

## Supporting information

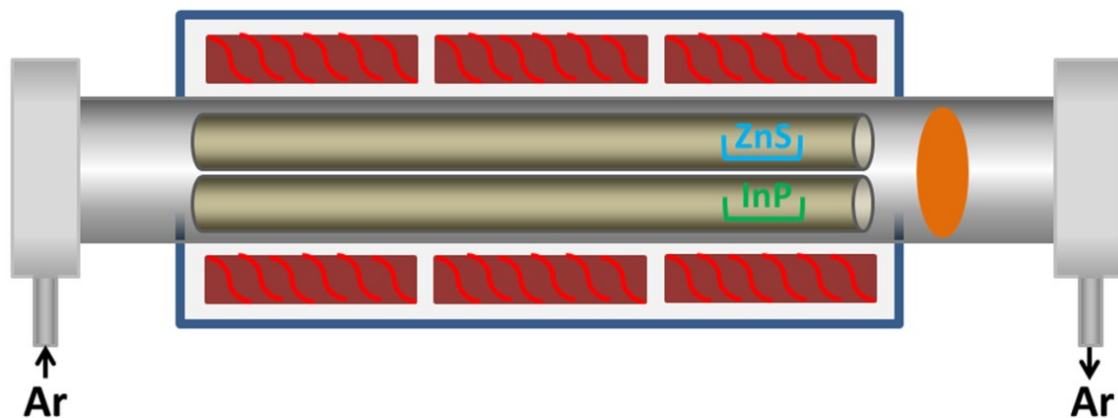
# Ternary $\text{In}_2\text{S}_3/\text{In}_2\text{O}_3$ heterostructures and their cathodoluminescence

