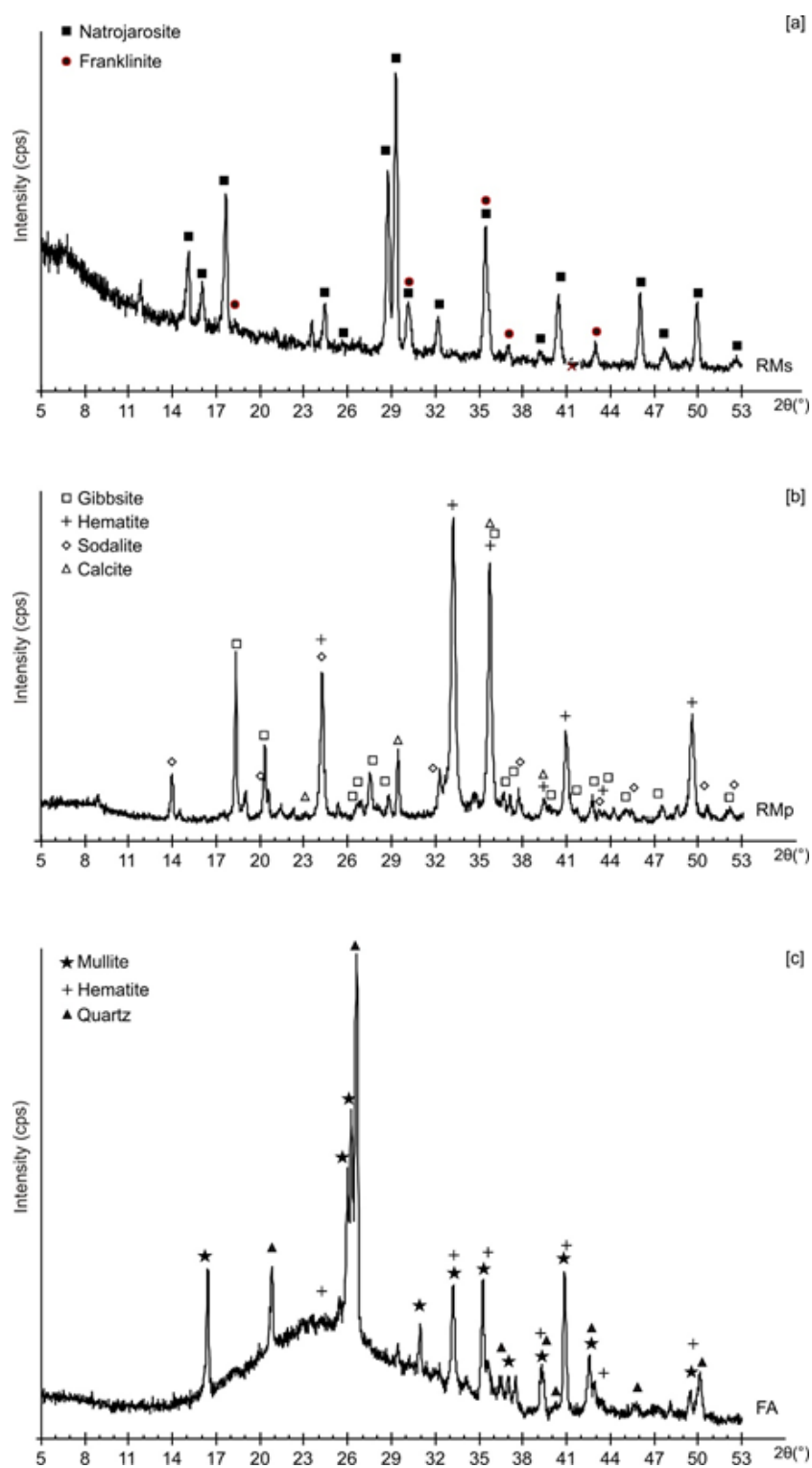**Supplementary Materials:**

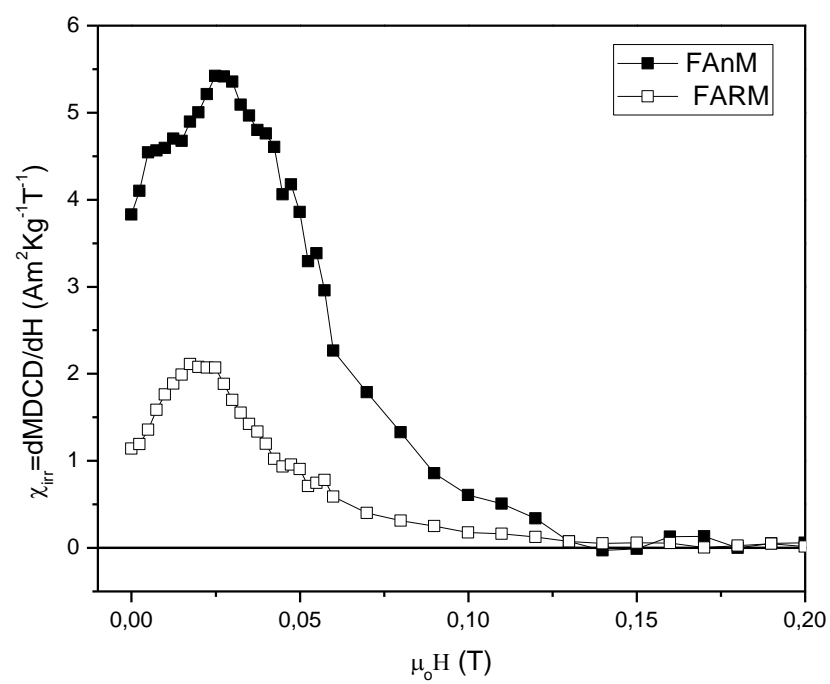**Figure S1.** XRD patterns of: (a) RMs; (b) RMp and (c) FA.

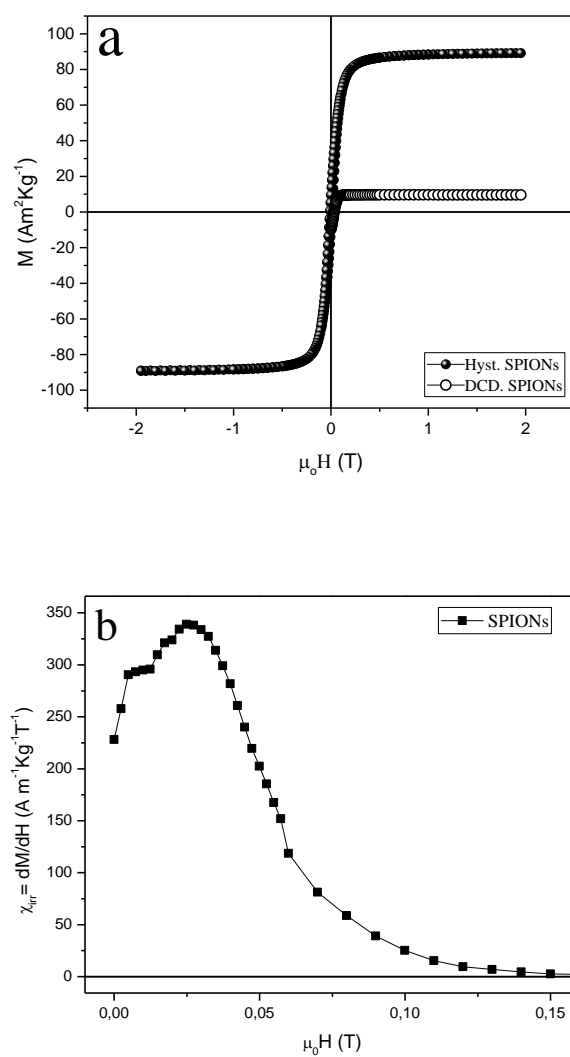**Figure S2.** Irreversible magnetic susceptibility for FAnM and FARMp samples.

