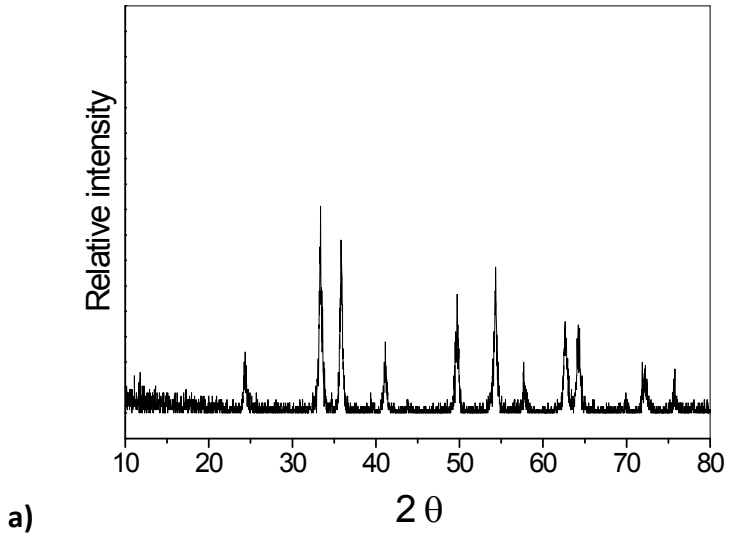
Electronic supplementary information (ESI)

Reactive porous composites for chromium(VI) reduction applications based on Fe/carbon obtained from post-consumer PET and iron oxide.

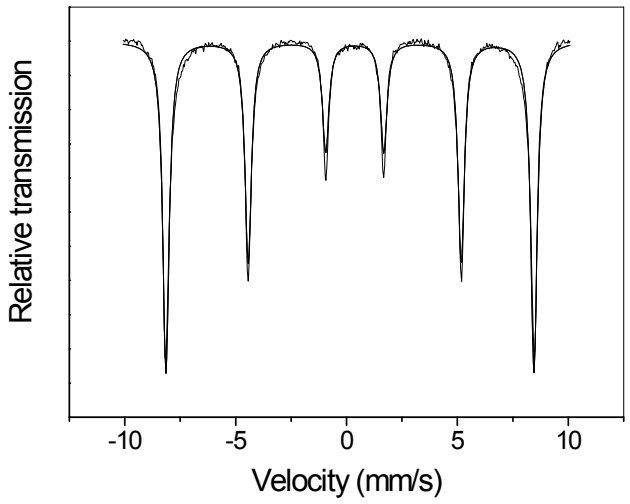
Lílian A. Carvalho, José D. Ardisson, Rochel M. Lago, Maria D. Vargas and

Maria Helena Araujo

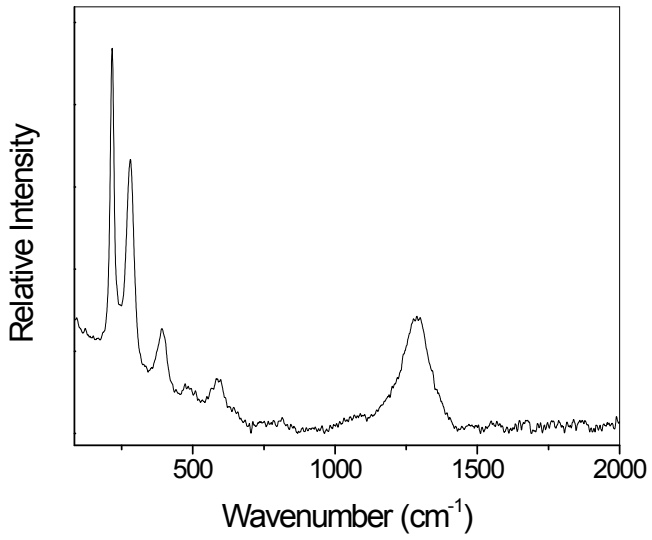
Contents



a)



b)



c)

Fig. S1 (**a**) XDR pattern; (**b**) Mössbauer spectrum and (**c**) Raman spectrum of the hematite prepared by thermal treatment of iron(III) nitrate at 450 ^{o}C. All the signals and bands are only related to hematite.

