Electronic Supporting Information

for

Magnetic Cobalt-Graphene Nanocomposite derived from Self-Assembly of MOFs with Graphene Oxide as an Activator for Peroxymonosulfate

Kun-Yi Andrew Lin[*], *Fu-Kong Hsu*, and *Wei-Der Lee*

[a]Department of Environmental Engineering, National Chung Hsing University, 250 Kuo-Kuang Road, Taichung, Taiwan, R.O.C.

*Corresponding Author. Tel: +886-4-22854709, E-mail address: linky@nchu.edu.tw

(Kun-Yi Andrew Lin)

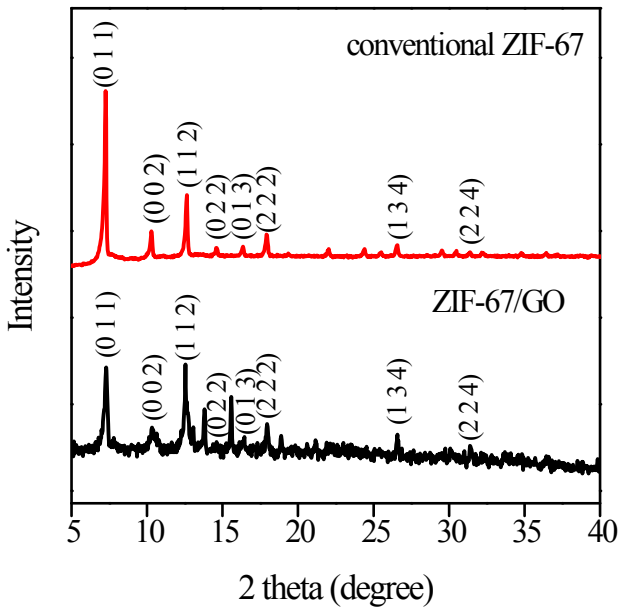

Fig. S1. XRD patterns of the conventional ZIF-67 and the as-prepared ZIF-67/GO composite

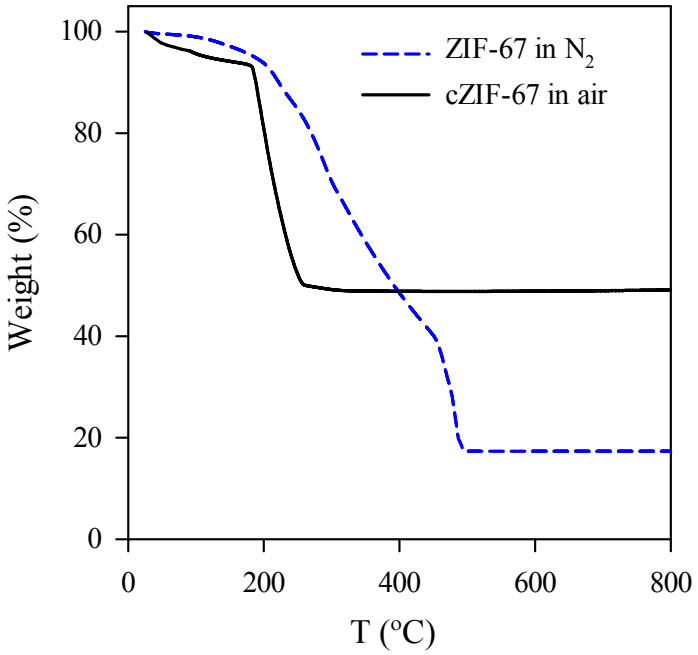

Fig. S2. TG curves of ZIF-67 in N_2 and cZIF-67 in air.