Figure S3. (a) Field dependence of magnetization (full circlee) and DCD remenence magnetization (empty cicles) recorded at 300 K; (b) irreversible susceptibility extracted from DCD.
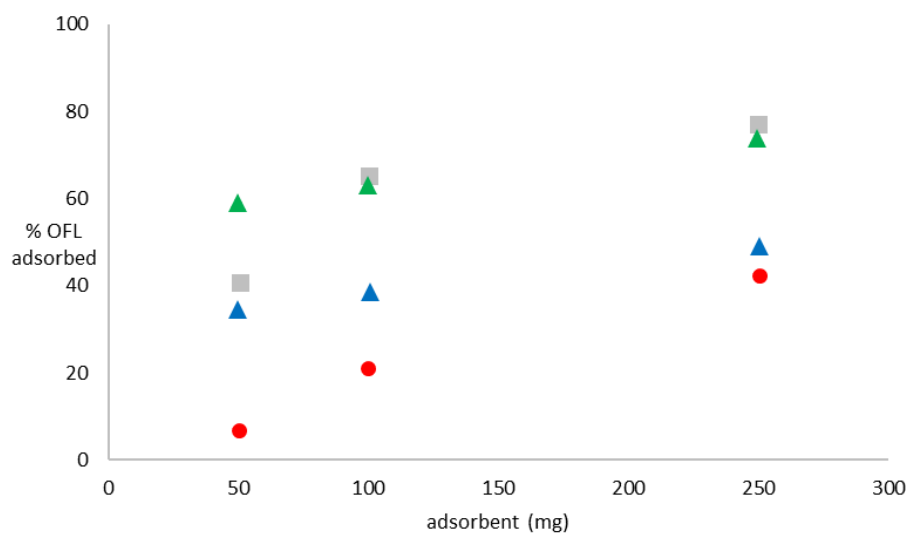
Figure S4. % adsorbed OFL *vs.* adsorbent amount (50, 100, 250 mg): SAnM (▲), SARMs (●), FAnM (▲), and FARMp (■) (Experimental conditions: 10 mL tap water, OFL concentration 10 L^{-1}).
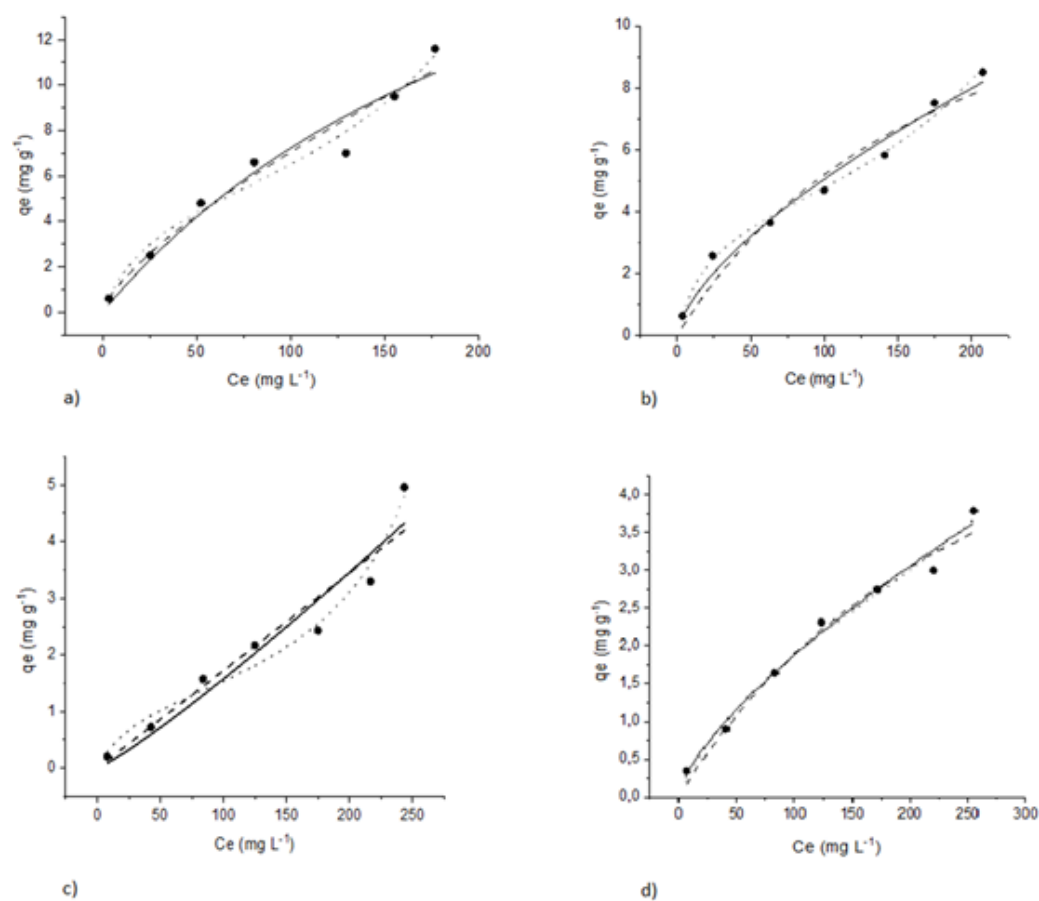