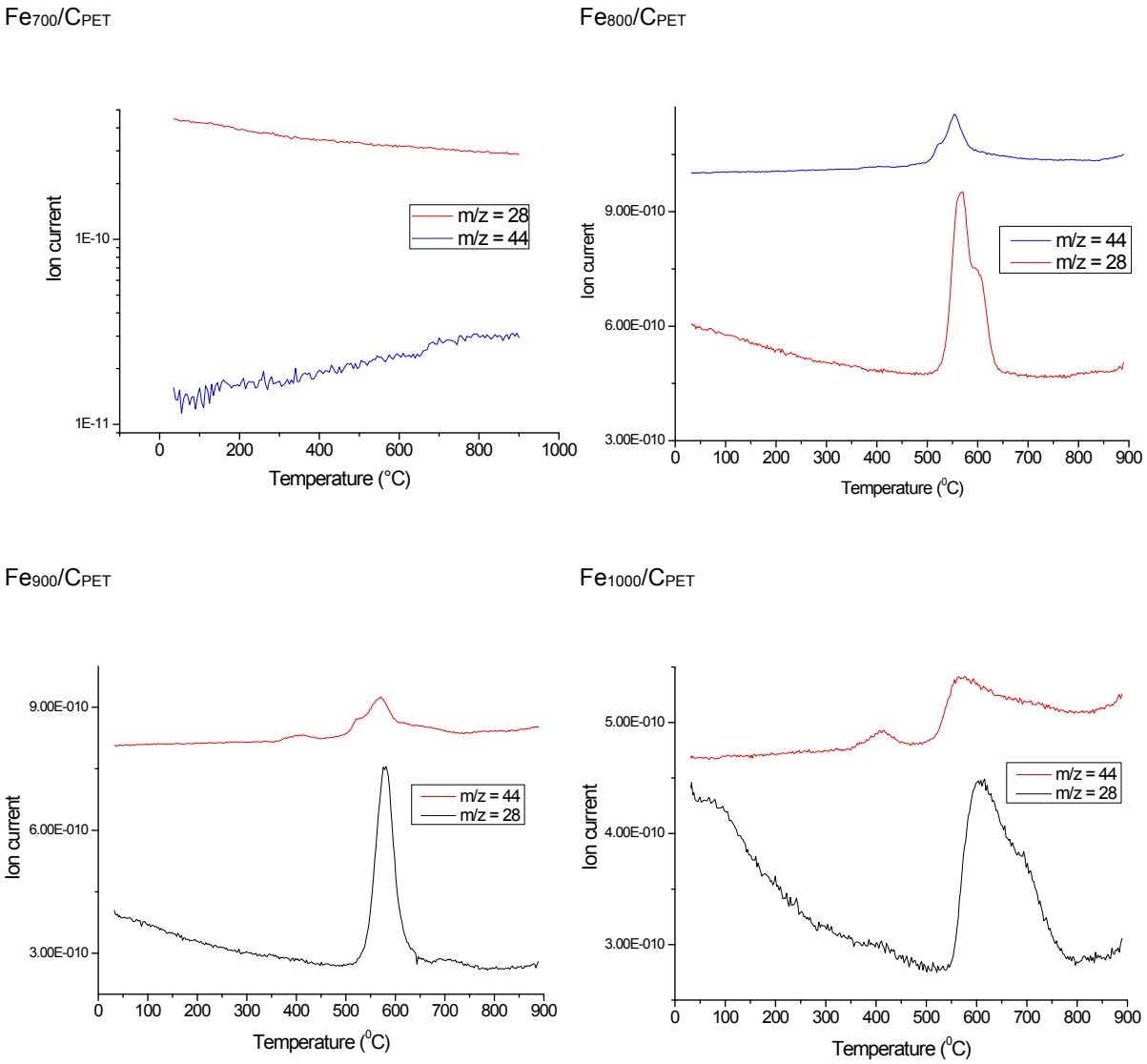
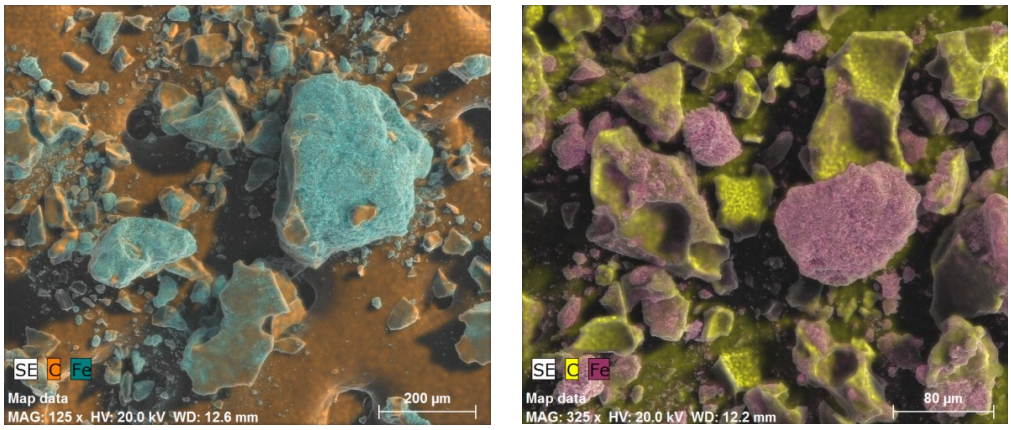