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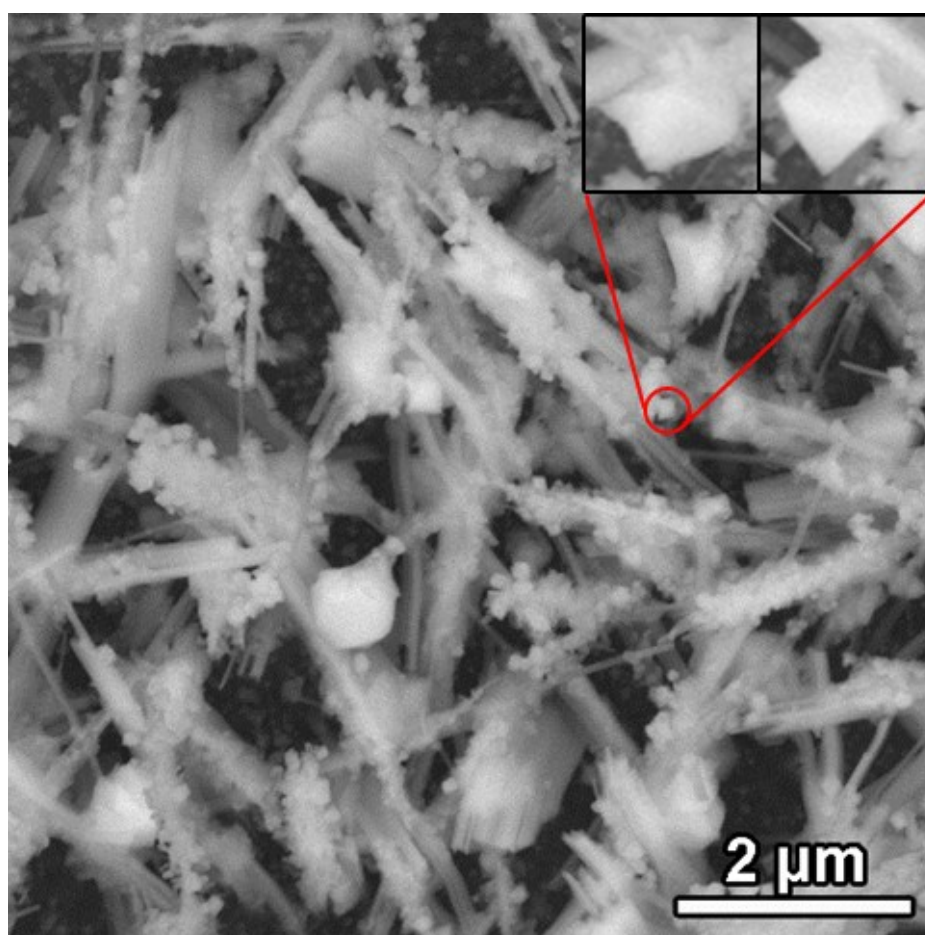
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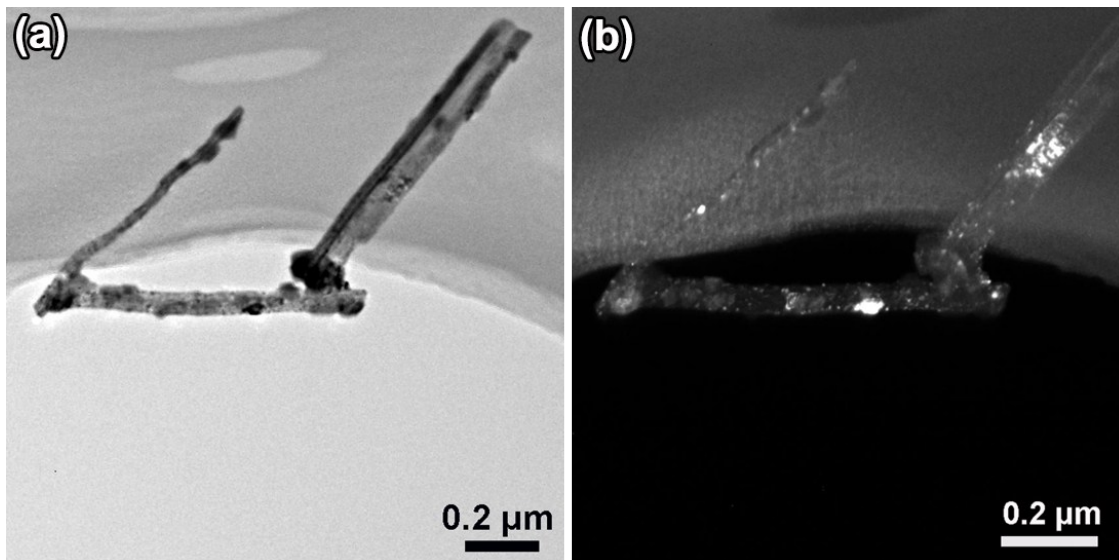
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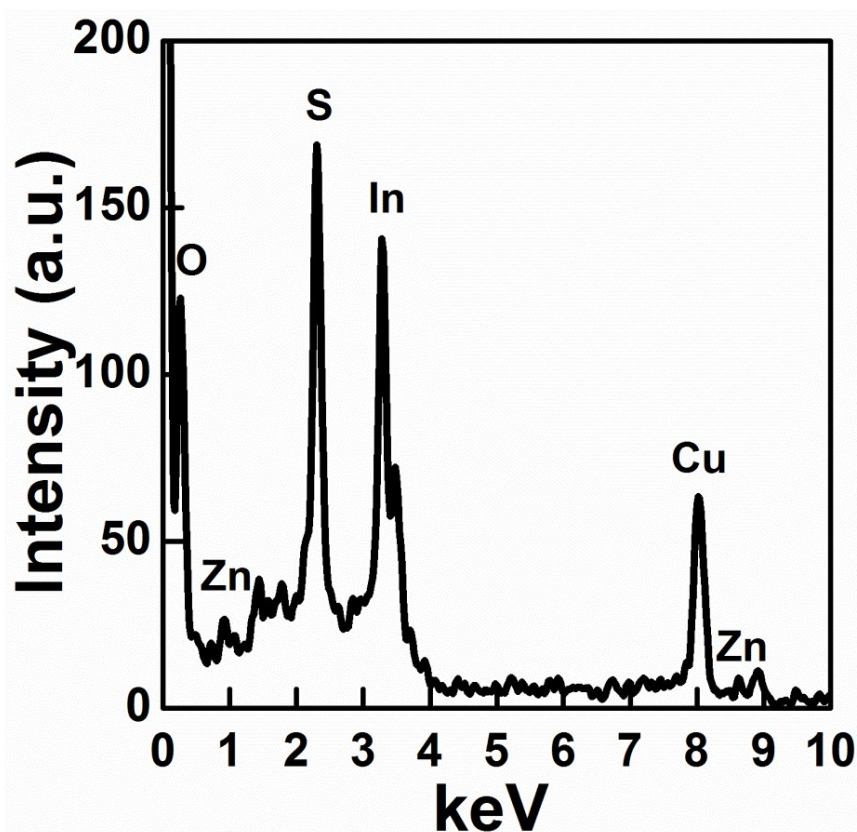
*Figure S1* Schematic of the experimental set-up for  $\text{In}_2\text{S}_3/\text{In}_2\text{O}_3$  heterostructure nanomaterials growth



