Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Supporting Information

Carbon Fibers-Assisted Iron Carbide Nanoparticles: as an Efficient Catalyst via Peroxymonosulfate Activation for Organic Contaminants Removal

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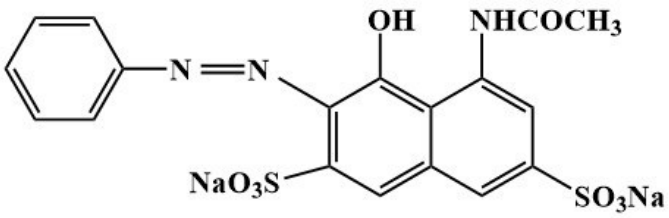

Fig. S1 The chemical structure of AR1.

Table S1 Catalytic Oxidation of Different Dyes. Conditions: Fe_3C@CFs dosage: 1 g/L, [AO7]= [MO]= [KN-R]= [MB]=50 μM, [PMS]=1 mM, sample's pH 10.0, T=50 ºC.

Dyes (50 μM)	**PMS concentration (1.0mM) Reaction time (14min)**	
	Removal rate (%)	**K_{obs} (min^{-1})**
AO 7	97.7	0.282
MO	98.0	0.270
KN-R	95.1	0.227
MB	94.8	0.216

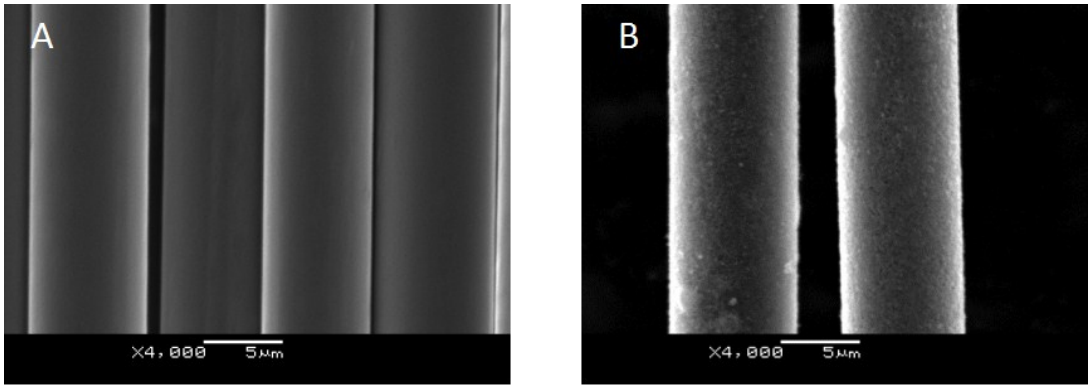

Fig. S2 SEM images of (A) CFs and (B) Fe3C@CFs

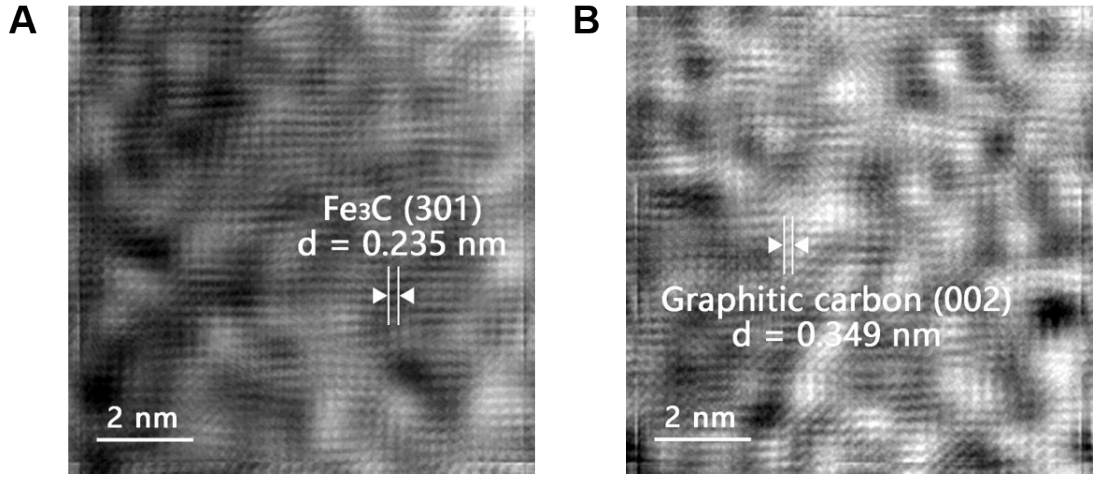

Fig. S3 The inverse FFT images of (A) Fe3C; (B) Graphitic carbon on the outside of the nanoparticle.

