Supporting Information

Efficient and selective removal of Congo red by a C@Mo composite nanomaterial using a citrate-based coordination polymer as the precursor

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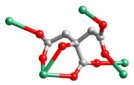
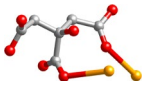
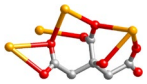
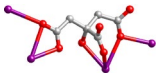
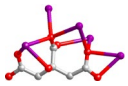
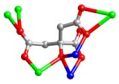
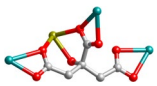
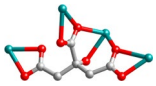
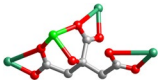
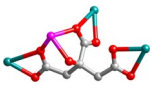
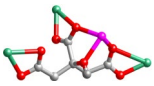
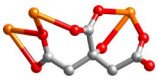
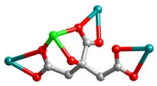
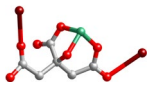
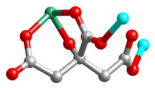
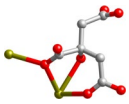
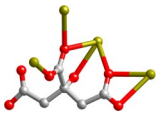
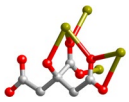
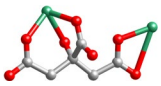
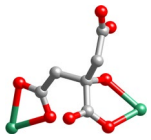
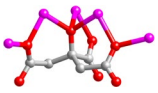
Table S1 Selected bond distances (Å) and angles (°) for complex **1**

Cu(1)–O(1)	1.934(5)	Cu(2)–O(1W)	2.089(5)
Cu(1)–O(5)	1.936(4)	Cu(2)–O(7)	1.912(4)
Cu(1)–O(4)	1.944(4)	Cu(2)–O(2)	1.921(5)
Cu(1)–O(7)	1.951(4)	Cu(2)–O(3)#2	1.923(5)
Cu(1)–O(6)#1	2.285(4)	Cu(2)–O(2W)	2.275(5)
O(1)–Cu(1)–O(5)	158.7(2)	O(7)–Cu(2)–O(2)	93.3(2)
O(1)–Cu(1)–O(4)	88.63(19)	O(7)–Cu(2)–O(3)#2	97.09(18)
O(5)–Cu(1)–O(4)	90.53(18)	O(2)–Cu(2)–O(3)#2	169.6(2)
O(1)–Cu(1)–O(7)	97.55(18)	O(7)–Cu(2)–O(1W)	135.79(19)
O(5)–Cu(1)–O(7)	84.59(17)	O(2)–Cu(2)–O(1W)	82.9(2)
O(4)–Cu(1)–O(7)	173.37(17)	O(3)#2–Cu(2)–O(1W)	88.7(2)
O(1)–Cu(1)–O(6)#1	94.6(2)	O(7)–Cu(2)–O(2W)	136.04(18)
O(5)–Cu(1)–O(6)#1	106.6(2)	O(2)–Cu(2)–O(2W)	86.7(2)
O(4)–Cu(1)–O(6)#1	87.89(17)	O(3)#2–Cu(2)–O(2W)	86.8(2)
O(7)–Cu(1)–O(6)#1	89.20(17)	O(1W)–Cu(2)–O(2W)	87.89(18)

Symmetry code: #1 $-x + 2, y - 1/2, -z + 1/2$; #2 $x, -y + 3/2, z - 1/2$

Table S2. Coordination Modes of Carboxylic Ligand H_4cit (Other Metal-based CPs)

