Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

Selective anisotropic growth of Bi_2S_3 nanoparticles with adjustable optical properties

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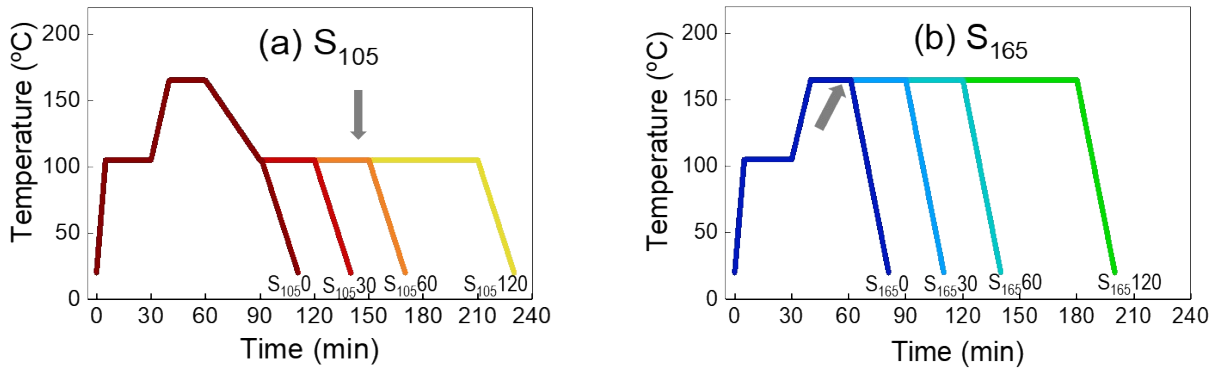

Figure S1. Reaction temperature profiles for series of samples (a) S_{105} and (b) S_{165}. Grey arrows are signaling the injection time of the thioacetamide mixture.

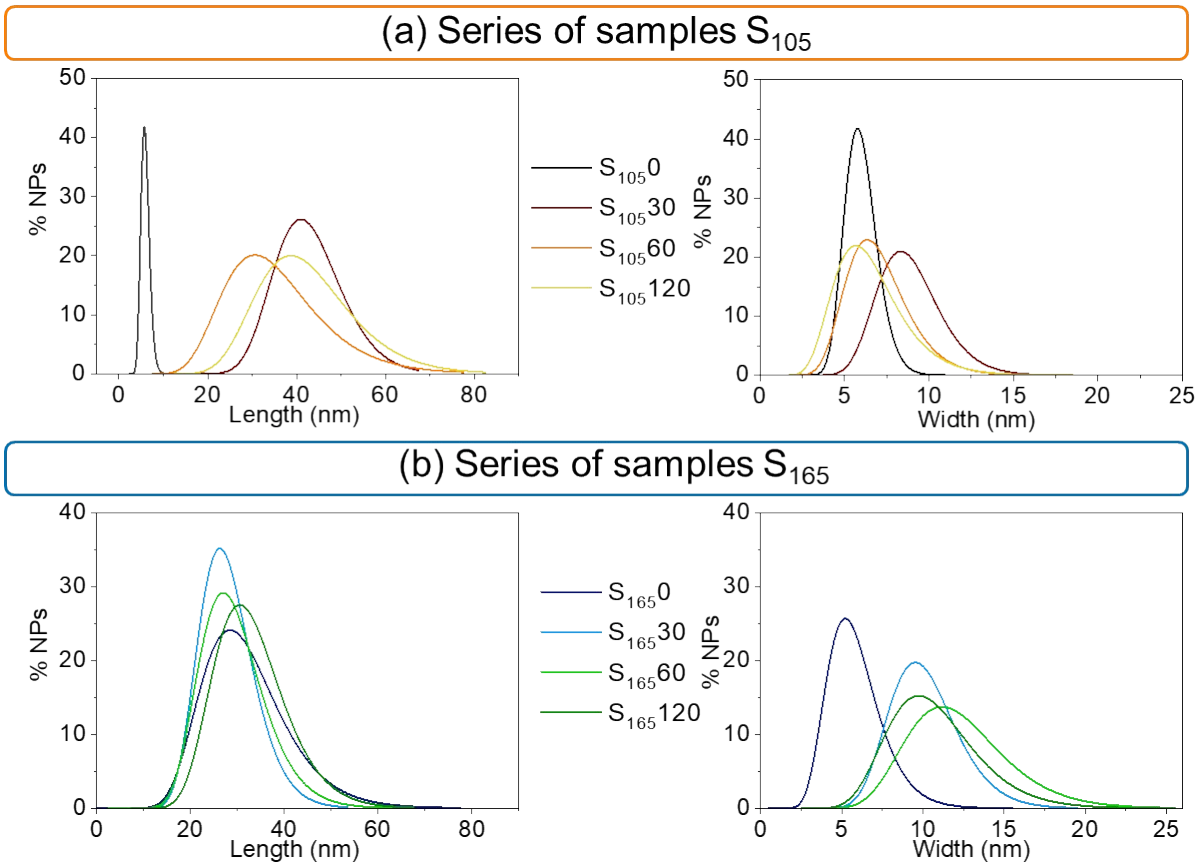

Figure S2. Particle length (left) and width (right) distributions obtained by fitting TEM histograms to log-normal distributions for the series of samples (a) S_{105} and (b) S_{165}, for times ranging from 0 to 120 min.

