Supplementary Information

Microwave-Assisted Synthesis of Hematite/Activated Graphene Composites with Superior Performance for Photocatalytic Reduction of Cr(VI)

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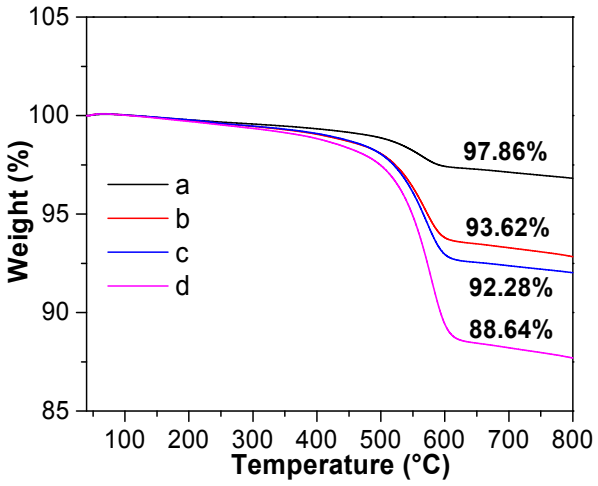

Figure S1. The TG curves of (a) α-Fe_2O_3/aMEGO-1, (b) α-Fe_2O_3/aMEGO-2, (c) α-Fe_2O_3/aMEGO-3 and (d) α-Fe_2O_3/aMEGO-4.

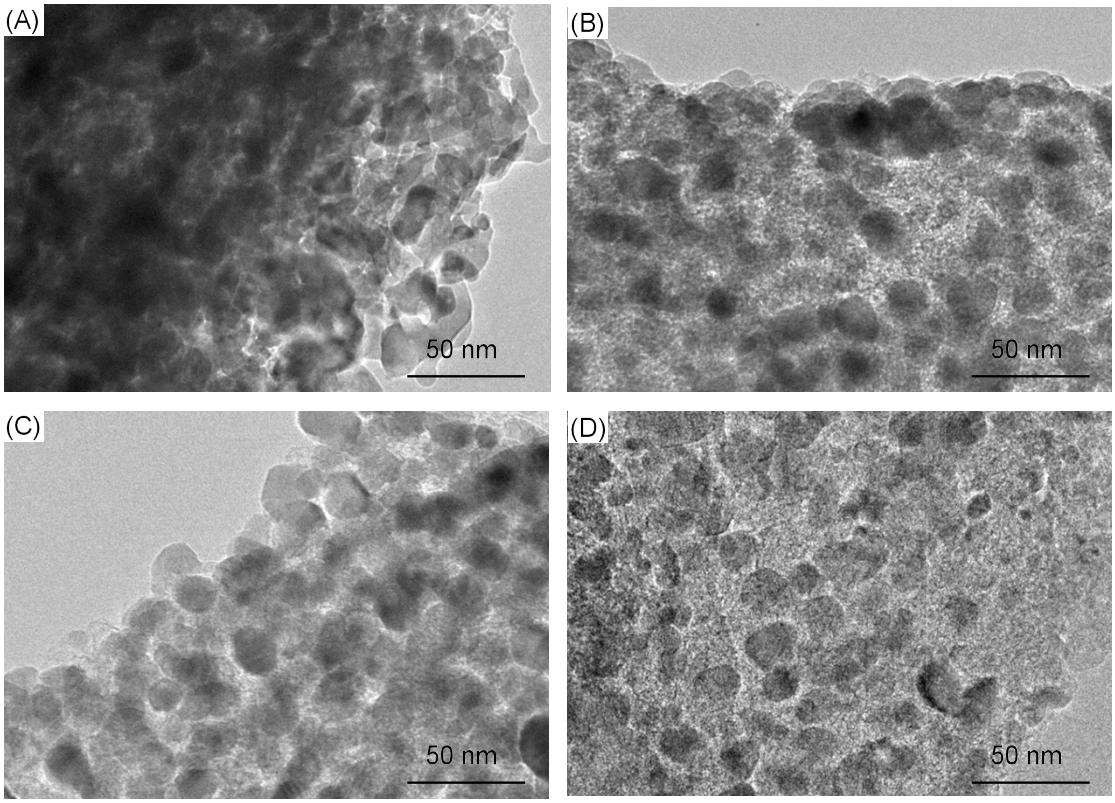

Figure S2. TEM images of (A) α-Fe_2O_3/aMEGO-1, (B) α-Fe_2O_3/aMEGO-2, (C) α-Fe_2O_3/aMEGO-3 and (D) α-Fe_2O_3/aMEGO-4.

