Supporting information

Synthesis and dye adsorption studies of {dibromo(1,1'-(1,2-ethanediyl)bis(3-methyl-imidazole-2-thione) dicopper(I)}$_n$ polymer and conversion it to CuO nanospheres for their photocatalytic and antibacterial applications

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Table S1. Selected bond lengths (Å) and bond angles (°) for compounds **1** and **2**.

Compound **1**					
Cu1-Br1	2.5337(8)	Cu1-Br1´	2.5296(8)	Cu1-S1	2.3866(13)
Cu1-S1´	2.4066(13)				
S1-Cu1-S1´	108.48(5)	S1-Cu1-Br1	110.56(4)	S1-Cu1-Br1´	113.35(4)
S1´-Cu1-Br1	111.57(4)	S1´-Cu1-Br1´	110.38(4)	Br1-Cu1-Br1´	102.45(3)
Compound **2**					
Cu1-Br1	2.3507(5)	Cu1-Br2	2.3891(5)	Cu1-Br3	2.3777(5)
Br1-Cu1-Br2	123.30(2)	Br1-Cu1-Br3	119.60(2)	Br2-Cu1-Br3	117.10(2)

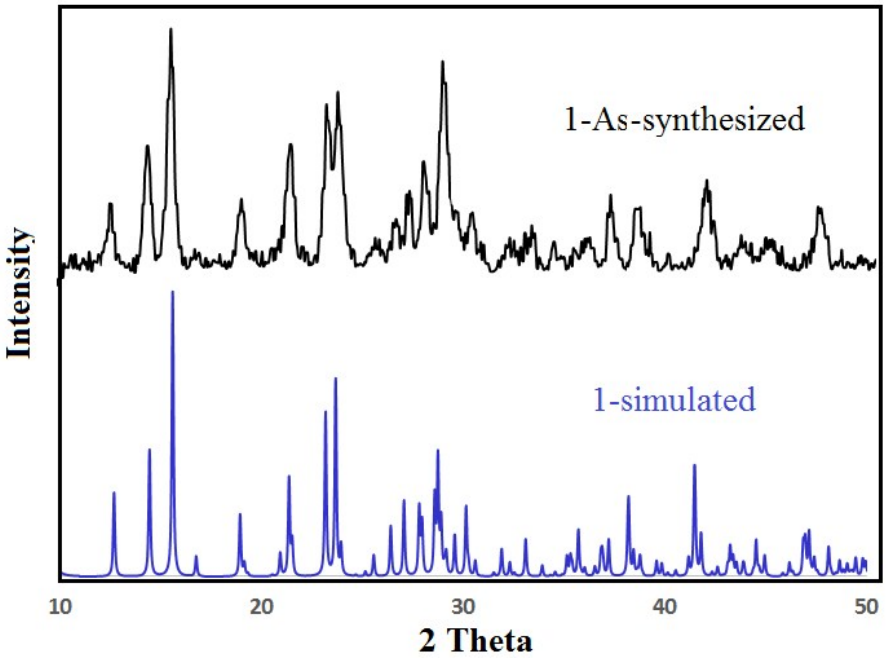

Figure S1. The PXRD patterns of **1** in simulated form (blue) and as-synthesized (black).

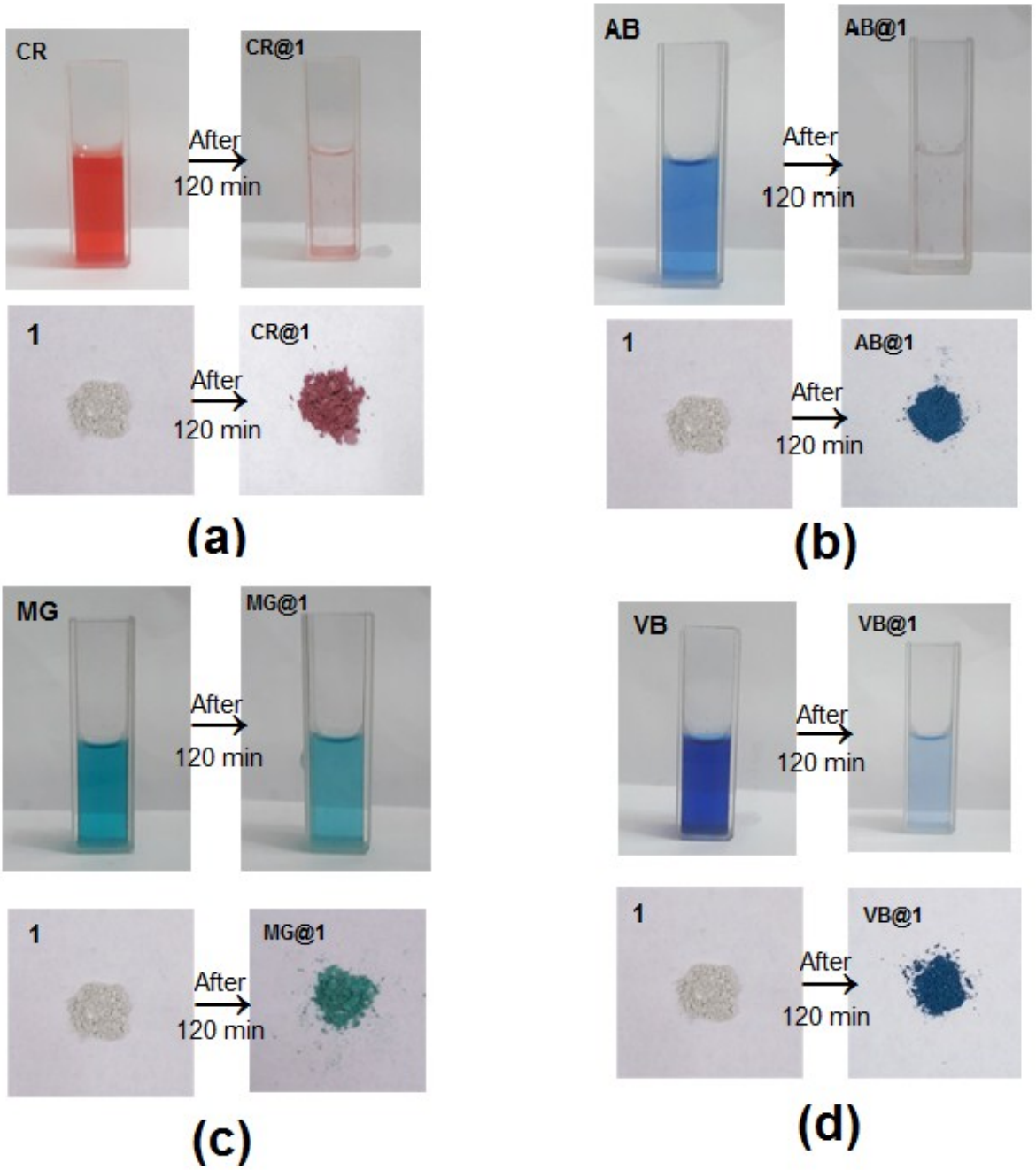

Figure S2. Color changes of the dye solutions of (a) the CR, (b) the AB, (c) the MG and (d) the VB and the precipitation **1** during adsorption process within 120 min.