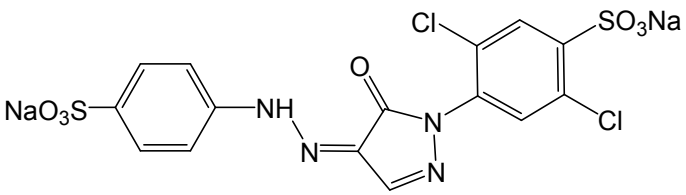

Fig. S3. Chemical structure of Acid yellow 17

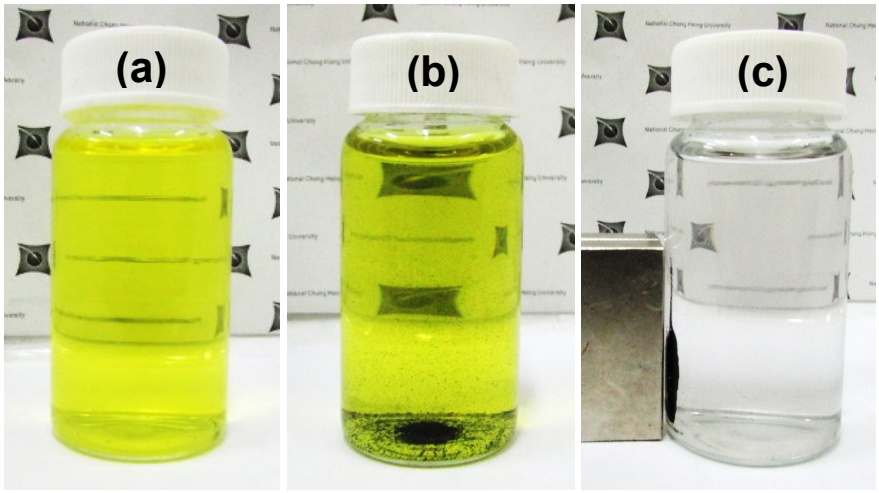

Fig. S4. Degradation of AY by PMS activated using MCG: (a) AY solution (50 mg L^{-1}) with PMS (90 mg L^{-1}); (b) MCG (500 mg L^{-1}) was added to the AY solution with PMS (c) the resulting mixture after 30-min shaking. The solution becomes clear and MCG can be drawn by a magnet (on the left in (c)).

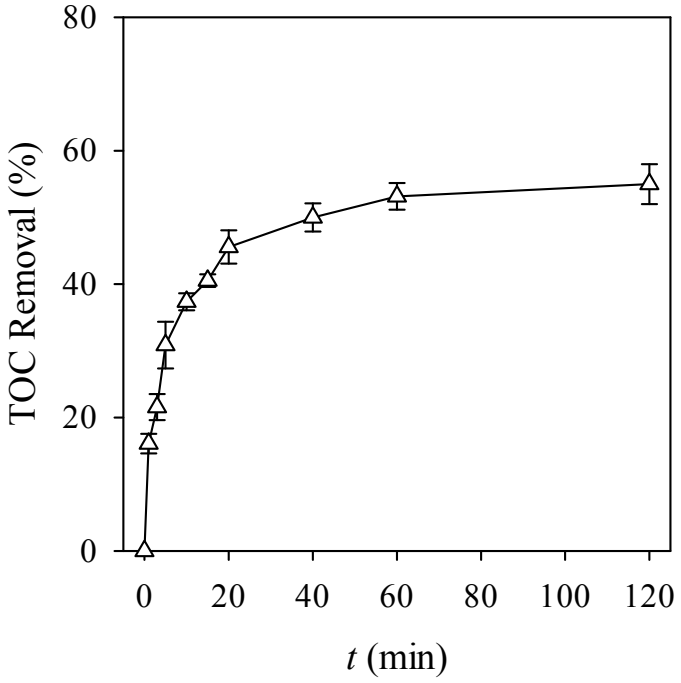

Fig. S5. TOC removal during the decolorization of AY activated by MCG at 25 °C (AY solution = 100 mg L^{-1}; PMS = 90 mg L^{-1}; MCG = 500 mg L^{-1}).