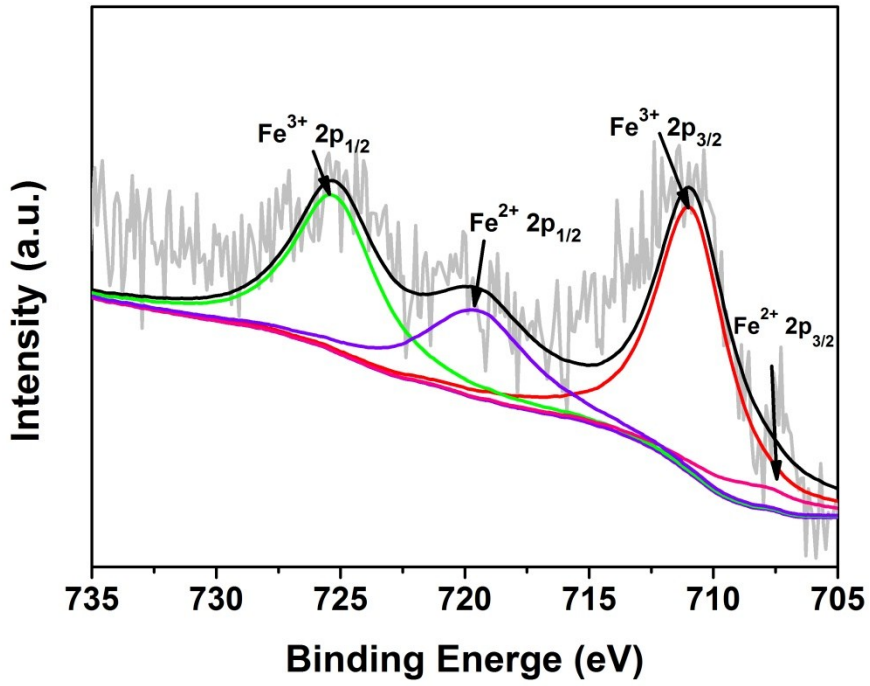

Fig. S4 XPS spectrum of Fe 2p region for used catalyst.

Table S2 The activation energies of other catalytic oxidation system.

Catalysts	Organics	*Ea* (kJ/mol)	Reference
$CoFe_2O_4$/TNTs	Rhodamine B	70.6	[1]
Co_3O_4	Phenol	66.2	[2]
RuO_2/AC	Phenol	61.4	[3]
Mn_3O_4–rGO	Orange II	49.5	[4]
Fe@ACFs	RR M-3BE	32.9	[5]
Fe_3C-CFs	Acid red 1	24.47	This study

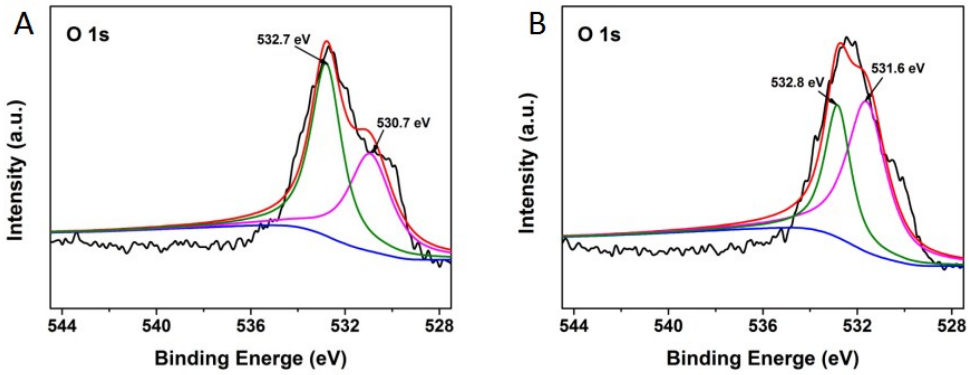

Fig. S5 XPS spectrum of O 1s region for (A) fresh and (B) used catalyst.

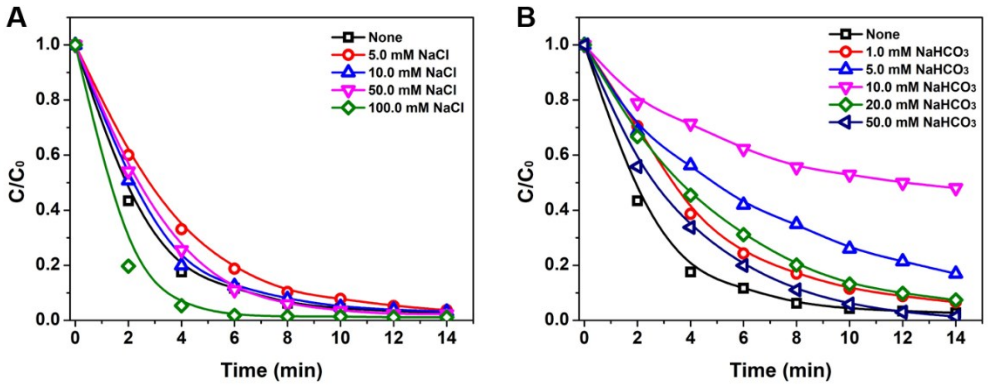

Fig. S6 Effect of different anions the removal of AR1. Conditions: Fe_3C@CFs dosage: 1 g/L, [AR1]= 50 µM, [PMS]=1 mM, sample's pH 10.0, T=50 ºC.

Reference:

1 Y. Du, W. Ma, P. Liu, B. Zou and J. Ma, *J Hazard Mater*, 2016, **308**, 58-66.

2 E. Saputra, S. Muhammad, H. Sun, H. M. Ang, M. O. Tade and S. Wang, *J Colloid Interface Sci*, 2013, **407**, 467-473.

3 S. Muhammad, P. R. Shukla, M. O. Tade and S. Wang, *J Hazard Mater*, 2012, **215-216**, 183-190.

4 Y. Yao, C. Xu, S. Yu, D. Zhang and S. Wang, *Industrial & Engineering Chemistry Research*, 2013, **52**, 3637-3645.

5 F. Gong, L. Wang, D. Li, F. Zhou, Y. Yao, W. Lu, S. Huang and W. Chen, *Chemical Engineering Journal*, 2015, **267**, 102-110.