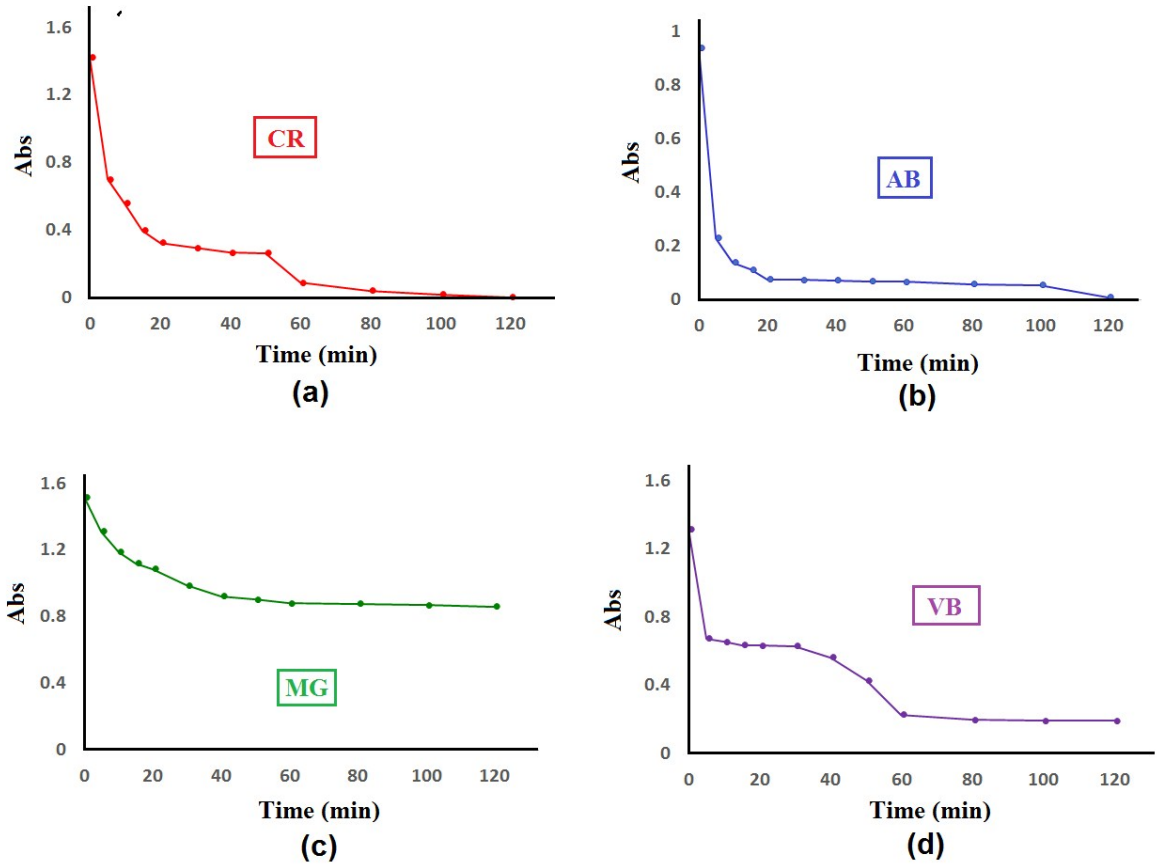

Figure S3. The absorption curves vs. time for four selected dyes of (a) the CR, (b) the AB, (c) the MG and (d) the VB.