Sample	Morphology	Width (nm) $W_{TEM} \pm \sigma$ (RSD)	Length (nm) $L_{TEM} \pm \sigma$ (RSD)	Ratio (W:L)	η (%)
$S_{105}0$	Spheroid	5.9 ± 0.8 (14%)	5.9 ± 0.8 (14%)	1:1	15.4
$S_{105}30$	Needle	8.9 ± 1.9 (21%)	43 ± 8 (19%)	1:5	21.5
$S_{105}60$	Needle	7.7 ± 1.4 (18%)	46 ± 6 (13%)	1:6	35.2
$S_{105}120$	Needle	6.0. ± 2.0 (33%)	43 ± 11 (26%)	1:7	43.7
$S_{165}0$	Rod	5.9 ± 1.7 (28%)	32 ± 9 (28%)	1:5	39.1
$S_{165}30$	Rod	10.2 ± 2.2 (22%)	28 ± 6 (21%)	1:3	45.9
$S_{165}60$	Rod	13 ± 3 (23%)	29 ± 7 (24%)	1:3	32.2
$S_{165}120$	Rod	11 ± 3 (26%)	33 ± 8 (24%)	1:3	41.0

Table S1. Structural and morphological parameters of the series of samples S_{105} and S_{165}, obtained from TEM images. RSD stands for relative standard deviation

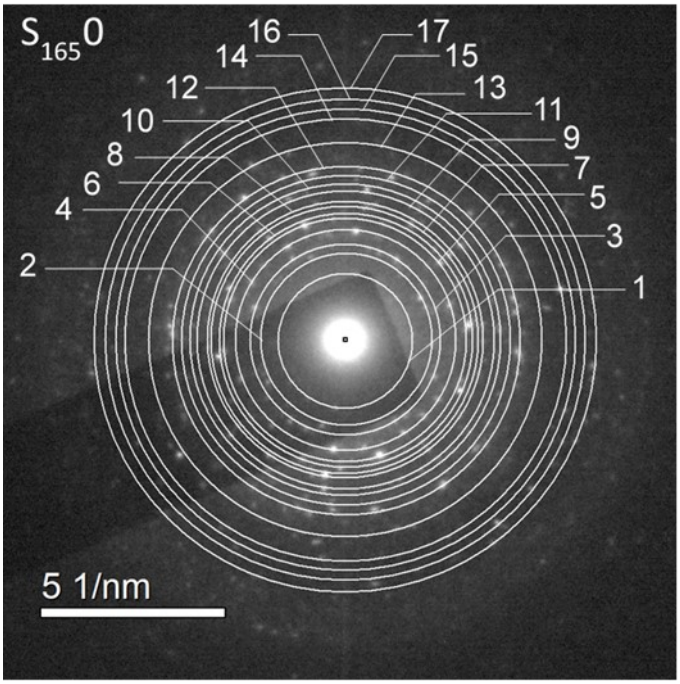

Figure S3. SAED pattern for sample $S_{165}0$. Numbered rings are analyzed in Table S2 in the SI.

Sample	Ring	Experimental d_{hkl} (Å)	d_{hkl} (Å) Bi_2S_3[1]	Plane of Bi_2S_3[1]
S_{105}120	1	5.55	5.5660	200
	2	3.93	3.9630	220
	3	3.81	3.7480	101
	4	3.33	3.2530	021
	5	3.01	3.1100	211
	6	2.89	2.8240	040
	7	2.75	2.7170	301
	8	2.66	2.6410	311
	9	2.45	2.4560	231
	10	2.38	2.3050	041
	11	2.18	2.1880	510
	12	2.12	2.1180	421
	13	2.07	2.0750	520
	14	1.661	1.6650	611
	15	1.59	1.5870	550
	16	1.538	1.5328	720
	17	1.46	1.4809	271

Table S2. Interplanar distances for sample S_{165}0 computed from the SAED pattern in Fig. S3 in the SI, using the Bi_2S_3 reference code: 00-017-0320.

