Supporting Information

High quality and high-performance adsorption of Congo red using as-grown MWCNT synthesis over Co-MOF as a catalyst precursor *via* CVD method

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

Co(1)–O(1)	2.0475(13)	Co(1)–O(1)#1	2.0475(13)
Co(1)–N(1)	2.1010(15)	Co(1)–N(1)#1	2.1010(15)
Co(1)–N(3)	2.2800(16)	Co(1)–N(3)#1	2.2801(16)
O(1)#1–Co(1)–O(1)	180	N(1)#1–Co(1)–N(3)	89.87(6)
O(1)#1–Co(1)–N(1)#1	79.32(6)	N(1)–Co(1)–N(3)	90.13(6)
O(1)–Co(1)–N(1)#1	100.68(6)	O(1)#1–Co(1)–N(3)#1	88.92(6)
O(1)#1–Co(1)–N(1)	100.68(6)	O(1)–Co(1)–N(3)#1	91.08(6)
O(1)–Co(1)–N(1)	79.32(6)	N(1)#1–Co(1)–N(3)#1	90.13(6)
N(1)#1–Co(1)–N(1)	180	N(1)–Co(1)–N(3)#1	89.87(6)
O(1)#1–Co(1)–N(3)	91.08(6)	N(3)–Co(1)–N(3)#1	180
O(1)–Co(1)–N(3)	88.92(6)		

Symmetry code: #1 $-x$, $-y$, $-z + 1$

Table S2 Hydrogen bonding geometries (Å, °) of complex **1**

D–H···A	D–H	H···A	D···A	D–H···A
O1W–H1WA···O2	0.85(3)	1.91(3)	2.725(3)	161(3)
N2–H2–O1W ^{i}	0.90(2)	1.91(2)	2.801(3)	172(2)

Symmetry code: ^{i} $1/2 + x$, $1/2 - y$, $1/2 + z$

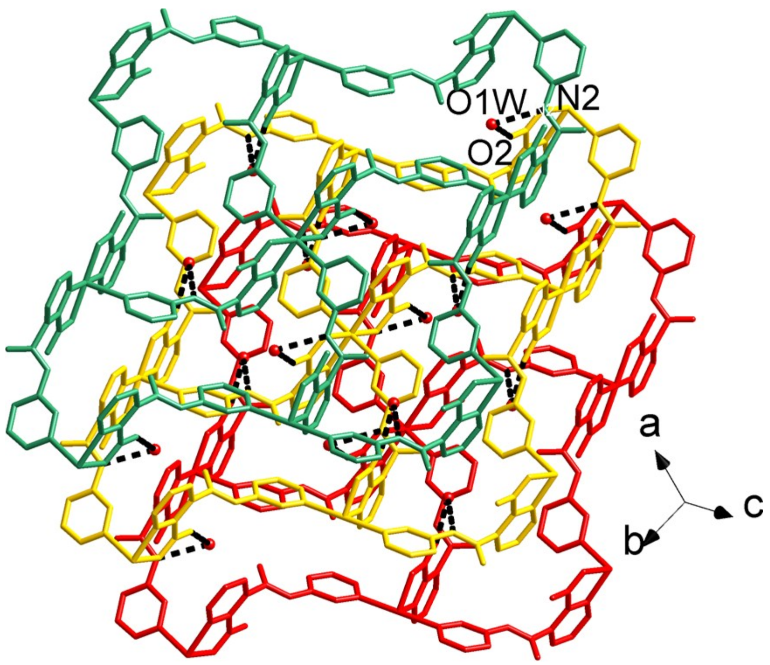


Fig. S1 View of 3D supramolecular architecture formed by N–H···O and O–H···O hydrogen-bonding interactions (H bonds: dotted line) in **1**.

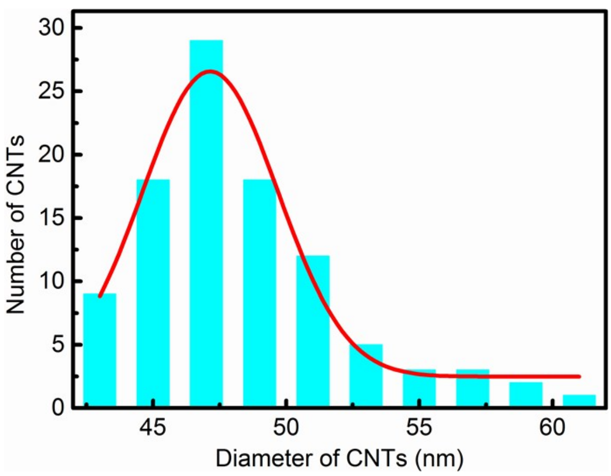


Fig. S2 Tipical MWCNT diameter distributions and its Gaussian fit with the mean diameter of 47.7 nm.