Figure S5. Adsorption profiles Langmuir (--), Freundlich (_) and BET (…) for OFL on (a) FARMp, (b) FanM, (c) SARMs and (d) SAnM, (Experimental conditions: 100 mg, 10 mL tap water, OFL solution from 10 to 293 mg L^{-1}).
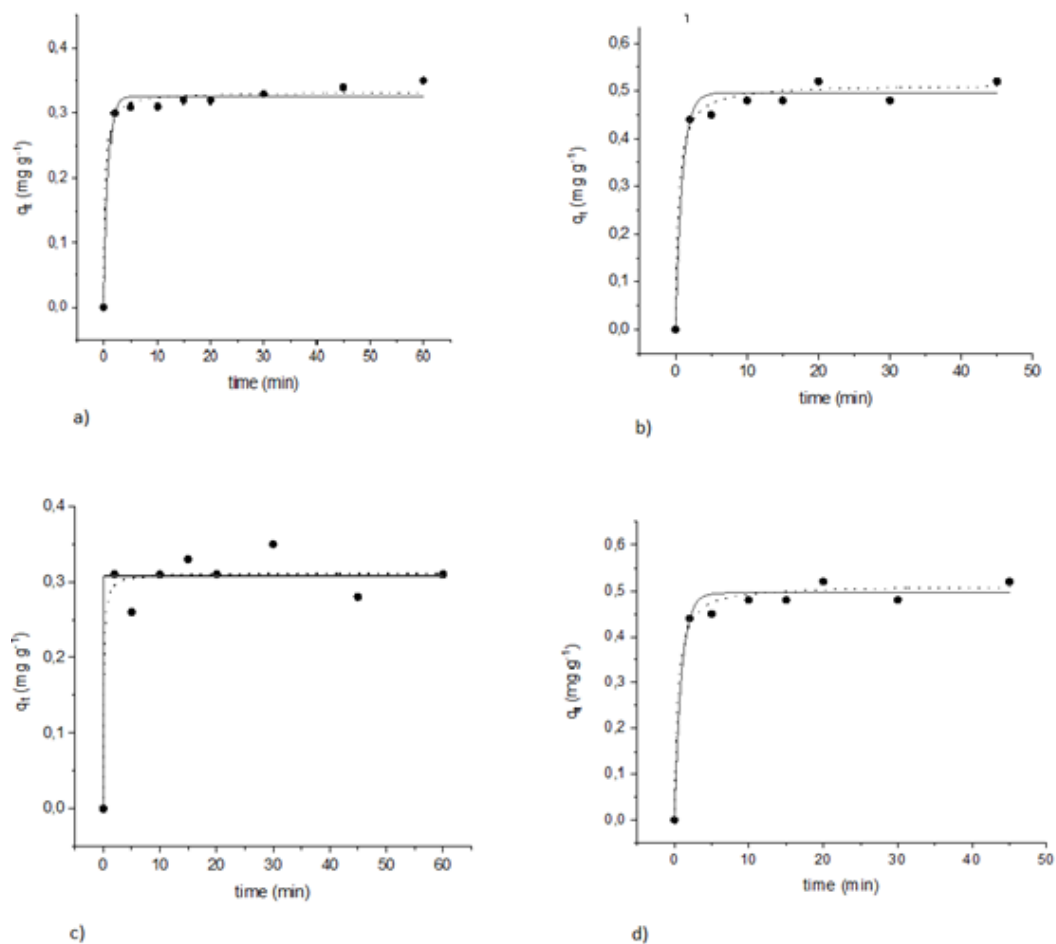
Figure S6. Kinetic profiles (pseudo-first order (_) and pseudo-second (..) order) for OFL on (a) FARMp, (b) FAnM, (c) SARMs and (d) SAnM (Experimental conditions: 200 mg, 20 mL tap water, OFL initial concentration 20 mg L^{-1}).