Fig. S2 Profile of temperature along with the evolution of gases of Fe_{500}/C_{PET}, Fe_{600}/C_{PET}, Fe_{800}/C_{PET} and Fe_{1000}/C_{PET} under argon atmosphere.



a) **b)**

Fig. S3 EDS mapping of (**a**) Fe_{800}/C_{PET} and (**b**) Fe_{900}/C_{PET}.

EDS mapping suggests that the Fe is homogeneously distributed throughout the particles, as it may be seen by the blue and pink colors in Fig. S2 (a) and (b), respectively, which shows the mapping of the elemental Fe in the material. The distribution of the carbon in the material is indicated by the orange and yellow colors in Fig. S2 (a) and (b).

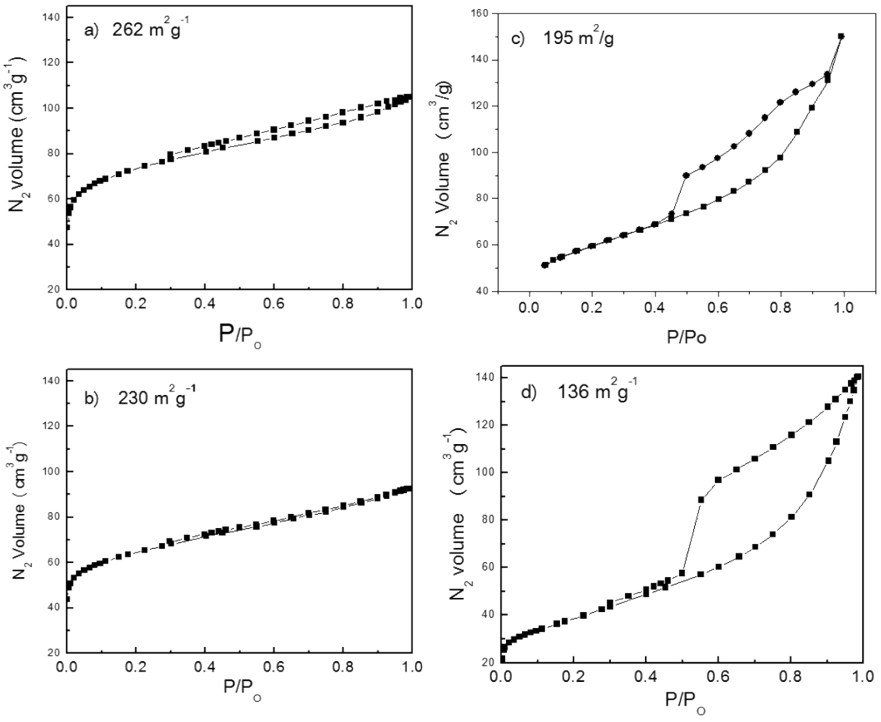


Fig. S4 Nitrogen adsorption and desorption isotherms obtained for (**a**) Fe_{500}/C_{PET}; (**b**) Fe_{600}/C_{PET}; (**c**) Fe_{800}/C_{PET}; (**d**) Fe_{1000}/C_{PET} and the surface area values.

