra of a Bi_2S_3 nanobelt. c)-f) Corresponding individual elementary distribution of Bi, S, Si and O.

Fig. S1a is the scanning electron microscope (SEM) image of Bi_2S_3 nanobelt. There are four dominating element peaks corresponding to Bi, S, Si and O, which can be identified in the EDS spectra, as shown in Fig. S1b. EDS analysis on an area marked by a green rectangle in Fig. S1a shows individual elementary distribution (as shown in Fig. S1c to f). The distribution of individual elements by EDS mapping shows the Bi and S elements homogeneously distribute across the entire Bi_2S_3 nanobelt, indicating the high uniformity of the as-prepared sample. While Si and O elements mainly distribute on the exposed SiO_2/Si substrate. The weak signal of Si and O elements appeared in the Bi_2S_3 nanobelt region can be attributed to the penetration of X-rays through Bi_2S_3 nanobelt layer to the SiO_2/Si substrate.

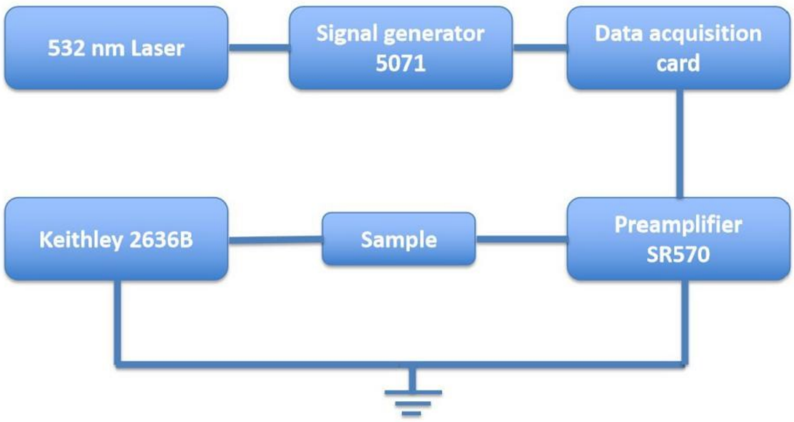

Fig. S2 Schematic illustration of the layout of self-designed photoresponse testing system for Bi_2S_3 nanobelts.

The layout of our self-designed photoresponse measurement system is schematically displayed in Fig. S2. In this system, a Keithley 2636B semiconductor parametric analyzer is used as a power source to provide a constant bias of 5 V to the Bi_2S_3 nanobelt based photodetectors. High frequency signal (1111 Hz) produced by the signal generator is sent to the laser controller to generate a high-frequency pulsed laser. The preamplifier (SR570) was used to convert the real-time high-frequency photocurrent signal to the periodically changed voltage signal. And then, the voltage signal from the preamplifier is recorded by a data acquisition card for further analysis.

Table S1. Quantitative analysis results of elements of the samples by EDS.

Element	Atomic number	Net value	Mass (%)	Normalized mass (%)	Atom (%)	abs. error (%)
O	8	22226	30.64	17.36	43.02	3.91
Si	14	17060	47.57	26.95	38.05	2.29
Cs	55	3740	48.01	27.20	8.11	7.97
Bi	83	6554	41.13	23.30	4.42	2.20
S	16	3357	9.14	5.18	6.40	0.53
		Total	176.48	100.00	100.00	

Table S2. The power density of incident light with different wavelengths from 300 to 1000 nm.

Wavelength (nm)	300	400	500	600	700	800	900	1000
Power density (mW cm^{-2})	1.2	3.9	7.7	7.5	6.3	3.5	11.8	8.1