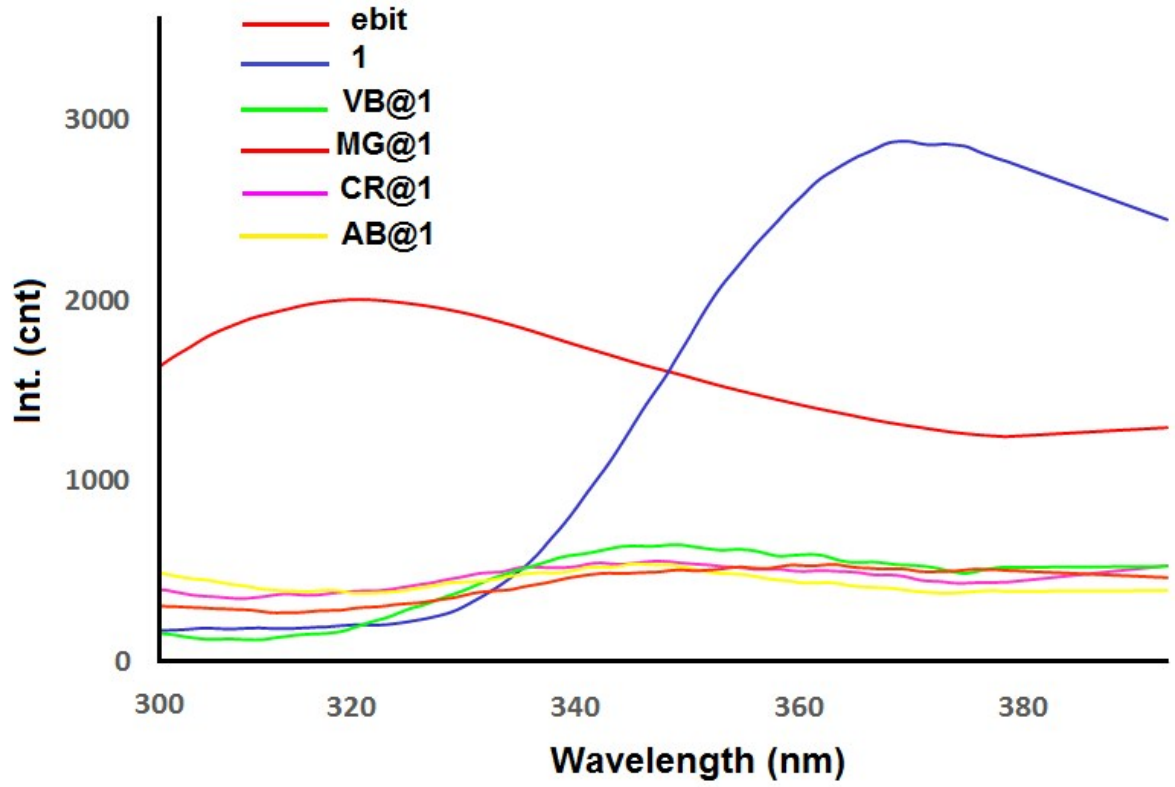

Figure S4. The emission spectra of the ebit (red) and **1** (blue) and when **1** was immersed in dye solutions of the AB (yellow), the CR (pink), the MG (orange) and the VB (green)**.**

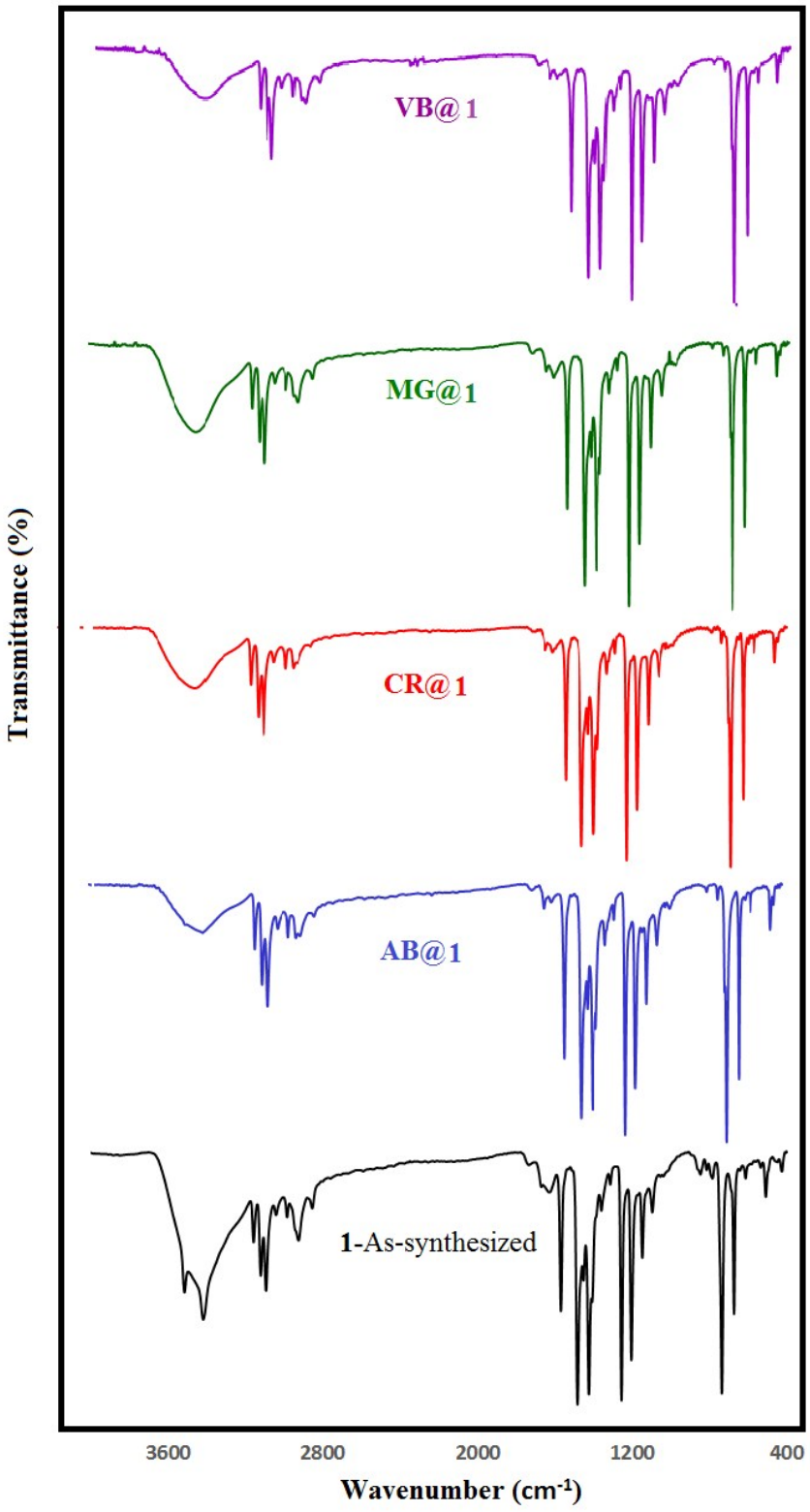

Figure S5. The IR spectra of the as-synthesized **1** (black) and when was immersed in dye solutions of the AB (blue), the CR (red), the MG (green) and the VB (purple)**.**