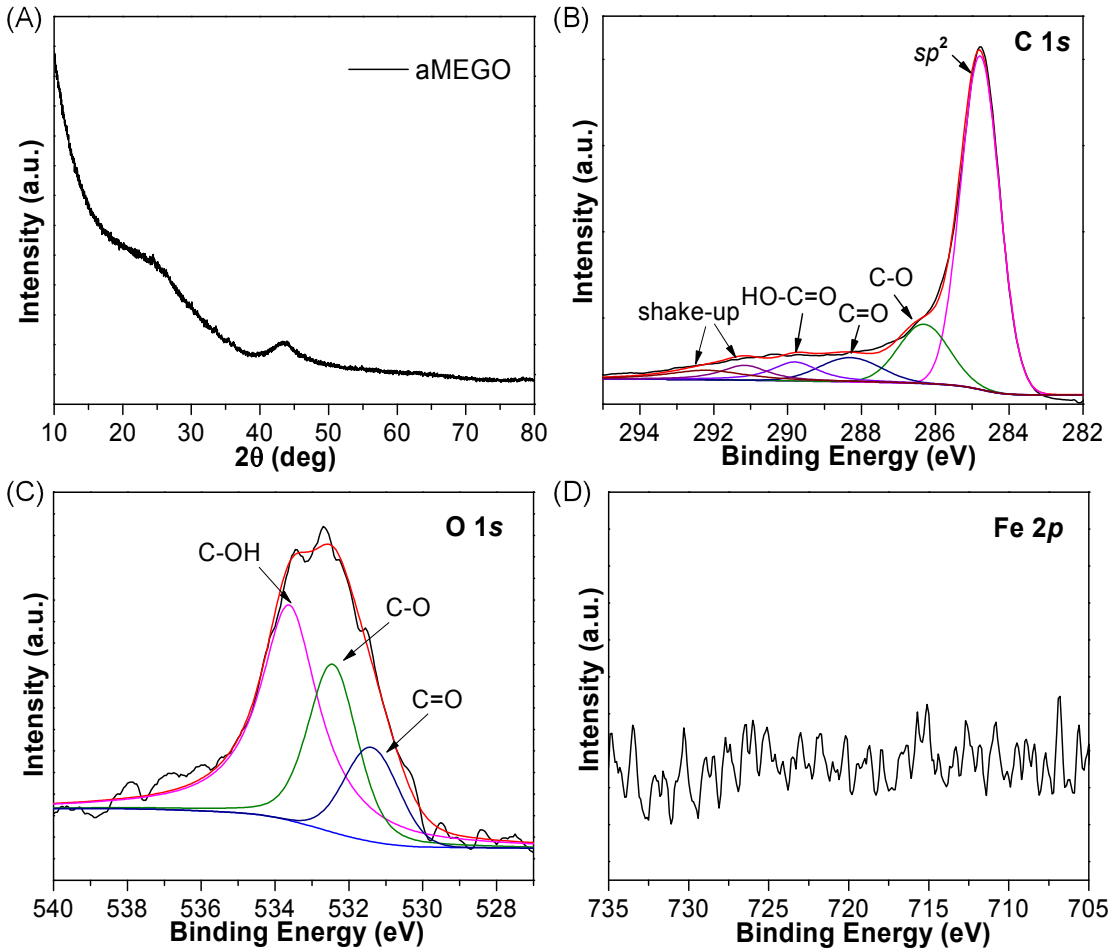

Figure S3. XRD pattern (A) and XPS spectra of aMEGO: (B) C 1s spectrum, (C) O 1s spectrum and (D) Fe 2p spectrum.

