Supporting Information

Determination of Interfacial Tension of Nanomaterials and the Effect of Particle Size on Interfacial Tension

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Table S1. The amount of TAA and cadmium acetate

$n_{(TAA)}$/mmol	$n_{(cadmium\ acetate)}$/mmol	r/nm
0.7	1.4	1.3
1.0	1.4	2.0
1.4	1.4	3.1
4.2	1.4	5.0
5.6	0.7	6.7
7.0	0.7	7.8
7.0	0.35	10.8
10.0	0.35	12.2

Table S2. The amount of thiourea, cadmium nitrate and PVP

$n_{(thiourea)}$/mmol	$n_{(cadmium\ nitrate)}$/mmol	$m_{(PVP)}$/g	r/nm
1.3	7.0	0.4	14.8
1.7	7.0	0.4	19.3
2.0	7.0	0.2	25.0
2.0	7.0	0.4	42.6
4.0	7.0	0.4	52.4
7.0	7.0	0.4	70.0

7.0	7.0	0.8	90.0

Table S3. Fitting linear correlation coefficients with first and second-order dynamics models (298.15K)

r/nm	First-order kinetic correlation coefficient	Second-order kinetic correlation coefficient
90.0	-0.1140	0.9835
70.0	-0.1029	0.9767
52.4	0.2585	0.9732
42.6	0.0668	0.9645
25.0	0.3771	0.9736
19.3	0.0717	0.9727
14.8	0.0102	0.9732
12.2	0.3681	0.9831
10.8	-0.0045	0.9893
7.8	0.2612	0.9857
6.7	0.2646	0.9615
5.0	0.1002	0.9834
3.1	0.2391	0.9861
2.0	-0.0416	0.9704
1.3	-0.0574	0.9855

Table S4. Logarithms of the adsorption rate constants of methylene blue adsorbed by cadmium sulfide nanoparticles with different radii at different temperatures

r^{-1}/nm^{-1}	ln*k*				
	338.15K	328.15K	318.15K	308.15K	298.15K
0.0111	4.4625	2.7848	1.7476	0.6167	-0.7141
0.0143	4.5267	2.8510	1.8201	0.6924	-0.6320
0.0191	4.6135	2.9529	1.9297	0.7813	-0.5033

0.0235	4.7112	3.0421	2.0336	0.9126	-0.3935
0.0400	5.0397	3.3902	2.4121	1.3101	0.0391
0.0518	5.2740	3.6328	2.6855	1.5954	0.3423
0.0676	5.5703	3.9704	3.0438	1.9764	0.7146
0.0820	5.7938	4.2491	3.3266	2.2644	1.0251
0.0926	5.9545	4.4018	3.4645	2.4491	1.2388
0.1282	6.1066	4.5633	3.6103	2.6494	1.5228
0.1493	6.2042	4.8044	3.8641	2.8473	1.7066
0.2000	6.7230	5.2019	4.3484	3.5275	2.3329
0.3226	7.1148	5.5835	4.8499	4.0434	3.0183
0.5000	7.2075	5.8662	5.2141	4.2792	3.3302
0.7692	7.5712	6.3518	5.6463	4.8678	3.9752

Table S5. Interfacial tension of cadmium sulfide nanoparticles with different radii at different temperatures before adsorption

r/nm	σ^* /J·m^{-2}				
	338.15K	328.15K	318.15K	308.15K	298.15K
90.0	0.6233	0.6372	0.6768	0.6840	0.7170
70.0	0.6241	0.6349	0.6744	0.6817	0.7148
52.4	0.6092	0.6371	0.6736	0.6429	0.7208
42.6	0.6250	0.6329	0.6774	0.6816	0.7146
25.0	0.6237	0.6357	0.6762	0.6834	0.7178
19.3	0.6229	0.6328	0.6773	0.6846	0.7156
14.8	0.6143	0.6363	0.6748	0.6851	0.7001
12.2	0.5915	0.6276	0.6577	0.6648	0.6815
10.8	0.5780	0.6058	0.6262	0.6455	0.6671
7.8	0.4546	0.4758	0.4857	0.5107	0.5429
6.7	0.4107	0.4575	0.4670	0.4763	0.5001
5.0	0.3877	0.4018	0.4198	0.4524	0.4596

3.1	0.2783	0.2849	0.3060	0.3260	0.3435
2.0	0.1853	0.2010	0.2188	0.2238	0.2388
1.3	0.1352	0.1498	0.1588	0.1672	0.1783