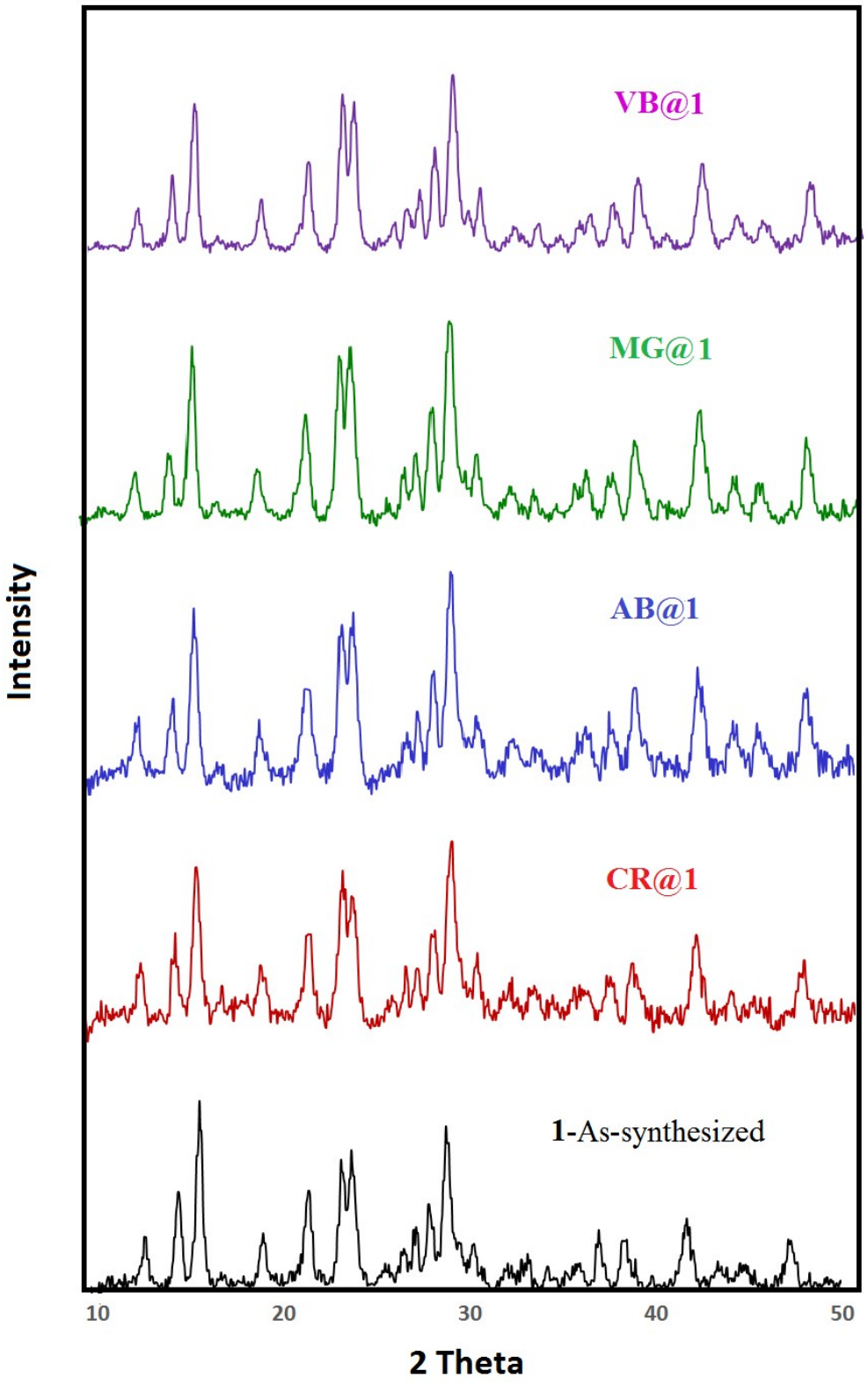

Figure S6. The PXRD patterns of the as-synthesized **1** (black) and when was immersed in dye solutions of the CR (red), the AB (blue), the MG (green) and the VB (purple)**.**

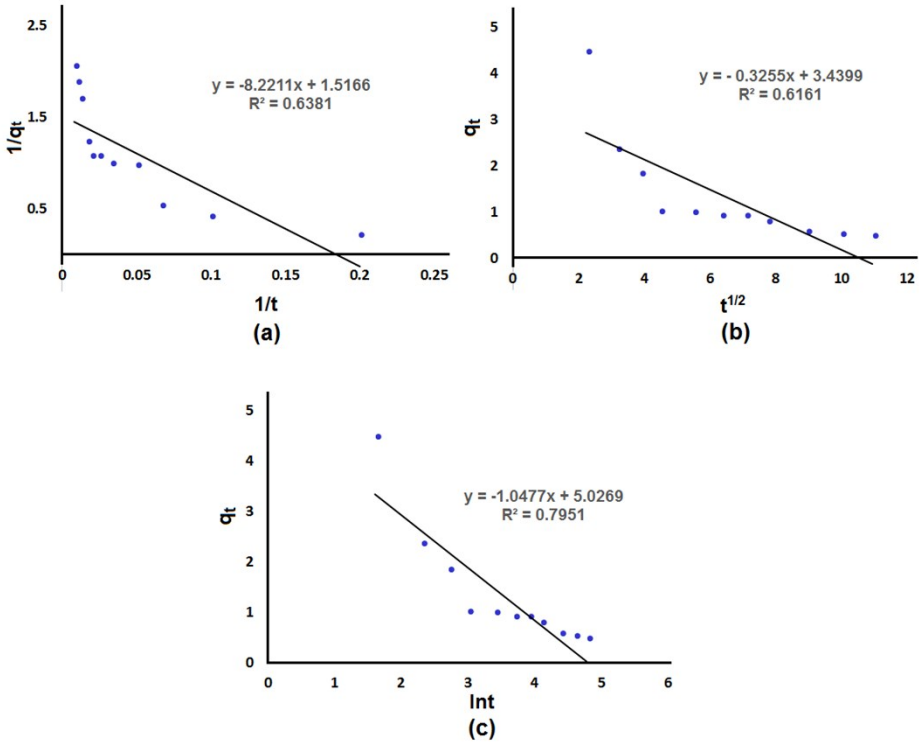

Figure S7. The adsorption kinetic curves of (a) Pseudo-first order, (b) Intraparticle diffusion, and (c) Elovich models for the AB dye.