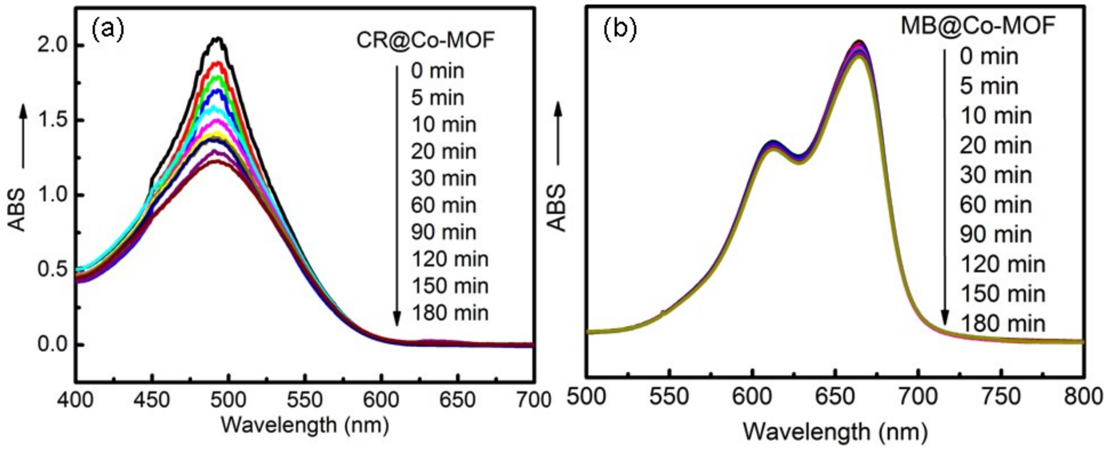


Fig. S3 UV-*vis* spectra of CR (a) and MB (b) solution after different adsorption times with the Co-MOF.

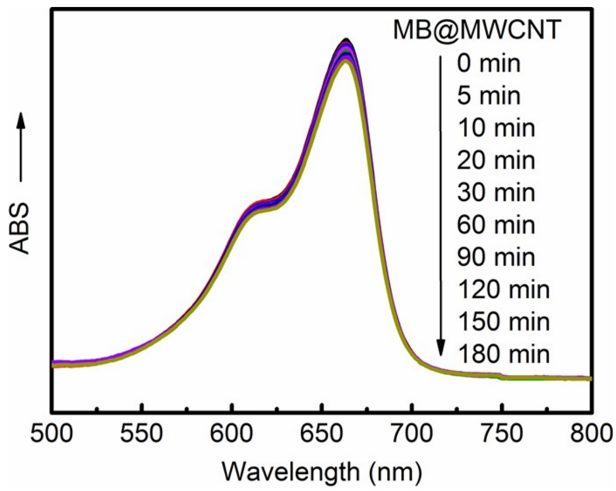


Fig. S4 UV-*vis* spectra of MB solution after different adsorption times with the MWCNT.

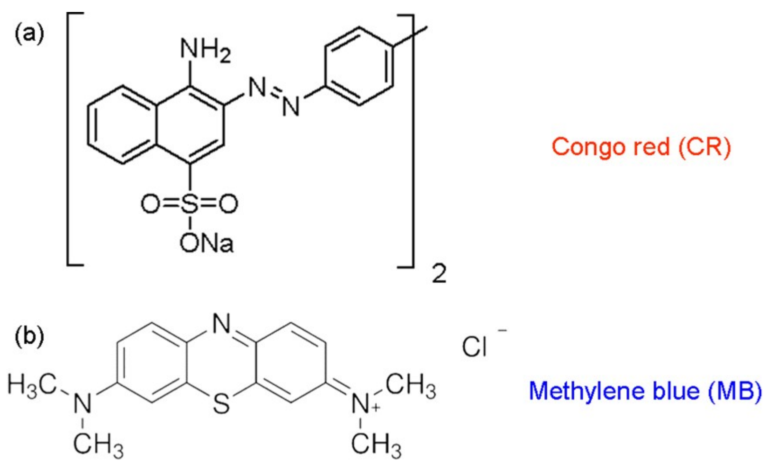


Fig. S5 Molecular formulae of (a) CR and (b) MB.