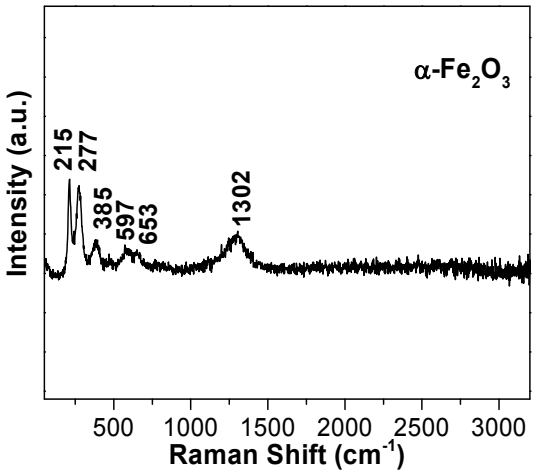

Figure S4. Raman spectrum of α-Fe_2O_3. The peaks at 215, 277, 385, 597 and 653 cm^{-1} can be identified as the $A_{1g}(1)$, $E_g(2)$, $E_g(4)$, $E_g(5)$ and E_u bands of hematite. The peak at 1302 cm^{-1} is magnon scattering peak.

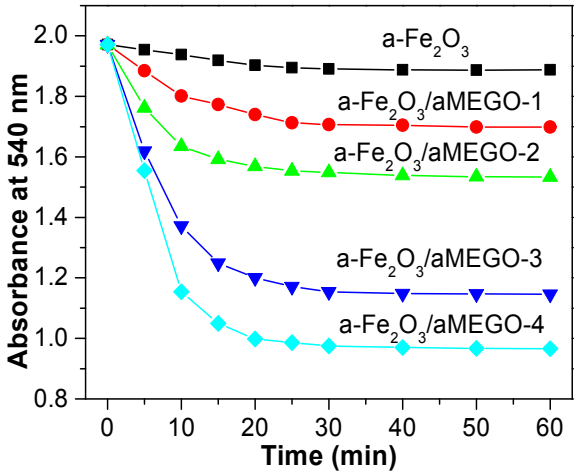

Figure S5. Adsorption-desorption equilibrium curves of Cr(VI) by α-Fe_2O_3 and α-Fe_2O_3/aMEGO composites.

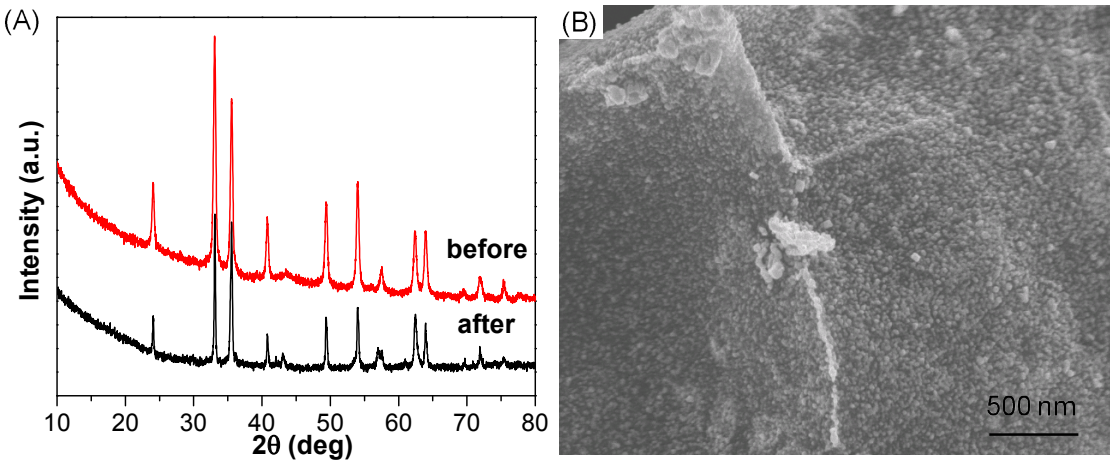

Figure S6. XRD pattern (A) and SEM image (B) of the α-Fe_2O_3/aMEGO-3 after reusing three times.