No.	CP	cit anion	Coordination mode	Coordination mode of −COO group	−OH	Reference
A4	[Gd(cit)(H_2O)]		Pentadentate	μ_2-η^1:η^1 μ_2-η^1:η^1 μ_2-η^1:η^1	μ_1	S1
A5	[5Ba(Hcit)$_2$(H_2cit)$_2$·6H_2O]·2H_2O	 	Biadentate Tetradentate	μ_1-η^1:η^0 μ_1-η^1:η^0 μ_0-η^0:η^0 μ_2-η^2:η^1 μ_3-η^2:η^1	NA μ_1	S2
A6	[5.5Pb(Hcit)$_3$(H_2cit)·5H_2O]·4.5H_2O	 	Tetradentate Pentadentate	μ_1-η^1:η^0 μ_2-η^2:η^0 μ_2-η^1:η^0 μ_2-η^1:η^1 μ_3-η^3:η^1	μ_1 μ_1	S2
A7	[Na(OH_2)$_6$]·{[Na$_3$(OH_2)$_8$]$_3$[NaPd$_3$(cit)$_3$]$_2$}·(H_2O)		Sexadentate	μ_3-η^2:η^1 μ_3-η^2:η^1 μ_1-η^1:η^0	μ_3	S3
A8	[FeCd$_2$(Hcit)$_2$(H_2O)$_2$]		Tetradentate	μ_3-η^2:η^1 μ_3-η^2:η^1 μ_1-η^1:η^1	μ_1	S4
A9	[Cd$_3$(Hcit)$_2$(H_2O)$_2$]		Tetradentate	μ_3-η^2:η^1 μ_3-η^2:η^1 μ_1-η^1:η^1	μ_1	S4
A10	[NiZn$_2$(Hcit)$_2$(H_2O)$_2$]		Tetradentate	μ_3-η^2:η^1 μ_3-η^2:η^1 μ_1-η^1:η^1	μ_1	S5
A11	[CoCd$_2$(Hcit)$_2$(H_2O)$_2$]		Tetradentate	μ_3-η^2:η^1 μ_3-η^2:η^1 μ_1-η^1:η^1	μ_1	S5
A12	[CoZn$_2$(Hcit)$_2$(H_2O)$_2$]		Tetradentate	μ_3-η^2:η^1 μ_3-η^2:η^1 μ_1-η^1:η^1	μ_1	S5
A13	[Ln(Hcit)(H_2O)$_2$·2H_2O] (Ln = Sm, Gd, Er, Nd)		Tridentate	μ_3-η^2:η^1 μ_2-η^1:η^1 μ_1-η^1:η^0	μ_1	S6

A14	[NiCd(cit)(H_2O)]		Tetradentate	μ_3-η^2:η^1 μ_3-η^2:η^1 μ_1-η^1:η^1	μ_1	S7
A15	[Ge(Hcit)$_2$Ba(H_2O)$_3$]·3H_2O		Tridentate	μ_1-η^1:η^0 μ_1-η^1:η^0 μ_2-η^1:η^1	μ_1	S8
A16	[Cu_2Ge(cit)$_2$(INH)$_2$]·4H_2O		Tridentate	μ_1-η^1:η^0 μ_2-η^1:η^1 μ_1-η^1:η^0	μ_1	S9
			Biadentate	μ_2-η^2:η^0 μ_1-η^1:η^0 μ_0-η^0:η^0	μ_1	
A17	[M(Hcit)(H_2cit)(H_3cit)(H_2O)]·H_2O (M = La, Ce)		Tetradentate	μ_3-η^2:η^1 μ_3-η^2:η^1 μ_0-η^0:η^0	μ_1	S10
			Tetradentate	μ_3-η^2:η^1 μ_3-η^2:η^1 μ_0-η^0:η^0	μ_1	
A18	[Zn(Hcit)(phen)(H_2O)][Zn_2(Hcit)(phen)$_2$(H_2O)$_3$]·13.5H_2O phen = 1,10-phenanthroline		Biadentate	μ_1-η^1:η^1 μ_1-η^1:η^0 μ_1-η^1:η^0	μ_1	S11
A19	[Zn_3(Hcit)$_2$(phen)$_4$]·14H_2O		Biadentate	μ_1-η^1:η^1 μ_1-η^0:η^0 μ_0-η^0:η^0	NA	S11
A20	[Co_8(cit)$_4$(bbi)$_6$(H_2O)$_{10}$]·7H_2O bbi = 1,1'-(1,4-butanediyl)bis(imidazole)		Pentadentate	μ_2-η^2:η^0 μ_2-η^2:η^0 μ_1-η^1:η^0	μ_3	S12

