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Magnetic Fe-Co crystals doped hierarchical porous carbon fibers for removal of organic pollutants

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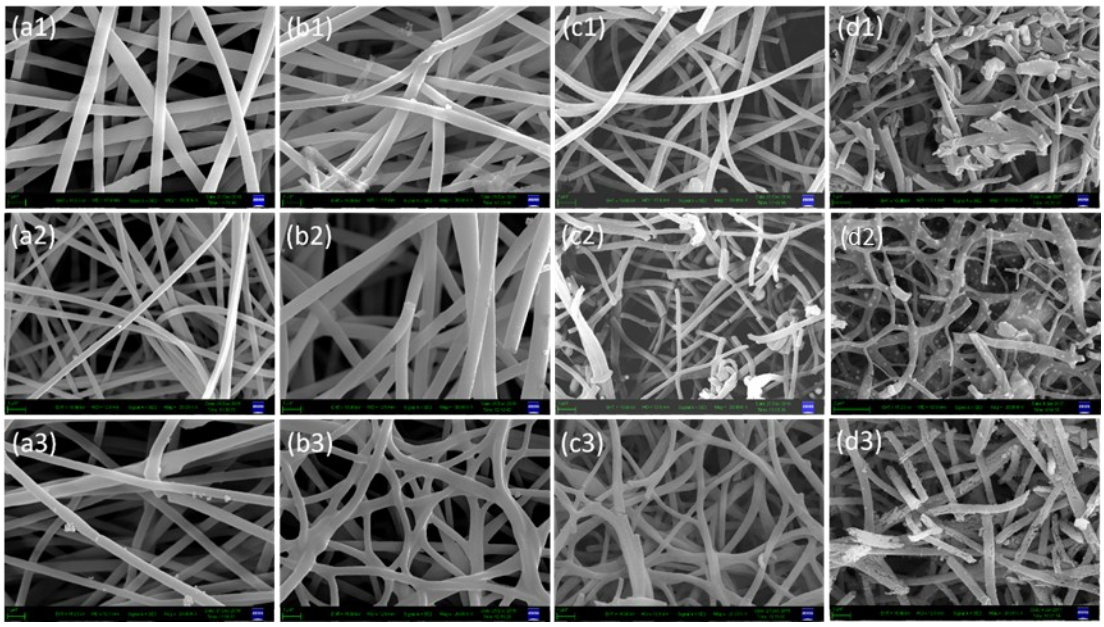

Fig. S1 FE-SEM images of composite fibers fabricated with various molar ratios of Fe and Co metal precursor. (1) 1:0, (2) 2:1 and (3) 0:1, respectively. (a) precursor composite fiber, (b) cured composite fiber, (c) cured composite fiber directly carbonized and (d) cured composite fiber carbonized after activation.