Table S6. Logarithms of adsorption equilibrium constants of methylene blue adsorbed by nano-cadmium sulfide with different radii at different temperatures

r^{-1}/nm^{-1}	$\ln K^{\circ}$				
	338.15K	328.15K	318.15K	308.15K	298.15K
0.0111	-1.8225	-1.7762	-1.7359	-1.6857	-1.6438
0.0143	-1.8121	-1.7655	-1.7207	-1.6756	-1.6306
0.0191	-1.8082	-1.7616	-1.7149	-1.6681	-1.6215
0.0235	-1.8038	-1.7545	-1.7084	-1.6585	-1.6084
0.0400	-1.7887	-1.7398	-1.6899	-1.6357	-1.5856
0.0518	-1.7749	-1.7185	-1.6626	-1.6061	-1.5506
0.0676	-1.7685	-1.7061	-1.6483	-1.5885	-1.5367
0.0820	-1.7405	-1.6785	-1.6260	-1.5490	-1.4725
0.0926	-1.7104	-1.6668	-1.6067	-1.5430	-1.4828
0.1282	-1.6626	-1.5909	-1.5143	-1.4444	-1.3707
0.1493	-1.6268	-1.5502	-1.4745	-1.3985	-1.3225
0.2000	-1.5077	-1.4163	-1.3349	-1.2568	-1.1721
0.3226	-1.1946	-1.1168	-0.9978	-0.8909	-0.7924
0.5000	-0.6881	-0.5890	-0.4655	-0.3131	-0.2110
0.7692	0.0309	0.1302	0.2969	0.4674	0.6036

Table S7. Adsorption Gibbs energy of methylene blue adsorbed by nano-cadmium sulfide with different radii at different temperatures

r^{-1}/nm^{-1}	$\Delta_{ads}G_m$ /kJ·mol^{-1}				
	338.15K	328.15K	318.15K	308.15K	298.15K
0.0111	5.1236	4.8460	4.5916	4.3187	4.0746
0.0143	5.0944	4.8167	4.5513	4.2928	4.0419

0.0191	5.0835	4.8060	4.5360	4.2737	4.0194
0.0235	5.0711	4.7868	4.5187	4.2490	3.9869
0.0400	5.0288	4.7465	4.4699	4.1907	3.9305
0.0518	4.9898	4.6885	4.3978	4.1148	3.8437
0.0676	4.9720	4.6547	4.3600	4.0697	3.8092
0.0820	4.8933	4.5793	4.3009	3.9684	3.6500
0.0926	4.8085	4.5475	4.2498	3.9530	3.5517
0.1282	4.6742	4.3402	4.0055	3.7004	3.3978
0.1493	4.5735	4.2294	3.9001	3.5830	3.2782
0.2000	4.2386	3.8639	3.5308	3.2198	2.9055
0.3226	3.3584	3.0470	2.6392	2.2824	1.9643
0.5000	1.9346	1.6070	1.2312	0.8022	0.5230
0.7692	-0.0869	-0.3551	-0.7853	-1.1975	-1.4963

Table S8. Tolman lengths of nano-cadmium sulfide with different particle sizes

r/nm	δ /nm				
	338.15 K	328.15 K	318.15 K	308.15 K	298.15 K
90.0	0.6376	0.6263	0.6914	0.6551	0.6340
70.0	0.6366	0.6253	0.6902	0.6541	0.6330
52.4	0.6350	0.6238	0.6883	0.6524	0.6314
42.6	0.6336	0.6224	0.6866	0.6509	0.6300
25.0	0.6282	0.6172	0.6803	0.6452	0.6247
19.3	0.6243	0.6135	0.6757	0.6411	0.6209
14.8	0.6192	0.6085	0.6697	0.6357	0.6158
12.2	0.6144	0.6040	0.6641	0.6307	0.6111
10.8	0.6110	0.6006	0.6601	0.6271	0.6077
7.8	0.5993	0.5894	0.6464	0.6148	0.5962
6.7	0.5924	0.5827	0.6383	0.6075	0.5894
5.0	0.5758	0.5667	0.6188	0.5900	0.5731

3.1	0.5356	0.5280	0.5716	0.5478	0.5336
2.0	0.4775	0.4721	0.5034	0.4866	0.4764
1.3	0.3893	0.3871	0.3999	0.3938	0.3896