Table S1. Sample synthesis

Code	Synthesis
SAnM	Pure silica and alumina source + SPIONs
SARMs	Pure silica and alumina source + Red Mud (RMs)
FAnM	Fly ash (FA) + SPIONs
FARMp	Fly ash (FA) + Red mud (RMp)

Table S2. XRF chemical composition of red muds (RM) and fly ash (FA) (wt%).

	FA	RMp	RMs
Fe_2O_3	5.23	36.80	37.04
MgO	1.43	0.21	0.31
Al_2O_3	28.21	11.46	0.89
SiO_2	46.80	7.89	4.23
CaO	5.57	3.53	1.09

Table S3. Isotherm parameters obtained by fitting the experimental data for OFL adsorption onto SAnM, SARMs, FAnM, and FARMp. (Experimental conditions: 100 mg adsorbent phase, 10 mL tap water, OFL concentrations from 10 to 293 mg L^{-1}).

		FARMp	FAnM	SARMs	SAnM
	q_{exp} (mg g^{-1})	11.6	**8.5**	5.0	3.8
Freundlich	K_F (mg$^{(1-n)}$ L^n g^{-1})	0.3 ± 0.1	0.2 ± 0.1	0.08 ± 0.01	0.71 ± 0.02
	1/n	0.7 ± 0.1	0.66 ± 0.07	1.1 ± 0.2	0.71 ± 0.06
	R^2	0.950	0.976	0.917	0.982
Langmuir	K_L (L mg^{-1})	0.004 ± 0.003	0.004 ± 0.002	3.8 E-7 ± 0.001	0.0032 ± 4E-5
	q_m (mg g^{-1})	26 ± 12	18 ± 6	44395 ± 2	7.74 ± 0.06
	R^2	0.940	0.950	0.911	0.994
BET	K_s (L mg^{-1})	0.042 ± 0.003	0.05 ± 0.03	0.03 ± 0.03	0.013 ± 0.009
	K_L (L mg^{-1})	0.0033 ±6E-4	0.0027 ± 2E-4	0.0030 ± 2E-4	0.0015 ± 6E-4
	q_m (mg g^{-1})	5 ± 1	4.0 ± 0.3	1.3 ± 0.3	3 ± 1
	R^2	0.963	0.991	0.966	0.979
		FARMp	FAnM	SARMs	SAnM
	q_{exp} (mg g^{-1})	0.39	0.37	0.31	0.52
Pseudo-first order	k_1 (min^{-1})	1.2 ± 0.3	0.7 ± 0.1	90 ± 0	1.0 ± 0.2
	q_e (mg g^{-1})	0.33 ± 0.01	0.39 ± 0.01	0.31 ± 0.01	0.49 ± 0.01
	R^2	0.983	0.996	0.931	0.983
Pseudo-second order	k_2 (g mg^{-1} min^{-1})	11 ± 4	3 ± 1	30 ± 63	6 ± 2
	q_e (mg g^{-1})	0.33 ± 0.01	0.41 ± 0.01	0.31 ± 0.01	0.50 ± 0.01
	R^2	0.990	0.940	0.933	0.989

Table S4. Municipal water of Pavia and Ticino River physico-chemical parameters. Conductivity (µS cm^{-1}); other parameters (mg L^{-1}).

Parameters/Ions	Tap water	River water
pH	7.7	7.2
Conductivity at 20 °C	271	166
Cl$^-$	5.0	5.2
NO$_3^-$	0.6	2.3
SO$_4^{2-}$	5.0	23.2
HCO$_3^-$	182	73.5
Ca^{2+}	35	25
Mg^{2+}	10	5.7
Na$^+$	12	4.8