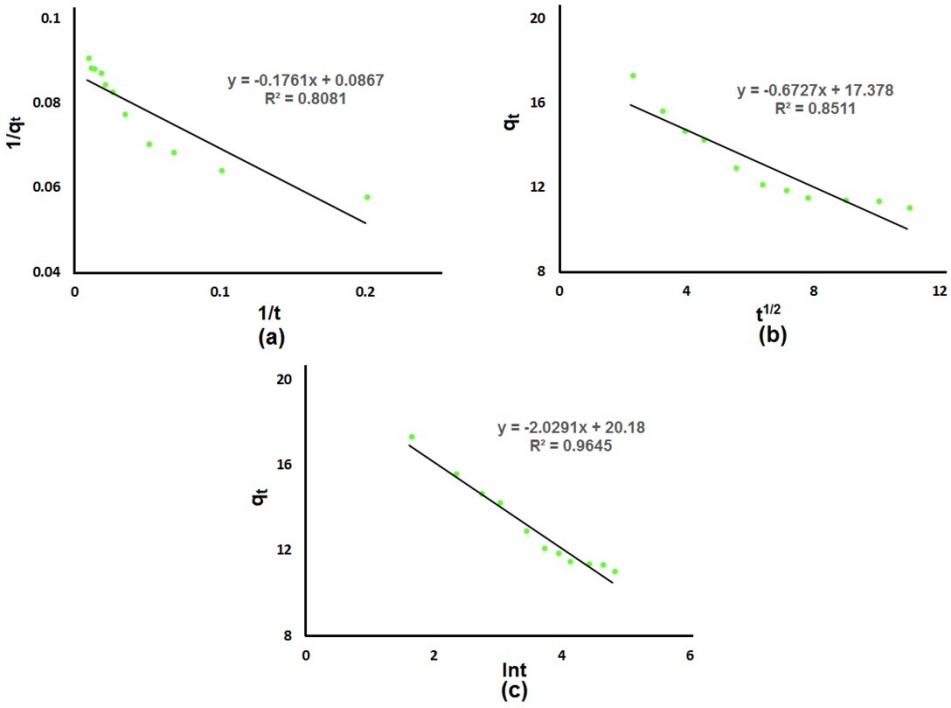

Figure S8. The adsorption kinetic curves of (a) Pseudo-first order, (b) Intraparticle diffusion, and (c) Elovich models for the MG dye.

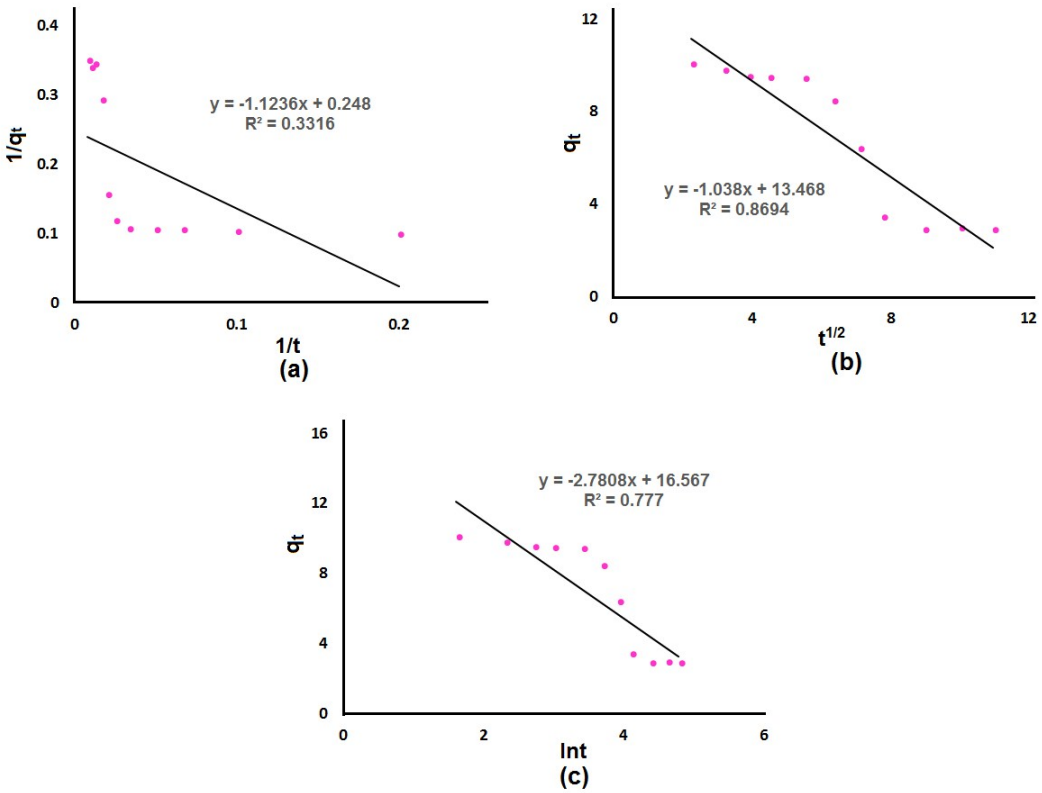

Figure S9. The adsorption kinetic curves of (a) Pseudo-first order, (b) Intraparticle diffusion, and (c) Elovich models for the AB dye.

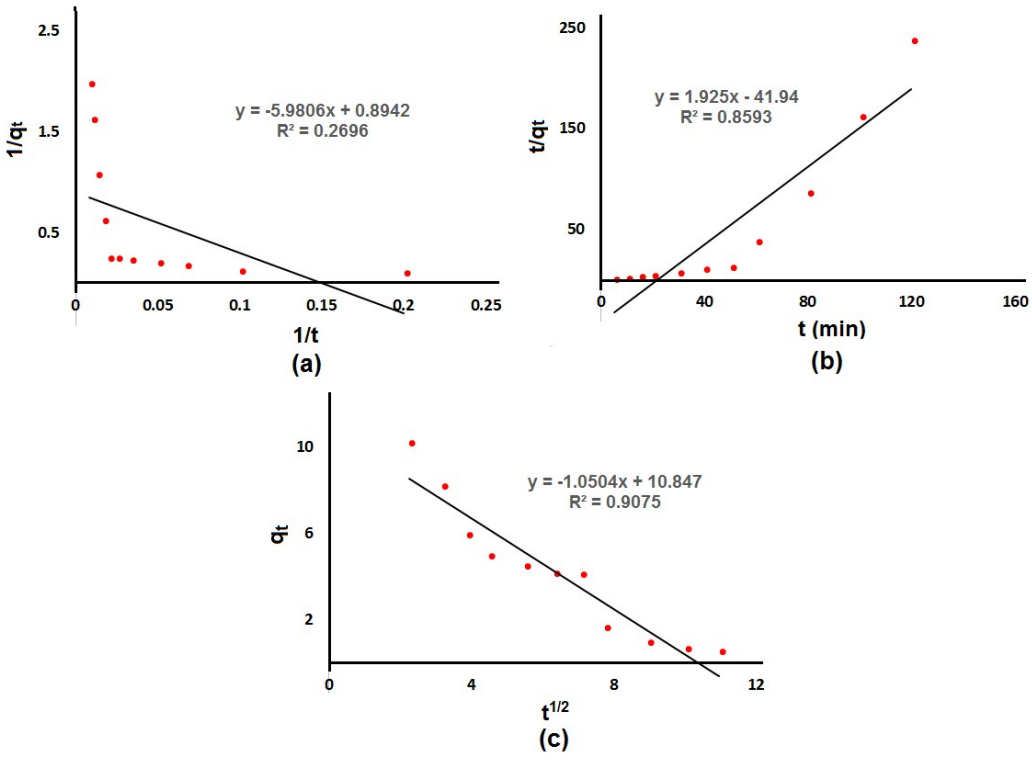

Figure S10. The adsorption kinetic curves of (a) Pseudo-first order, (b) Pseudo-second-order and (c) Intraparticle diffusion models for the CR dye.