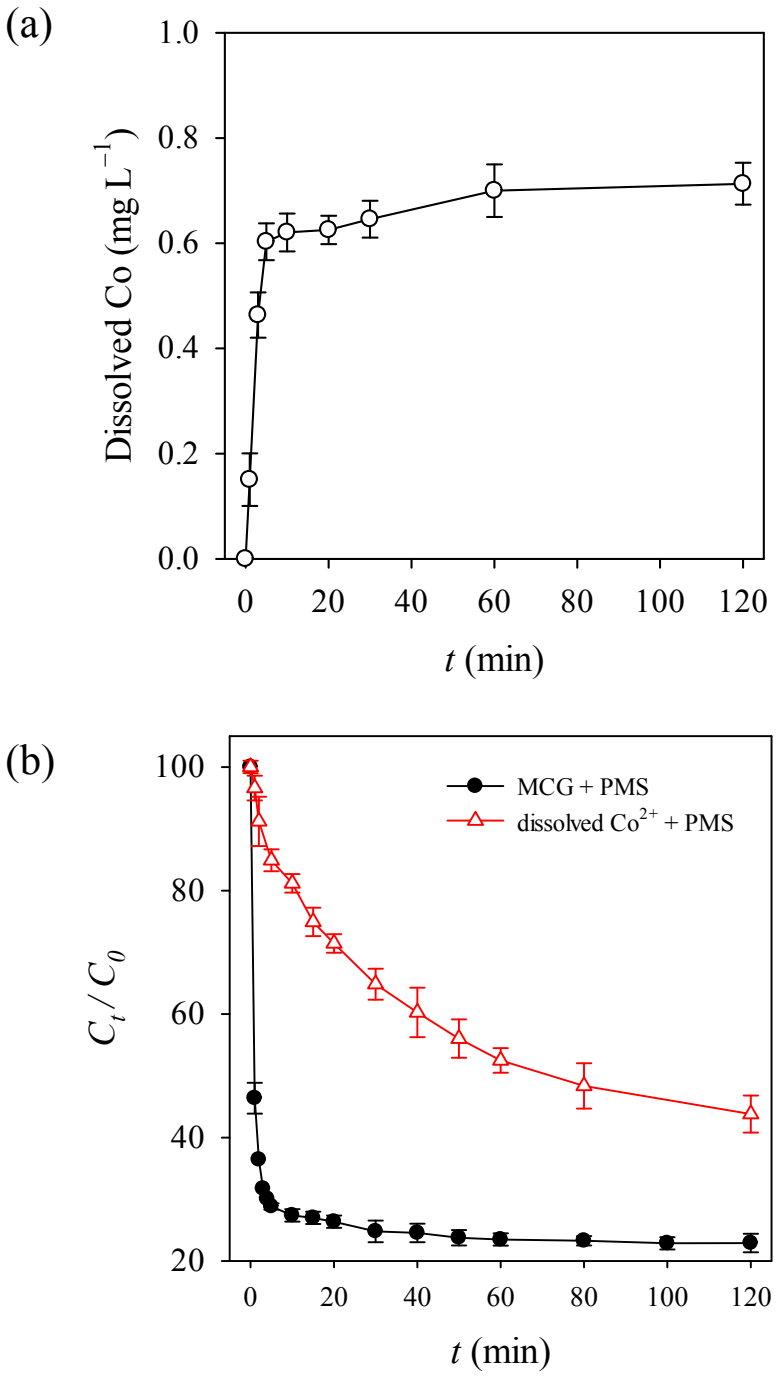

Fig. S6. Cobalt ion leached out from MCG: (a) dissolution of Co ion as a function of time during the decolorization of AY and (b) homogenous activation of PMS by the dissolved Co^{2+} (AY solution = 100 mg L^{-1}; PMS = 90 mg L^{-1}; MCG = 500 mg L^{-1}, the dissolved Co^{2+} = 0.71 mg L^{-1}).

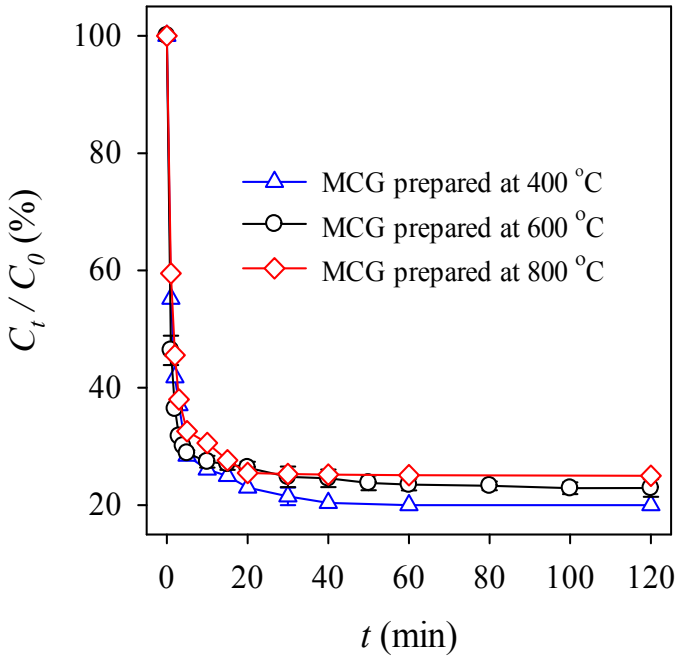

Fig. S7. Effect of carbonization temperature of MCG preparation on the degradation of AY at 25 °C (AY solution = 100 mg L^{-1}; PMS = 90 mg L^{-1}; MCG = 500 mg L^{-1}).