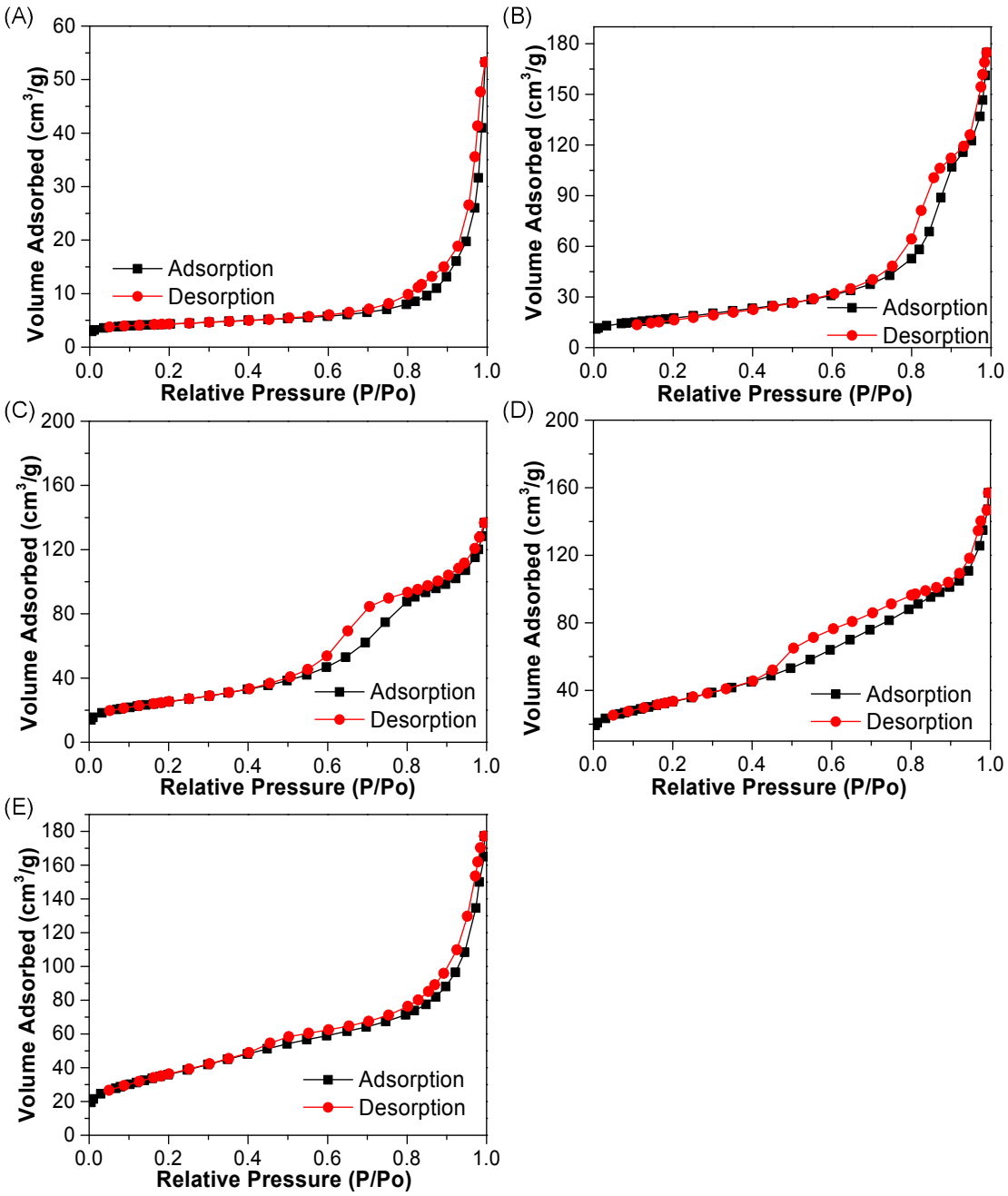

Figure S7. Nitrogen adsorption-desorption isotherms for (A) α-Fe_2O_3, (B) α-Fe_2O_3/aMEGO-1, (C) α-Fe_2O_3/aMEGO-2, (D) α-Fe_2O_3/aMEGO-3 and (E) α-Fe_2O_3/aMEGO-4.