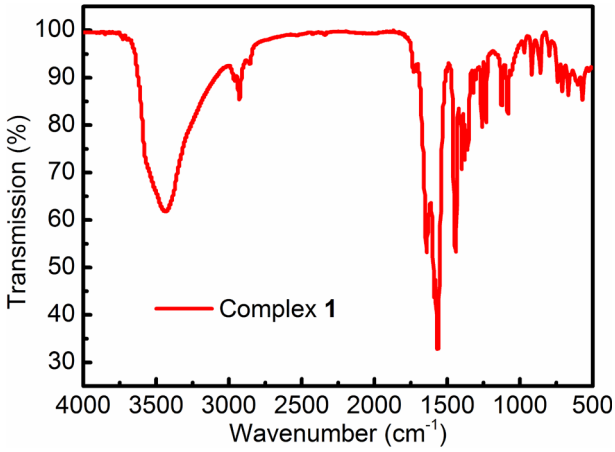


Fig. S1 The IR spectrum of complex **1**.

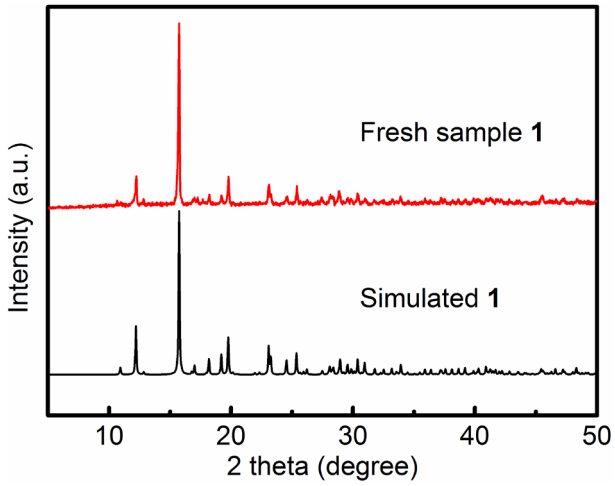


Fig. S2 The PXRD patterns of simulated and fresh sample for complex **1**.

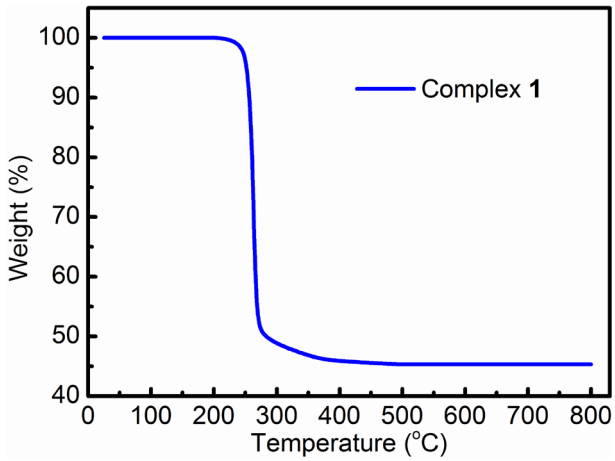


Fig. S3 The TG curve of complex **1**.