Table S2. The kinetics parameters for adsorption of different dyes from aqueous solutions by polymer **1** at room temperature.

Kinetic models	Equations	The dye	Parameters		
			Adj. R-square	q_e	K_1
Pseudo-first order	$\frac{1}{q_t}=\frac{k_1}{q_e t}+\frac{1}{q_e}$	AB	0.638	0.653	5.420
		MG	0.808	11.530	2.031
		VB	0.331	4.032	-4.520
		CR	0.269	1.118	-6.688
Pseudo-second order	$\frac{t}{q_t}=\frac{1}{k_2 q_e^2}+\frac{t}{q_e}$	CR	Adj. R-square	q_e	K_2
			0.859	2.240	0.007
Intraparticle diffusion	$q_t = k_{dif} t^{\frac{1}{2}} + x_i$		Adj. R-square	K_{dif}	x_i
		AB	0.616	-0.325	3.430
		MG	0.851	-2.029	17.378
		VB	0.869	-1.038	13.468
		CR	0.907	-1.050	10.847
Elovich	$q_t=\frac{lna_e b_e}{b_e}+\frac{1}{b_e}lnt$		Adj. R-square	a	b
		AB	0.795	0.007	-0.954
		MG	0.964	0.000024	-0.492
		VB	0.777	0.00093	-0.359

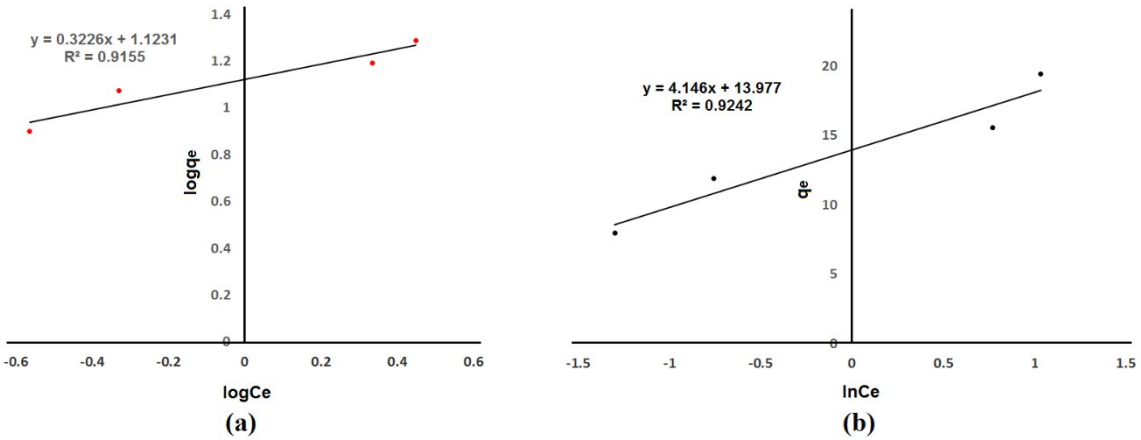

Figure S11. The adsorption isotherm curves of (a) Freundlich and (b) Temkin models for the CR dye.

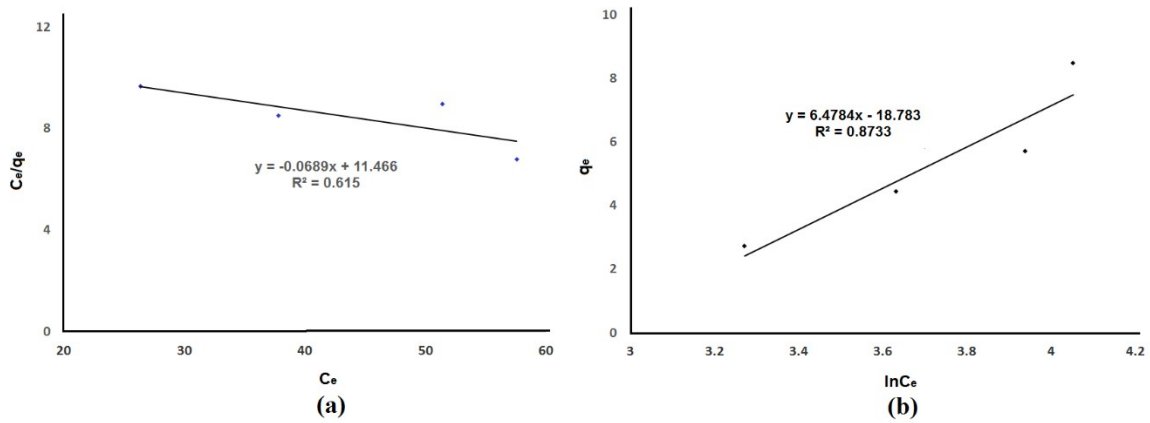

Figure S12. The adsorption isotherm curves of (a) Langmuir and (b) Temkin models for the MG dye.

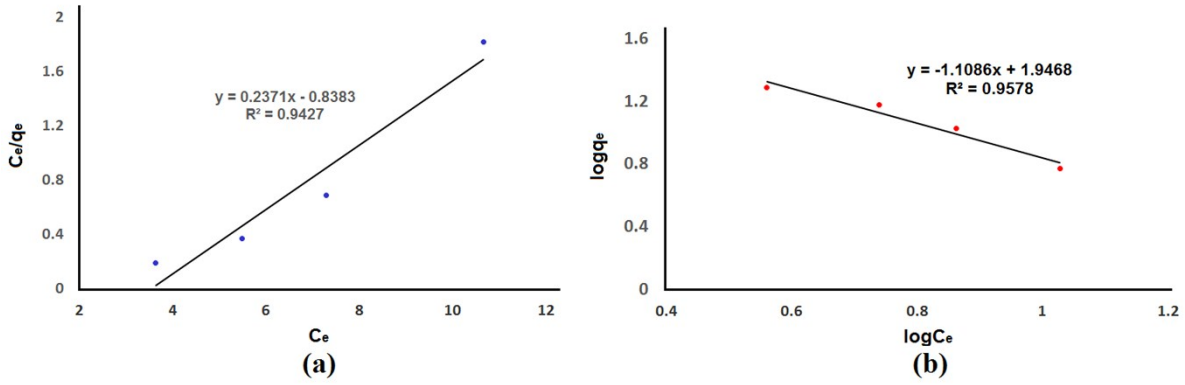

Figure S13. The adsorption isotherm curves of (a) Langmuir and (b) Freundlich models for the AB dye.