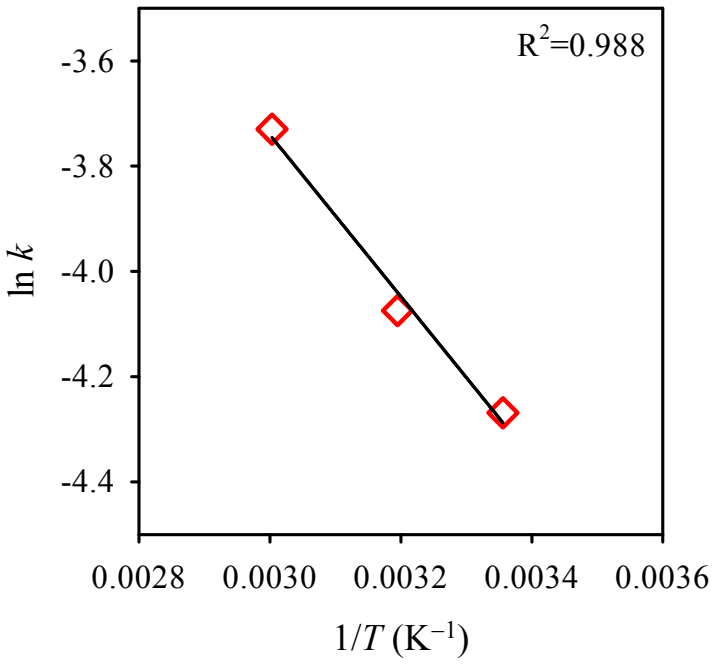

Fig. S8. Arrhenius plot of AY decolorization using PMS activated by MCG.

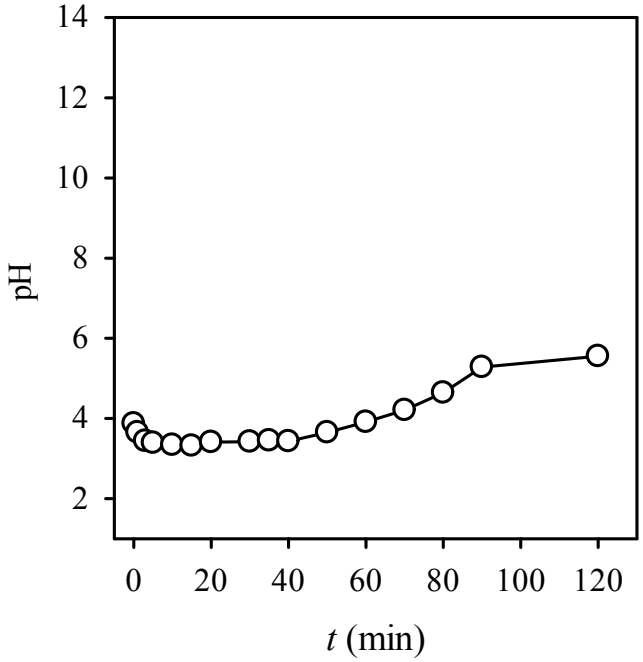

Fig. S9. pH variation during the decolorization of AY using PMS activated by MCG at 25 °C (AY solution = 100 mg L^{-1}; PMS = 90 mg L^{-1}; MCG = 500 mg L^{-1}).

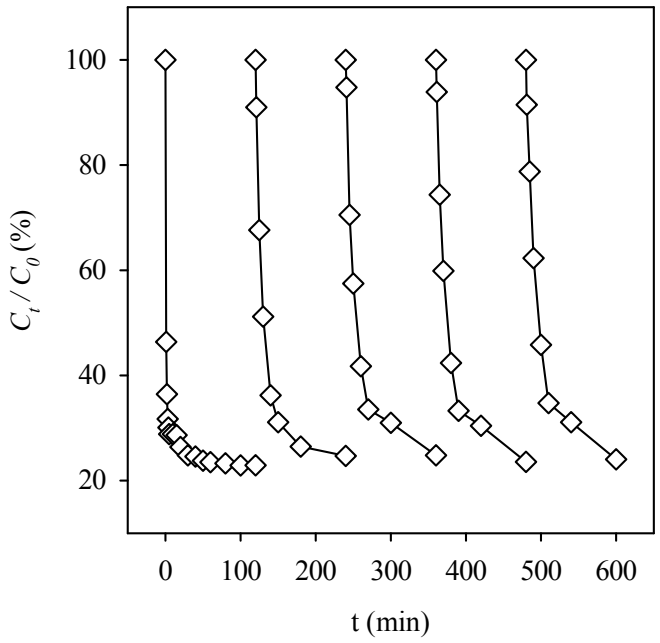

Fig. S10. Stability of MCG for the decolorization of AY at 25 °C (AY solution = 100 mg L^{-1}; PMS = 90 mg L^{-1}; MCG = 500 mg L^{-1}).