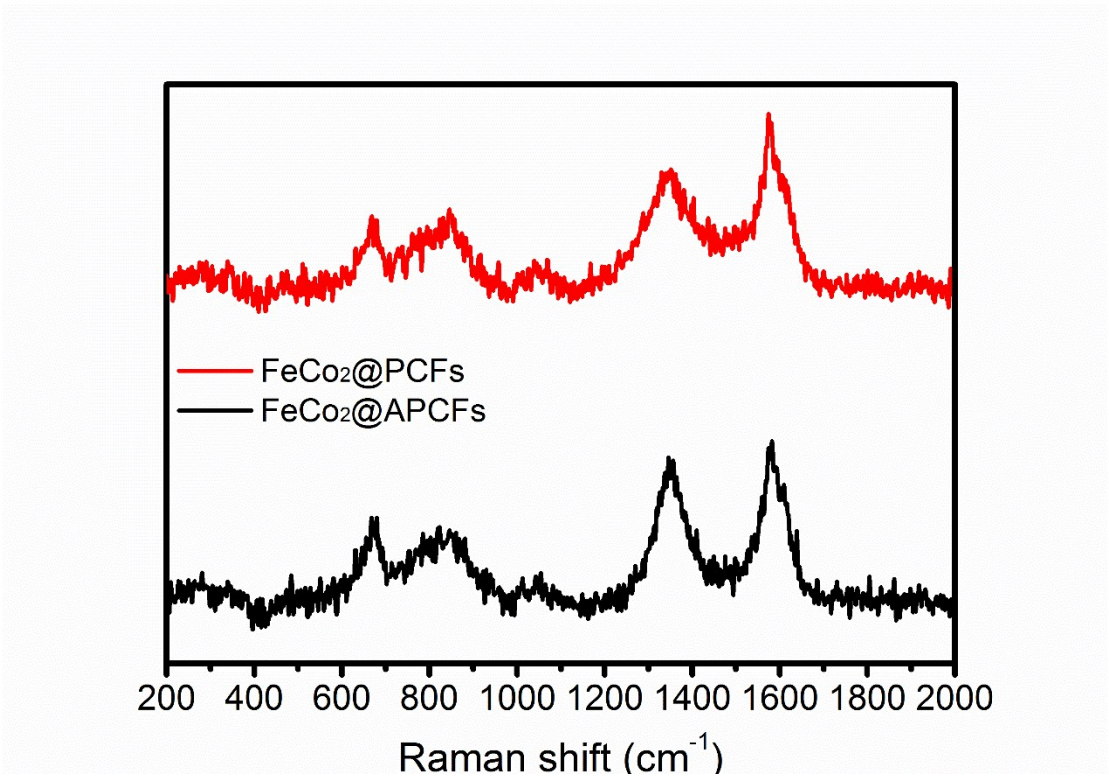

Fig. S2 Raman spectra of $FeCo_2$@PAN/ BA-a after carbonazation without and with activation process.

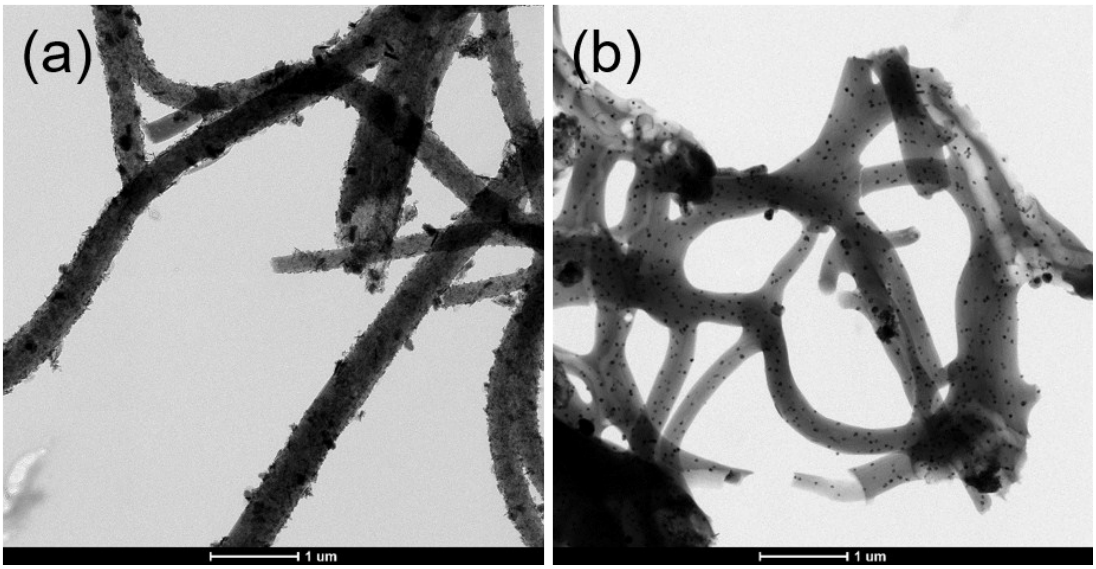

Fig. S3 TEM images of (a) Fe@APCFs and (b) Co@APCFs.