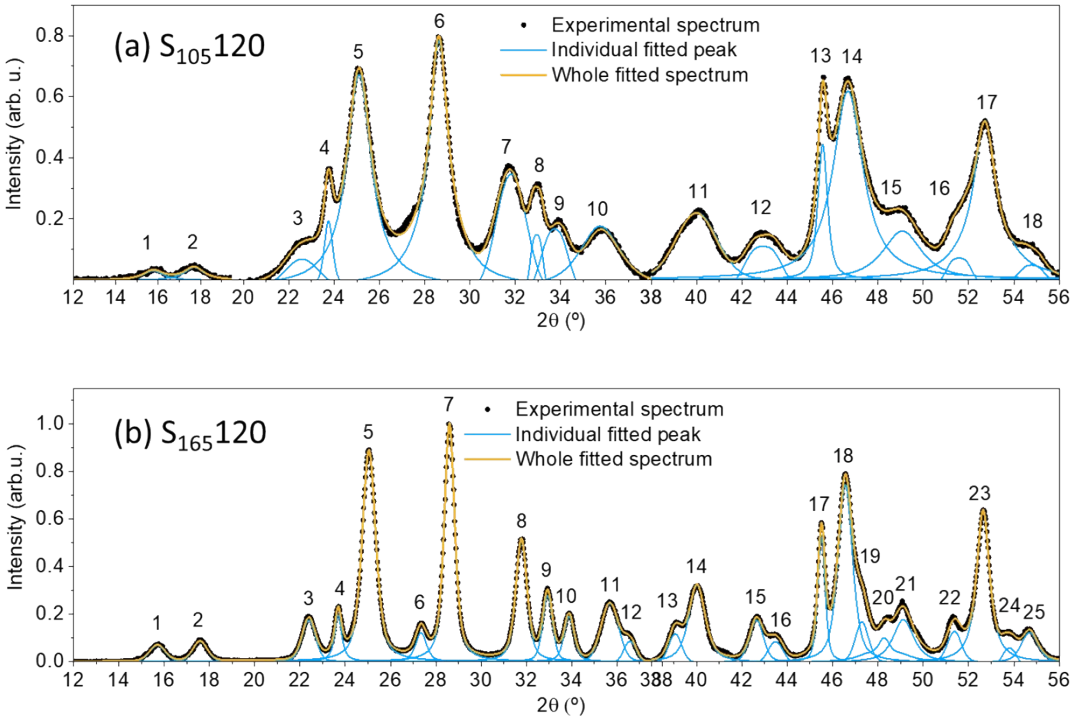

Figure S4. Multiple peak fitting of the XRD spectra from 12 to 56° for the samples S_{105}120 (a) and S_{165}120 (b). For each sample, the experimental spectrum (black spheres), whole fitted spectrum (yellow solid line), and individual fitted peaks (blue solid line) are depicted. Numbered peaks are analyzed in Table S3 in the SI.

$S_{105}120$				$S_{165}120$			
Peak	**2θ (°)**	D_{XRD} **(nm)**	**Plane**	**Peak**	**2θ (°)**	D_{XRD} **(nm)**	**Plane**
1	15.76	7.2	200	**1**	15.70	10.5	020
2	17.70	7.3	120	**2**	17.59	11.2	120
3	22.57	5.0	220	**3**	22.39	12.2	220
4	23.75	18.9	101	**4**	23.69	22.9	101
5	25.10	6.5	310	**5**	25.05	12.1	130
6	28.62	8.0	211	**6**	27.35	14.9	021
7	31.82	5.7	221	**7**	28.60	16.0	211
8	32.94	15,0	301	**8**	31.78	14.7	221
9	33.74	7.1	311	**9**	32.93	17.1	301
10	35.75	4.1	240	**10**	33.88	16.4	311
11	40.01	4.2	430	**11**	35.69	9.7	240
12	42.94	5.7	250	**12**	36.57	14.2	231
13	45.56	18.0	002	**13**	39.05	13.1	041/141
14	46.68	5.6	501	**14**	40.01	10.2	430
15	49.08	4.5	160	**15**	42.65	12.5	421
16	51.58	8.7	222	**16**	43.48	11.8	250/520
17	52.72	7.3	312/061	**17**	45.51	23.4	002
18	54.78	8.6	161	**18**	46.56	11.9	431/501
				19	47.30	13.1	530
				20	48.27	10.1	060
				21	49.12	8.4	160
				22	51.37	12.6	222
				23	52.64	13.6	351
				24	53.80	15.0	061
				25	54.69	10.7	360

Table S3. Plane indexation and D_{XRD} for samples $S_{105}120$ (left) and $S_{165}120$ (right) obtained from the multiple peak fitting of the XRD spectra in Fig. S4 in the SI.

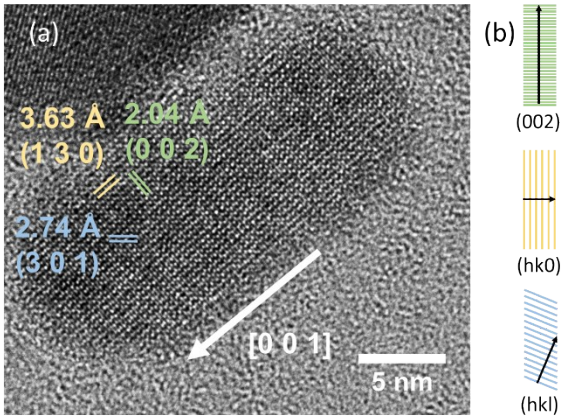

Figure S5. (a) Main interplanar distances together with their corresponding planes for a single Bi_2S_3 NR of sample $S_{165}120$. (b) Schematic illustrations of perpendicular (002), parallel (hk0), and diagonal (hkl) planes. Crystal growth along the [001] direction is shown with a white arrow.