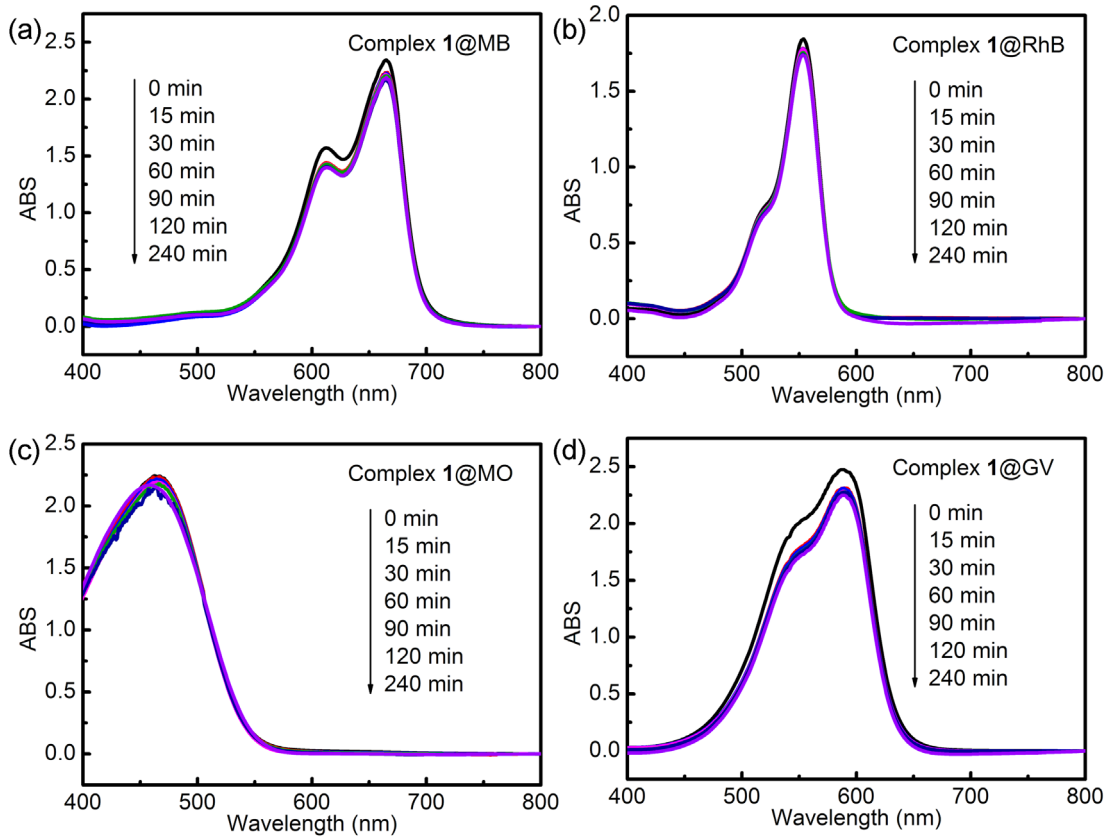


Fig. S4 UV–vis spectra of MB (a), RhB (b), MO (c), GV (d) solutions after different adsorption times with complex **1**.

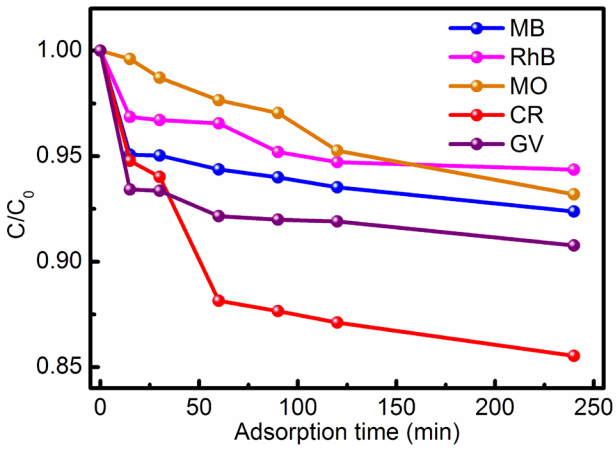


Fig. S5 The adsorption rates of MB, RhB, MO, CR and GV at different times with complex **1**.