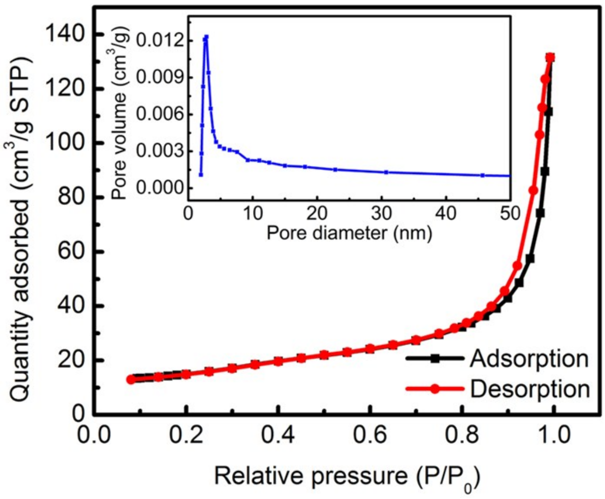


Fig. S6 Nitrogen adsorption and desorption isotherms of MWCNTs. The inset shows the pore size distribution.

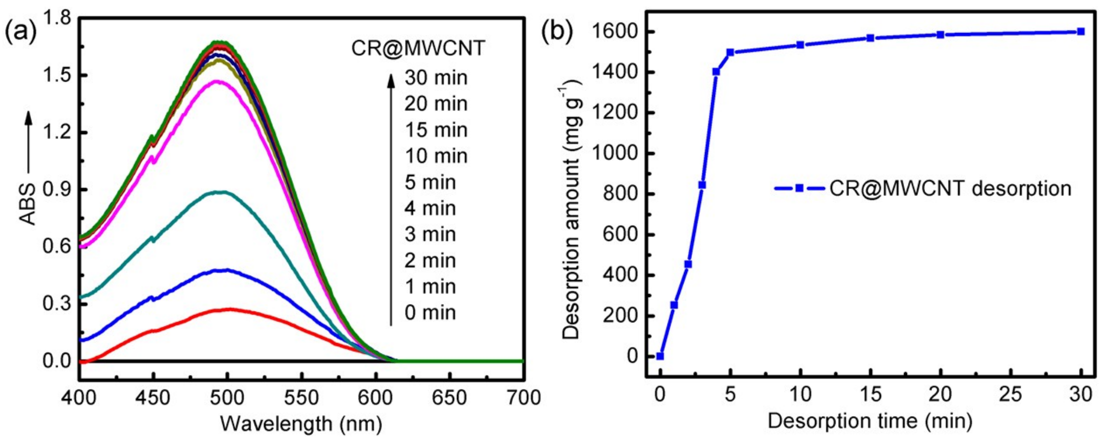


Fig. S7 (a) UV-vis spectra of CR solution after different desorption times with the MWCNT; (b) The desorption amount of CR at different times with the MWCNT.

Scheme S1 The adsorption amount and color change of dye solutions.

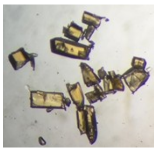
Sample	Dye	After adsorption	After desorption
Co-MOF 	CR 	~801 mg g^{-1} 	~780 mg g^{-1} 
	MB 	~10 mg g^{-1} 	——
MWCNT 	CR 	~1639 mg g^{-1} 	~1600 mg g^{-1} 
	MB 	~12 mg g^{-1} 	——

Table S3 A comparison of the CR removal performance of different materials

Adsorbents	Adsorption capacity (mg g^{-1})	Ref.
BUC-17	4923	S1
Hypercrosslinked poly(styrene-co-divinylbenzene) resin	2326	S2
MWCNT	**1639**	**This work**
CNT/Mg(Al)O nanocomposites	1250	S3
Functionalized CNT	882	S4
Porous $Pr(OH)_3$ nanostructures	837	S5
Co-MOF	**801**	**This work**
$[Ag_4(dpe)_4]\cdot(butca)\cdot 13H_2O$	739	S6
MIL-100(Fe)	714	S7
$\{[Cu_3(btb)_3(nbta)_2]\cdot(H_2O)\}_n$ complex	656	S8
Clay mixture	575	S9
Activated carbon fibers	557	S10
LDH-Fe_3O_4 nanohybrids	505	S11
CS/CNT beads	450	S12
Activated carbon	300	S13
MgO(111) nanoplates	297	S14
FeOOH hollow spheres	275	S15
$CoFe_2O_4$	245	S16
HTMAB-modified attapulgite	189	S17
Coal-based mesoporous activated carbon	189	S18
Functionalized MWNTs	148	S19
Chitosan hydrobeads	92.59	S20
Magnetic (Fe_3O_4) cellulose activated carbon	66.09	S21
Acid-activated bentonite	61.5	S22

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