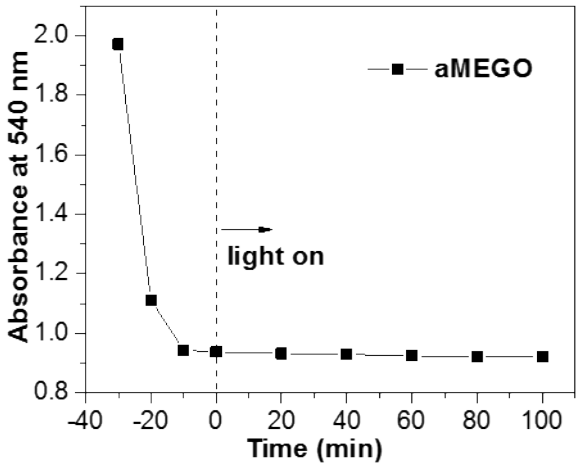

Figure S8. Absorption changes at 540 nm of DPC-Cr(VI) complex solutions in the presence of aMEGO with variation irradiation time. (experimental parameters: 5mg aMEGO, 50 ml, 10 mg/l Cr(VI) solutions, before or after 0: in the dark or under visible light irradiation)

Table S1. Comparison of the Cr(VI) reduction efficiency of α-Fe_2O_3/aMEGO with other graphene-based photocatalysts.

Sample name	Graphene loading	Concentration of Cr(VI) solution	Catalyst concentration	Light source	Irradiation time	Reduction ratio	Reference
P25		10 mg/L	1g/L	500 W Hg lamp to obtain UV irradiation	240 min	70%	1
TiO_2						82%	
TiO_2/RGO	0.8 wt%					90%	
CdS		10mg/L	1g/L	400 W metal ha logen lamp with cut off filter (λ>400 nm) to obtain visible light	240 min	80%	2
CdS/RGO	1.5 wt%					91%	
ZnO		10mg/L	1g/L	500 W Hg lamp to obtain UV irradiation	240 min	58%	3
ZnO/RGO	1.0 wt%					95%	
Bi_2WO_6		30 mg/L	1.5g/L	300 W halogen tungsten or 300 W Xe lamp with a cut off filter to obtain UV irradiation	120 min	43%	4
Bi_2WO_6-20GO-alginate sodium	20 mg					93%	
Bi_2WO_6		30 mg/L	1.5g/L	300 W halogen	250	39%	

Bi_2WO_6-20GO-alginate sodium	20 mg			tungsten or 300 W Xe lamp with a cut off filter to obtain visible light	min	85%	
ZnO		10mg/L	1g/L	500 W Hg lamp to obtain UV irradiation	240 min	68%	5
ZnO/RGO	1.0 wt%					96%	
TiO_2		12mg/L	0.2g/L	125 W Hg lamp with cut off filter (λ>450 nm) to obtain visible light	240 min	14%	6
TiO_2/RGO						80%	
TiO_2		10mg/L	0.5g/L	230 W Hg lamp to obtain UV irradiation	60 min	14%	7
TiO_2/RGO	2.5 wt%					18%	
UiO-66(NH_2)		10mg/L	0.5g/L	300 W Xe lamp with cut off filter (λ>420 nm) to obtain visible light	100 min	35%	8
RGO-UiO-66(NH_2)	2.0 wt%					99%	
a-FeOOH nanorod		10mg/L	1g/L	300 W Xe lamp with cut off filter (λ>400 nm) to obtain visible light	180 min	26%	9
a-FeOOH nanorod/RGO	3.0 wt%					94%	
ZnO		5mg/L	0.5g/L	300 W Xe lamp with cut off filter (λ>400 nm) to obtain visible light	150 min	1%	10
ZnO/RGO	3.0 wt%					34%	
CdS		20mg/L	0.3g/L	300 W Xe lamp with cut off filter (λ>420 nm) to obtain visible light	20 min	40%	11
CdS/RGO	0.5 wt%					49%	
CdS		10mg/L	0.175g/L	500 W Xe lamp with cut off filter (λ>420 nm) to obtain visible light	35 min	35%	12
CdS/RGO						78%	
ZnS		20mg/L		A solar simulator equipped with an AM 1.5 G filter and a 150 W Xe lamp	60 min	19%	13
ZnS/graphene aerogels						61%	
α-Fe_2O_3		**10mg/L**	**1g/L**	**300 W Xe lamp with cut off filter (λ>420 nm) to obtain visible light**	**160 min**	**25.26%**	**Present work**
α-Fe_2O_3/aMEGO	**7.72 wt%**					**95.28%**	

Reference

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