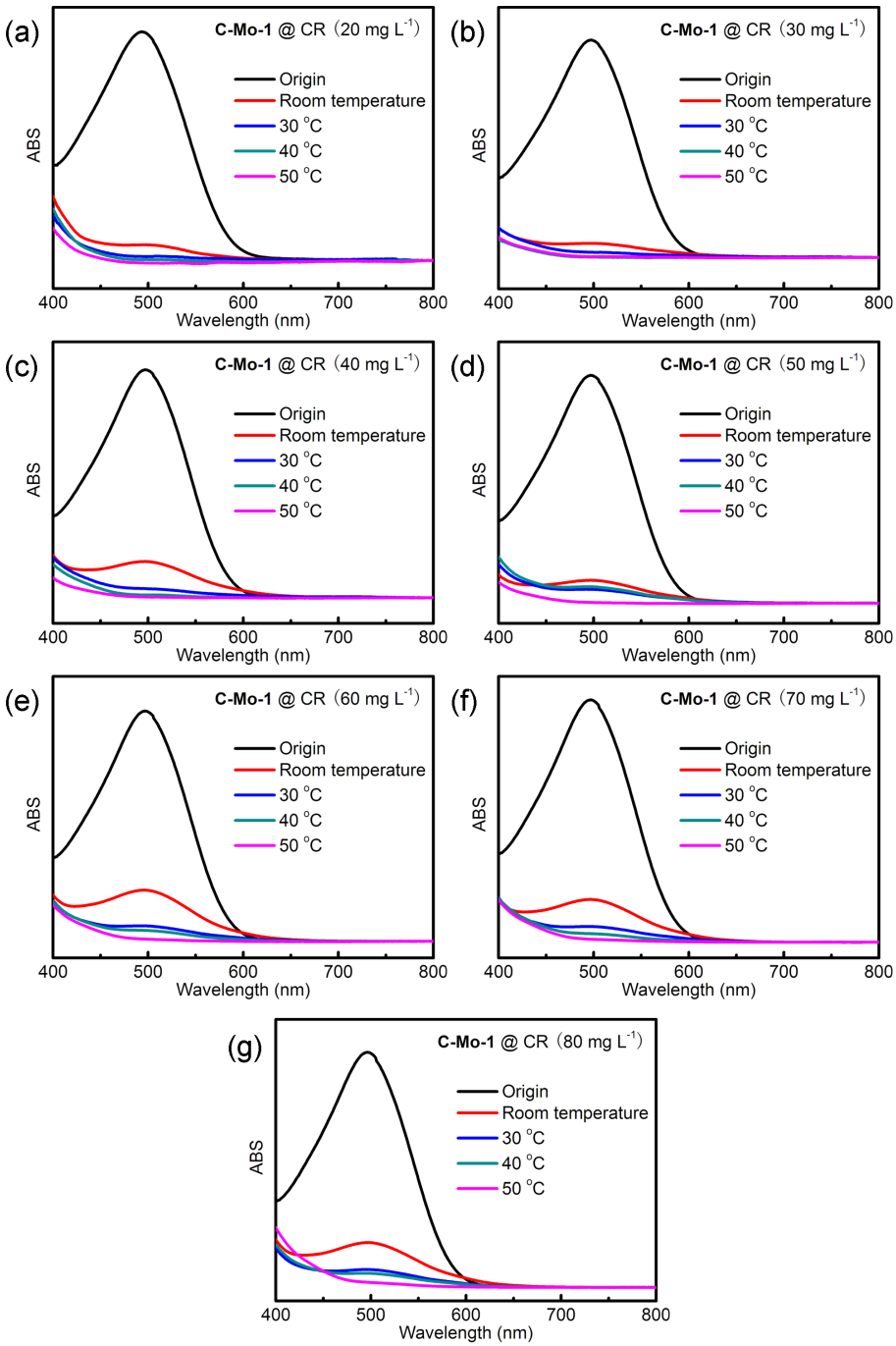


Fig. S6 UV–vis spectra of different concentrations of CR solutions after 240 min with **C-Mo-1** at different temperatures.