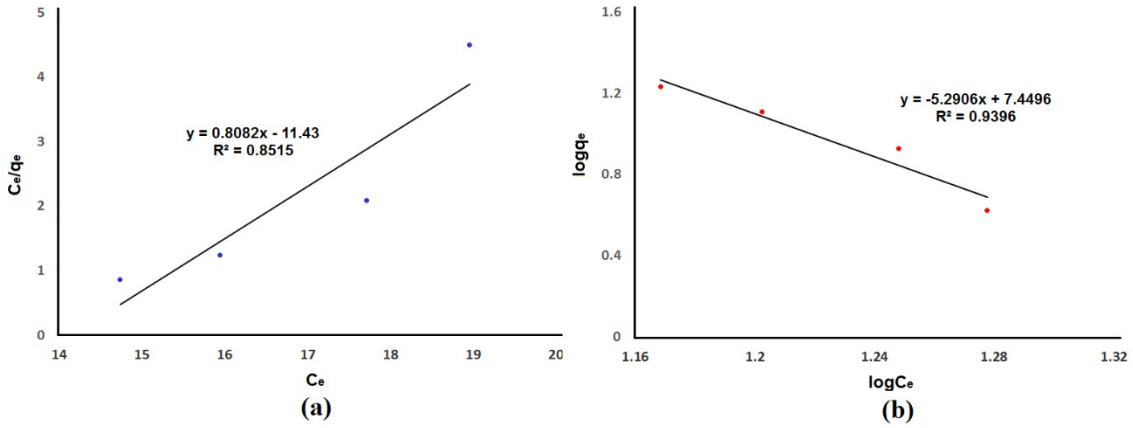

Figure S14. The adsorption isotherm curves of (a) Langmuir and (b) Freundlich models for the VB dye.

Table S3. Evaluated model parameters of adsorption isotherms for different dyes by the polymer **1** at room temperature.

Isotherm models	Equations	The dye	Parameters		
			Adj. R-square	q_m	K_l
Langmuir	$\frac{c_e}{q_e} = \frac{1}{q_m k_l} + \frac{c_e}{q_m}$	AB	0.942	3.057	0.390
		MG	0.615	-14.510	0.006
		VB	0.851	1.237	0.707
			Adj. R-square	n	k_f
Freundlich	$logq_e = logk_f + \frac{1}{n} logc_e$	AB	0.957	-0.902	7.000
		VB	0.939	-0.189	1719.175
		CR	0.915	3.099	3.074
			Adj. R-square	B_1	k_t
Temkin	$q_e = B_1 ln\, k_t + B_1 lnc_e$	CR	0.924	4.146	29.100
		MG	0.873	6.478	0.055

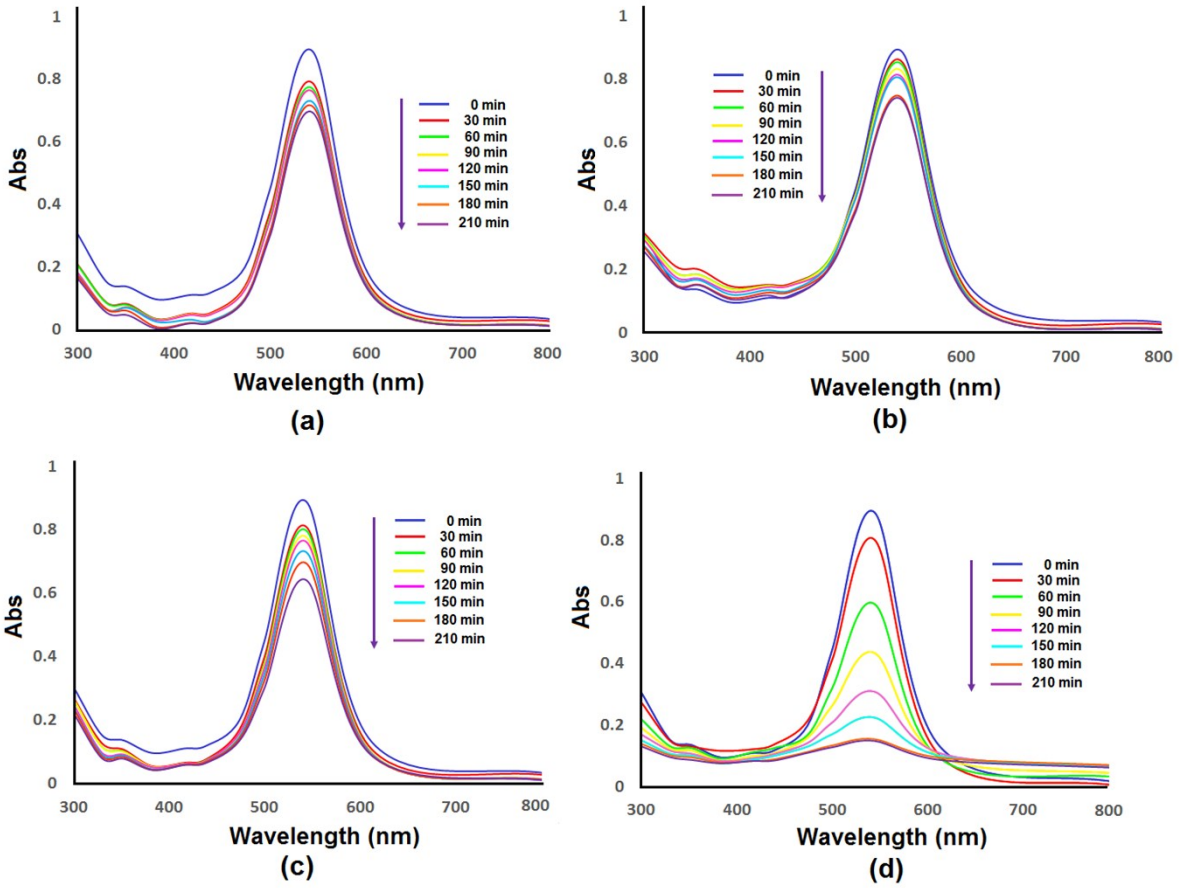

Figure S15.The UV-Vis adsorption spectra of the Rhodamine B as a function of irradiation time for (a) the blank, (b) the as-synthesized CuO nanospheres, (c) the H_2O_2 and (d) the commercial CuO with addition of H_2O_2.