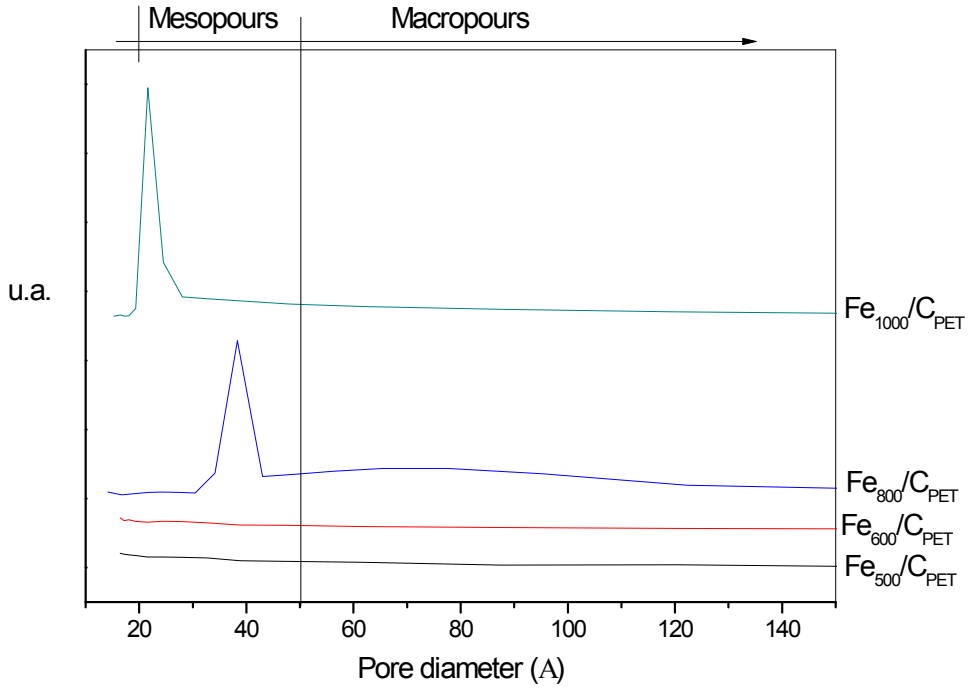


Fig. S5 Pore distribution in the Fe_{500}/C_{PET}, Fe_{600}/C_{PET}, Fe_{800}/C_{PET} and Fe_{1000}/C_{PET} composites.

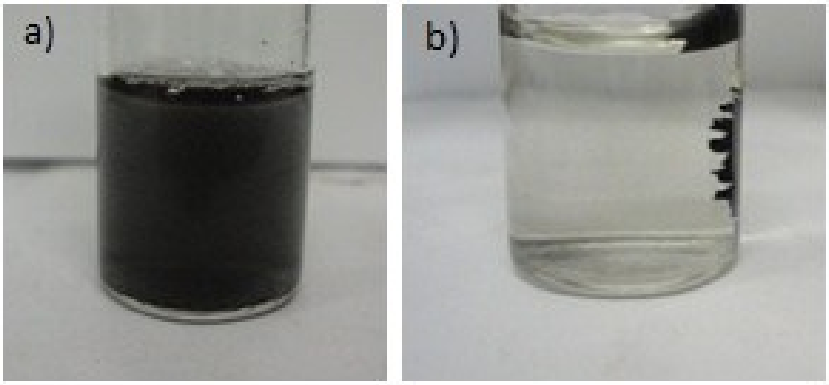


Fig. S6. Magnetic separation of the Fe_{800}/C_{PET} composite from a suspension in water.

Table S1 Mössbauer hyperfine parameters of the composites.

Material	Phase	$\delta \pm 0.05$ (mm/s)	$2\varepsilon//\Delta Q \pm 0.05$ (mm/s)	$B_{HF} \pm 0.5$ (Tesla)	Area $\pm$ 1 (%)
Fe_{500}/C_{PET}	**mix Fe_3O_4,**	0.65	0.04	46.0	28
	γ-Fe_3O_4	0.25	-0.06	49.0	29
	Fe^{3+}	0.21	1.34	-	18
	Fe^{2+}	0.97	1.08	-	09
	FeOOH	0.63	0.13	38.4	16
Fe_{600}/C_{PET}	**mix Fe_3O_4,**	0.53	0.04	45.6	27
	γ-Fe_3O_4	0.27	-0.06	49.2	26
	Fe^{3+}	0.34	1.62	-	15
	Fe^{2+}	0.97	1.40	-	15
	FeOOH	0.31	0.13	40.9	17
Fe_{700}/C_{PET}	**α-Fe**	0.0	0.0	33.0	23
	Fe_3C	0.17	0.02	20.8	69
	γ-Fe(C)	0.41	0.80	-	4
	γ-Fe	-0.20	-	-	4
Fe_{800}/C_{PET}	**α-Fe**	0,00	0,00	33,10	65
	Fe_3C	0,20	0,03	20,70	22
	γ-Fe	-0,09	-----	-----	13
Fe_{900}/C_{PET}	**α-Fe**	0.0	0.0	33.0	31
	Fe_3C	0.17	0.02	20.8	53
	γ-Fe(C)	0.39	0.58	-	6
	γ-Fe	-0.15	-	-	10
Fe_{1000}/C_{PET}	**α-Fe**	0.0	0.0	33.0	49
	Fe_3C	0.15	0.02	21.0	38
	γ-Fe(C)	0.40	0.69	-	4
	γ-Fe	-0.13	-	-	9