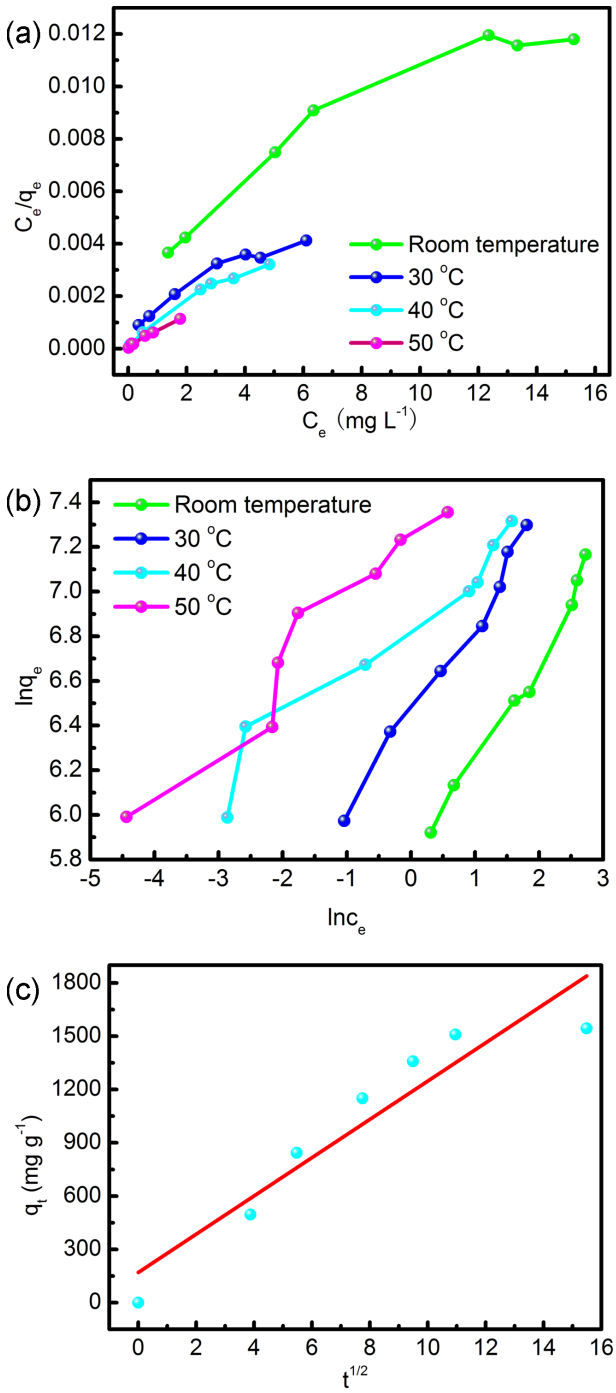


Fig. S7 Adsorption kinetics of CR adsorbed by **C-Mo-1**: (a) Pseudo-first-order model; (b) Pseudo-second-order model; (c) Intra-particle diffusion model.

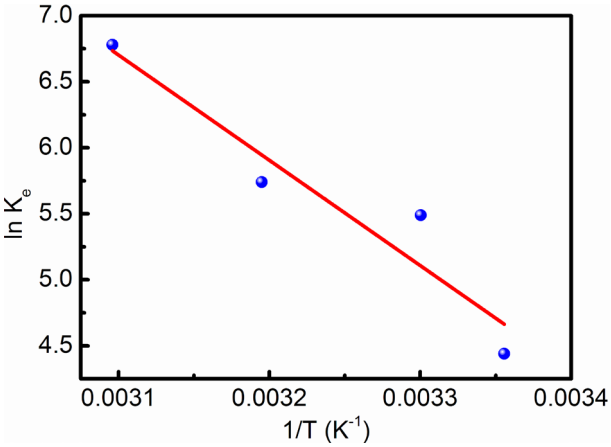


Fig. S8 The plot of lnK$_e$-1/T for adsorption of CR on **C-Mo-1**.