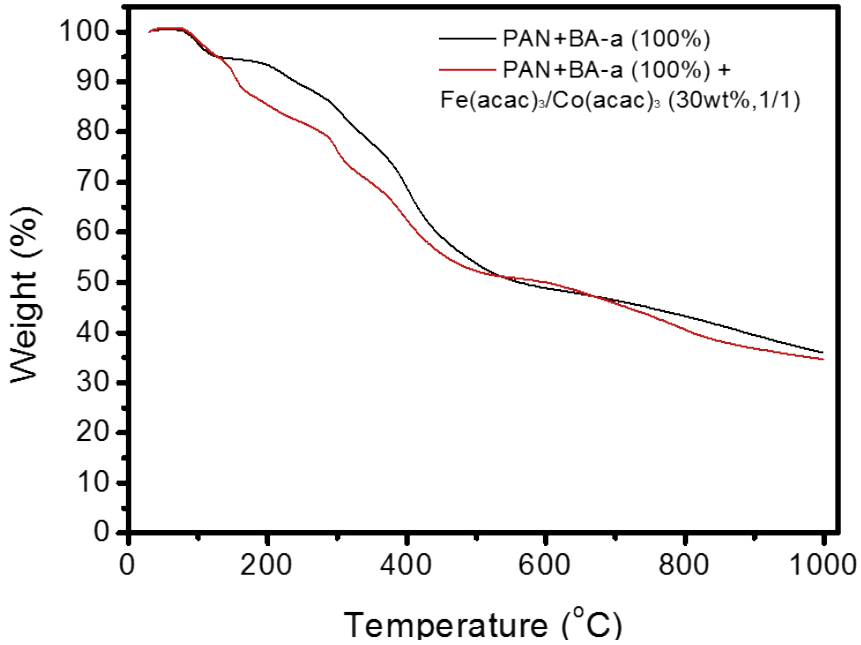

Fig. S4 TGA curves of carbon fibers from carbonazation without and with metal salts.

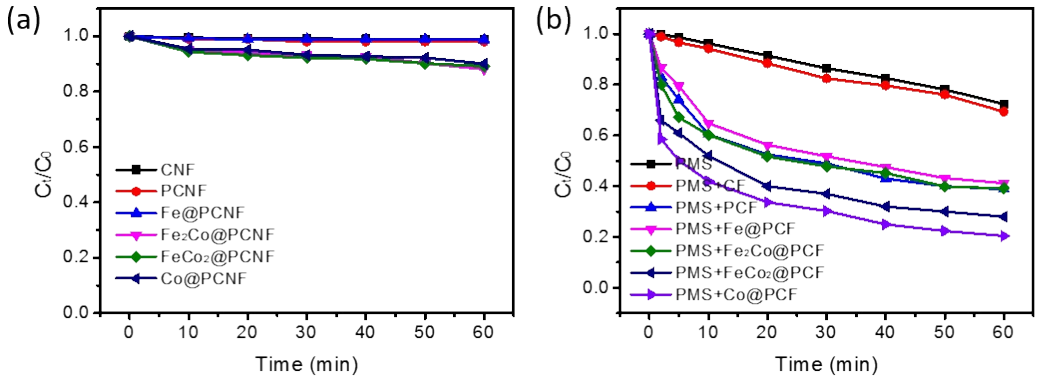

Fig. S5 Time dependence of Fe_xCo_y@PCNFs (a) without and (b) with PMS for MeB removal. ([MeB] =20 mg/L, [adsorbent, catalyst dosage] =0.1 g/L, [PMS dosage] =0.5 g/L, pH=7, T=20°C)

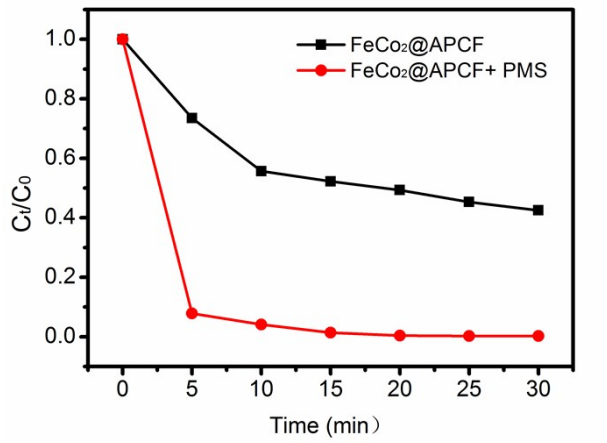

Fig. S6 Time dependence of $FeCo_2$@APCFs (a) without and (b) with PMS for MeB removal. ([MeB] =100 mg/L, [adsorbent, catalyst dosage] =0.1 g/L, [PMS dosage] =0.5 g/L, pH=7, T=20 °C)