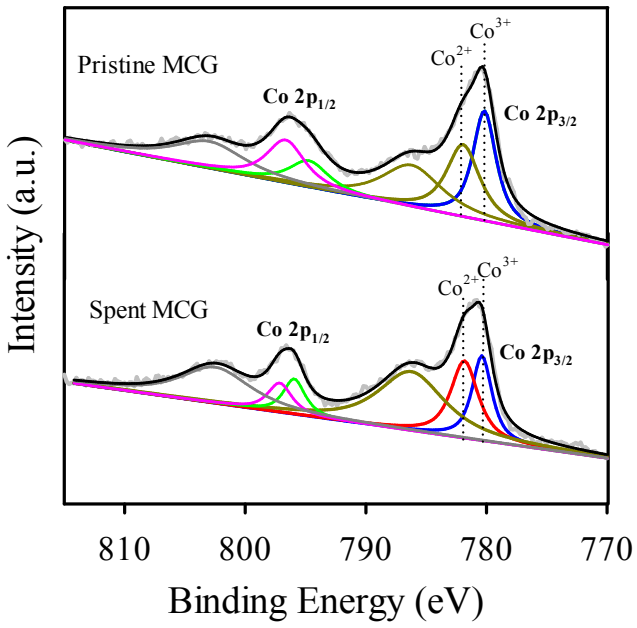

Fig. S11. XPS spectrum of the pristine MCG and the spent MCG recovered from the long-term cyclic decolorization test.

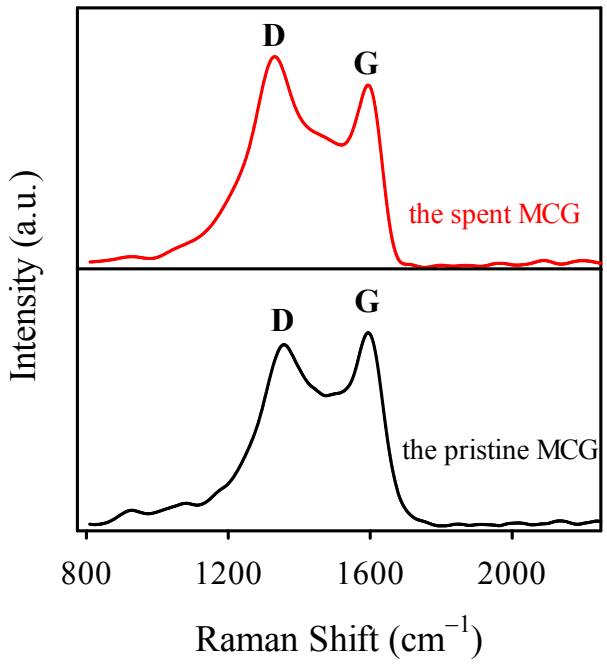

Fig. S12. Raman spectra of the pristine MCG and the MCG recovered from the long-term cyclic decolorization test.

Table S1. Comparisons of MCG with other metal oxides/graphene composites as the PMS activator for degradation of organic pollutants.

Composite name	Fraction of Metal oxides in the composite[a]	Conc. of pollutants (mg L^{-1})	Conc. of PMS (mg L^{-1})	Conc. of Catalyst (mg L^{-1})	k (min^{-1})	E_a (kJ mol^{-1})	T (°C)	Ref.
Magnetic Cobalt-Graphene (MCG)	Co_3O_4 36%	Acid Yellow 17 100	90	500	0.0119	12.0	25	In this study
Co_3O_4-Graphene	Co_3O_4 58%	Phenol 20	2000	67	0.1	26.5	25	Yao *et al.*[51]
Magnetic $MnFe_2O_4$-Graphene	$MnFe_2O_4$ 64%	Orange II 20	500	50	0.019	25.7	25	Yao *et al.*[52]
Supported Co_3O_4 on Graphene	Co_3O_4 38%	Orange II 70	304	100	—	—	—	Shi *et al.*[49, 68]

a: the remaining part is carbon-based material (i.e., carbon, graphene)