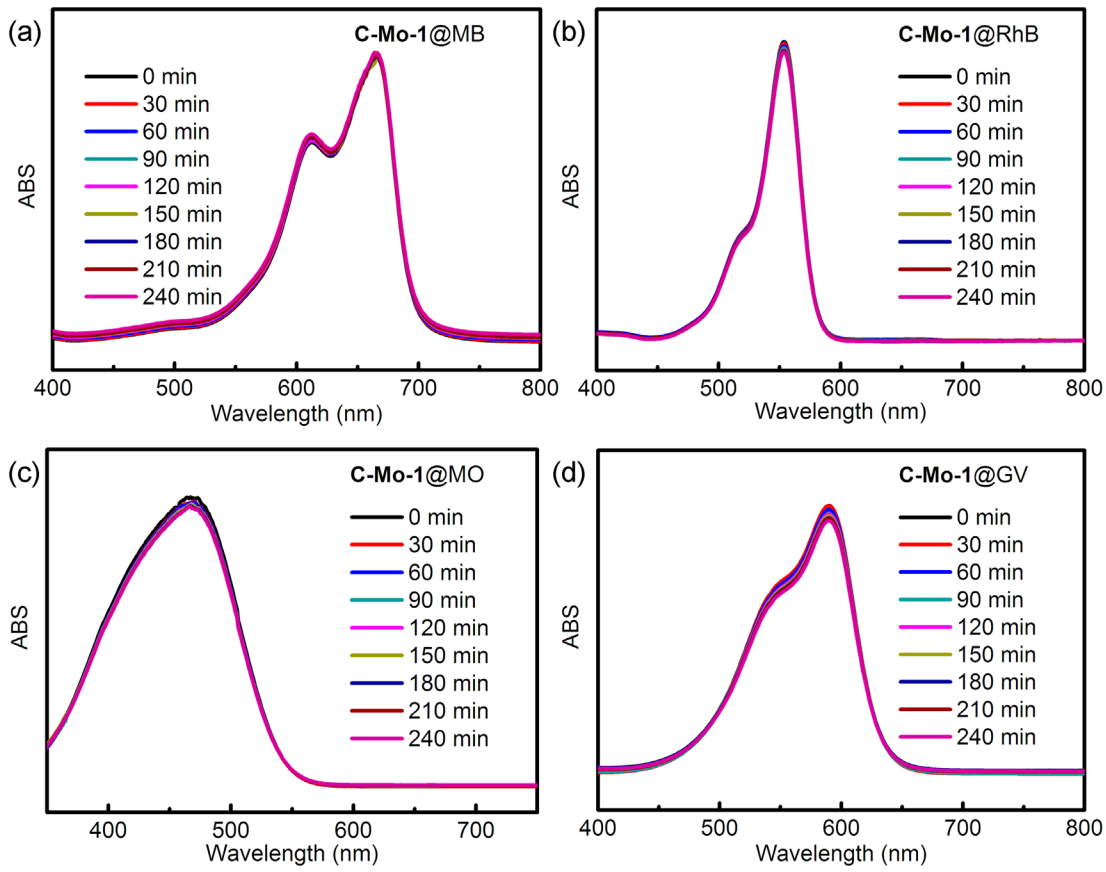


Fig. S9 UV–vis spectra of MB (a), RhB (b), MO (c) and GV (d) solutions after different adsorption times with **C-Mo-1**.

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S12 B. J. Zhang, C. J. Wang, G. M. Qiu, S. Huang, X. L. Zhou, J. Weng and Y. Y. Wang, *Inorg. Chim. Acta*, 2013, **397**, 48–59.