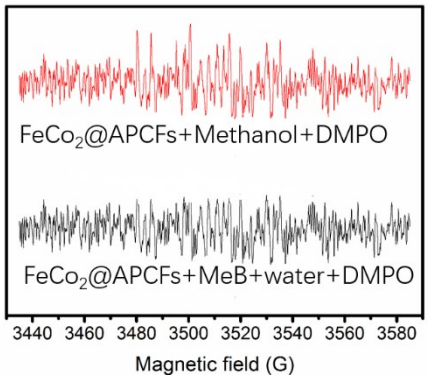

Fig. S7 5,5-Dimethyl-pyrroline-N-oxide (DMPO) spin-trapping EPR spectra of $FeCo_2$@APCFs/ MeB / water system and $FeCo_2$@APCFs/ methanol system, respectively. [DMPO=10 mM]

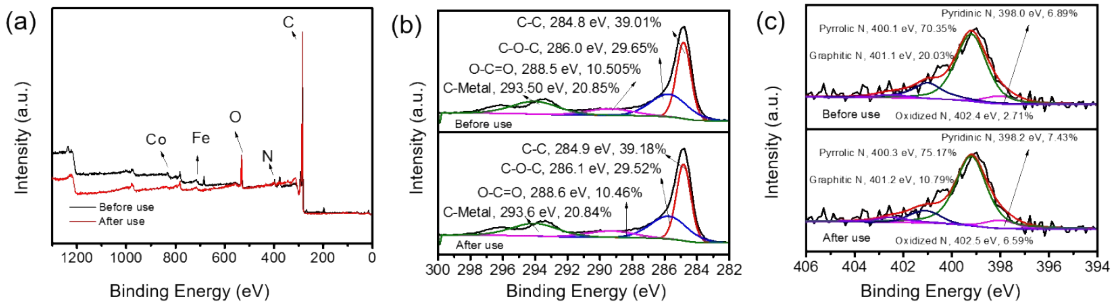

Fig. S8 (a) XPS survey spectra, (b) C1s spectrum and (c) N1s spectra of $FeCo_2$@APCFs before and after use.

Table S1 The summary of pore structure parameters of relevant carbon fibers.

Samples	S_{BET}[a] (m^2 g^{-1})	S_{micro}[b] (m^2 g^{-1})	V_{total}[c] (cm^3 g^{-1})	V_{micro}[d] (cm^3 g^{-1})
PCNs100	500	260	0.28	0.14
APCNs100	2337	1190	1.21	0.57
$FeCo_2$@APCFs	2085	1051	1.12	0.45

[a] Total surface area was calculated by the Brunauer-Emmett- Teller (BET) method. [b] Microporous surface area was calculated by the Bareet, Joyner and Halenda (BJH) method. [c] SF_{micro} indicates the surface area fraction of microporous. [d] the total pore volume was estimated was calculated at P/P_0=0.99. [d] Vmicro was calculated by the HK method.

Table S2 Comparison of the properties of $FeCo_2$/APCFs with the literature results.

PMS activator	Pollutant	Concentration of pollutant (mg/L)	Activator in solution (g/L)	Concentration of PMS (g/L)	T (^oC)	Time (min)	Conv. (%)	Ref
$MnFe_2O_4$-rGO	MeB	20	0.05	0.5	25	40	~100	[1]
OMS-2	MeB	20	0.25	0.25	-	15	~100	[2]
rGO900	MeB	10	0.2	0.61	-	10	~100	[3]
CNT	Phenol	9.4	0.1	1.14	-	60	~92	[4]
α-MnO_2	Phenol	25	0.4	2	25	30	~100	[5]
Fe^0/Fe_3C@CS	Phenol	20	0.1	2	25	30	~100	[6]
$LaCoO_3$	Phenol	20	0.3	0.03	-	90	~100	[7]
A-Fe@CNF1100	MeB	10	0.1	0.5	25	15	~100	[8]
A-Fe@CNF1100	Phenol	10	0.1	0.5	25	15	~100	[8]
$FeCo_2$@APCFs	MeB	20	0.1	0.5	20	7	~100	This study
$FeCo_2$@APCFs	Phenol	20	0.1	0.5	20	20	~100	This study

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