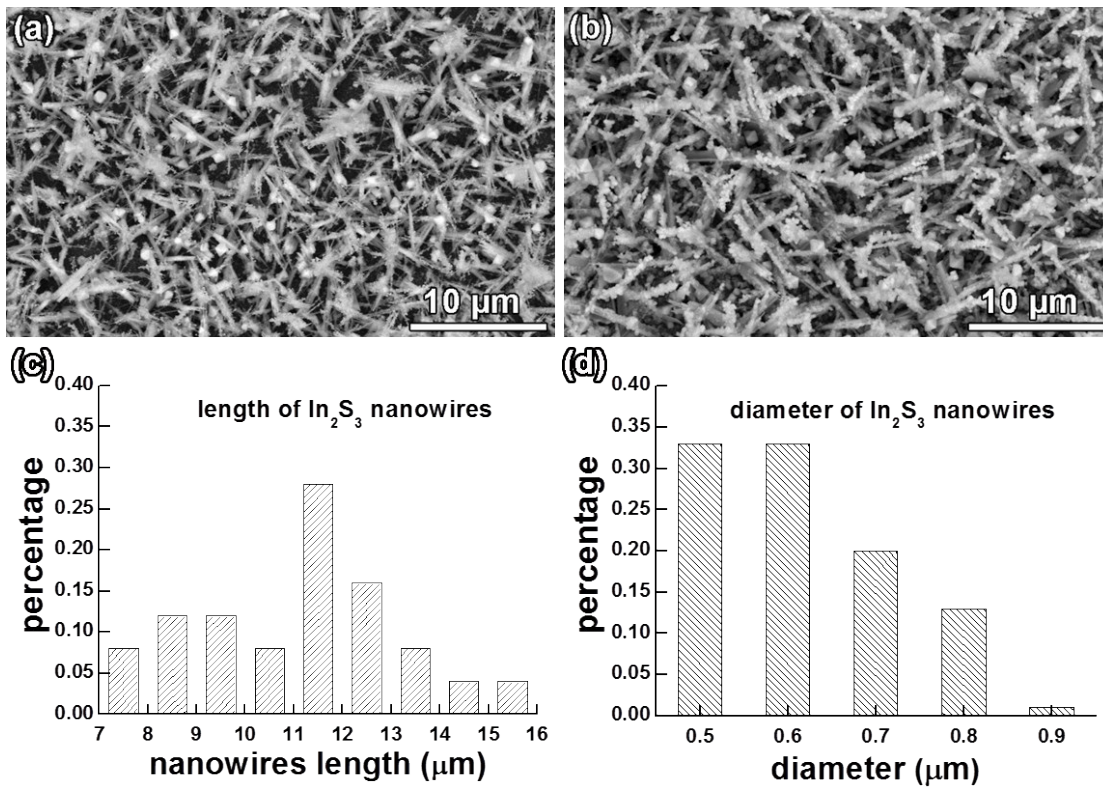
*Figure S2* The SEM image of  $\text{In}_2\text{S}_3/\text{In}_2\text{O}_3$  heterostructures grown on (111) silicon substrate



**Figure S3** (a) Bright field (BF) TEM image of samples; (b) dark field (DF) TEM image of samples



**Figure S4** The EDS spectrum of as-synthesized  $\text{In}_2\text{S}_3/\text{In}_2\text{O}_3$  heterostructure nanomaterials



**Figure S5** (a-b) SEM images of as-fabricated  $\text{In}_2\text{S}_3/\text{In}_2\text{O}_3$  heterostructures; (c-d) The diagram column of the statistical distribution of the length and diameter of  $\text{In}_2\text{S}_3$  nanowires

In <sub>2</sub> S <sub>3</sub> (PDF#65-0459)				In <sub>2</sub> O <sub>3</sub> (PDF#65-3170)			
2-Theta	d(Å)	h k l	I(v)	2-Theta	d(Å)	h k l	I(v)
14.227	6.220	111	18.6	17.477	5.070	200	0.1
23.333	3.809	220	15.0	21.448	4.139	211	8.4
27.433	3.248	311	100	24.815	3.585	220	0.1
28.679	3.110	222	9.9	30.514	2.927	222	100
33.235	2.693	400	50.6	33.026	2.710	123	1.1
36.316	2.471	331	4.2	35.379	2.535	400	33.5
41.005	2.199	422	9.0	37.603	2.390	411	5.4
43.616	2.073	511	58.4	39.720	2.267	420	0.9
47.711	1.904	440	99.2	41.747	2.161	332	4.5
50.044	1.821	531	9.1	43.696	2.069	422	0.8
50.804	1.795	442	0.2	45.579	1.988	134	9.4
53.766	1.703	620	4.2	49.174	1.851	125	2.2
55.915	1.643	533	19.6	50.899	1.792	440	57.7
56.620	1.624	622	8.6	52.584	1.739	433	2.7
59.383	1.555	444	14.4	54.231	1.690	600	0.5

**Table S1** The XRD data of cubic In<sub>2</sub>S<sub>3</sub> and In<sub>2</sub>O<sub>3</sub> compounds