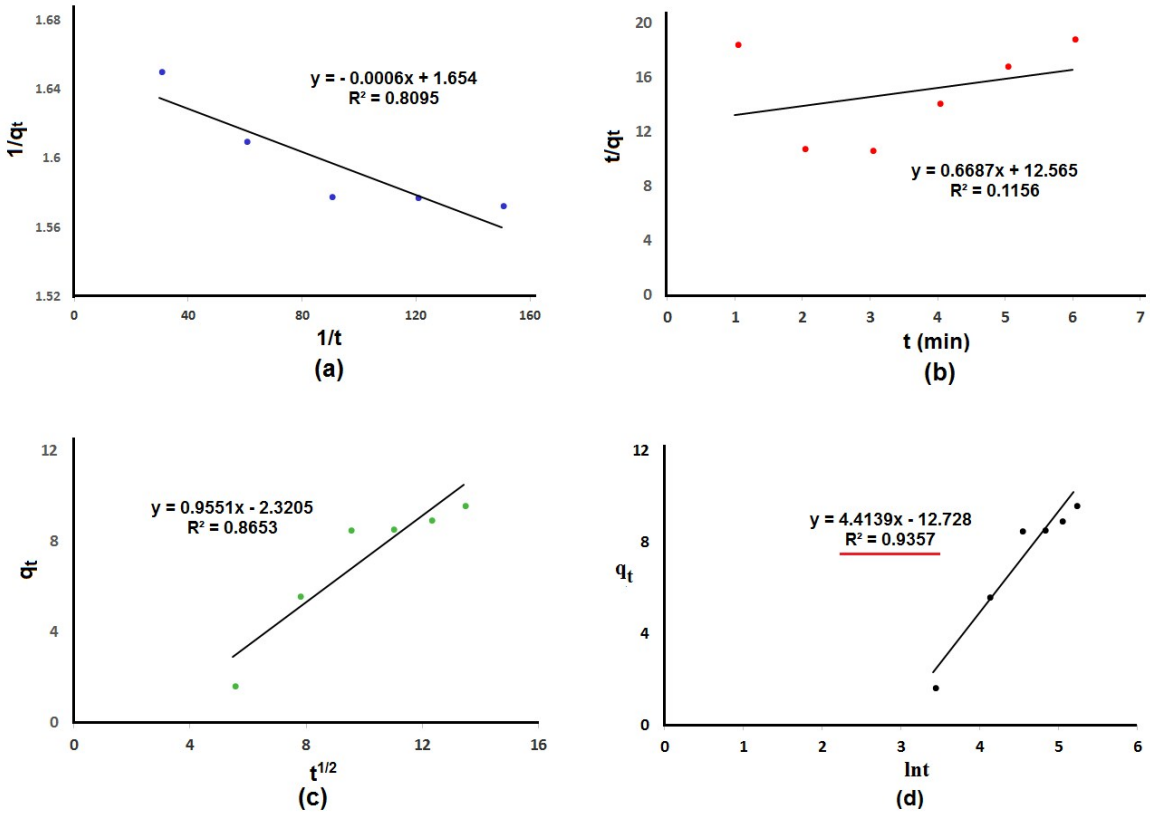

Figure S16. The adsorption kinetic curves for (a) Pseudo-first order, (b) Pseudo-second-order, (c) Intraparticle diffusion and (d) Elovich kinetic models in the photodegradation of the RhB solution by the CuO nanospheres.

Table S4. The fitted kinetics parameters for photodegradation of the RhB solution by the CuO nanospheres.

Kinetic models	Equations	Parameters	
Pseudo-first order model	$\frac{1}{q_t}=\frac{k_1}{q_e t}+\frac{1}{q_e}$	Adj. R-square	0.809
		q_e	0.604
		k_1	-0.00036
Pseudo-second order model	$\frac{t}{q_t}=\frac{1}{k_2 q_e^2}+\frac{t}{q_e}$	Adj. R-square	0.115
		q_e	1.495
		K_2	0.035
Intraparticle diffusion model	$q_t = k_{dif} t^{\frac{1}{2}} + x_i$	Adj. R-square	0.865
		K_{dif}	0.955
		x_i	-2.320
Elovich model	$q_t = \frac{ln a_e b_e}{b_e} + \frac{1}{b_e} ln t$	Adj. R-square	0.935
		a	0.000012
		b	0.226

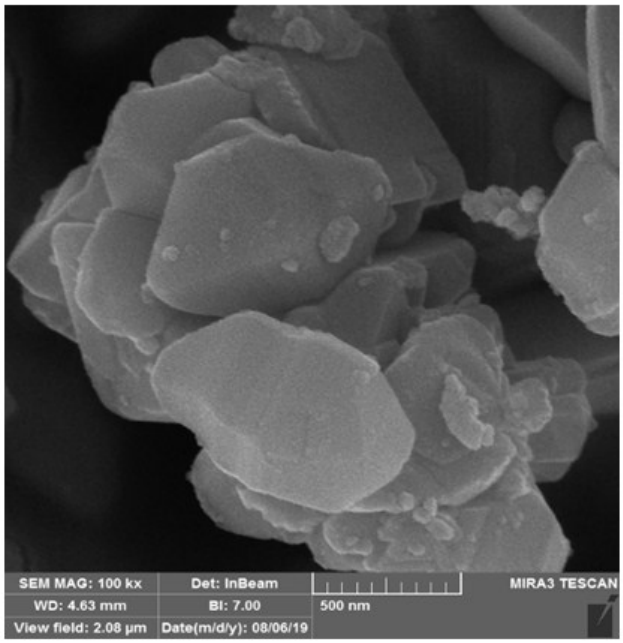

Figure S17. The SEM image of the commercial CuO.