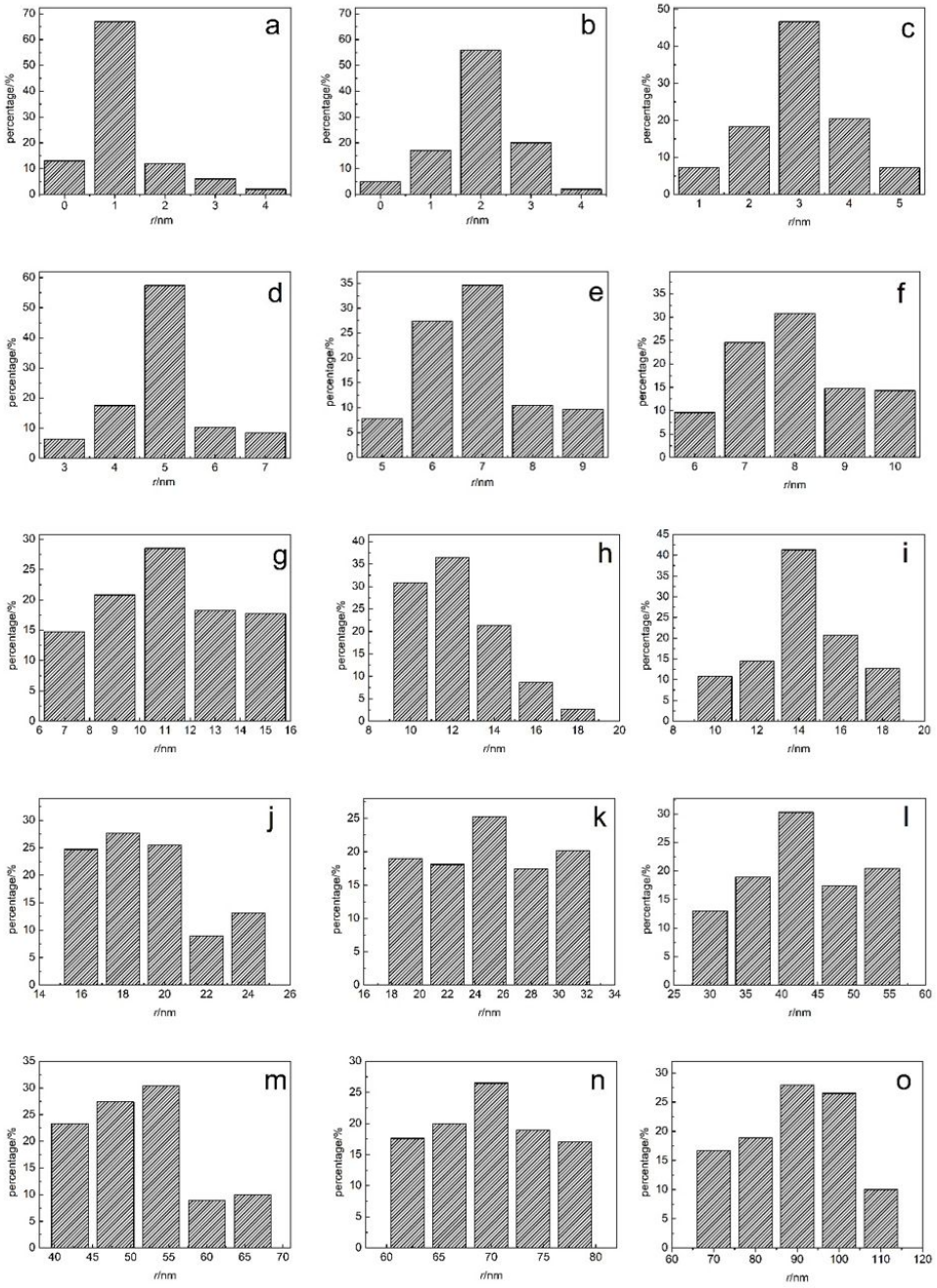

Figure S1. The radius distribution of the nano-cadmium sulfide:

a.1.3 nm, b.2.0 nm, c.3.1 nm, d.5.0 nm, e.6.7 nm, f.7.8 nm, g.10.8 nm, h.12.2 nm, i.14.8 nm, j.19.3 nm, k.25.0 nm, l.42.6 nm, m.52.4 nm, n.70.0 nm, o.90.0 nm.