Electronic Supplementary Material (ESI) for Environmental Science: Nano.

Nanostructured ZnFeZr oxyhydroxide precipitate as efficient phosphate adsorber in waste water: understanding the role of different material-building-blocks

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Supplementary Information

S1 – Adsorption Kinetics

Table S1: Adsorption rate constants, equilibrium loads and correlation coefficients of the pseudo-first-order and pseudo-second-order kinetic models for all samples.

Sample	Pseudo-first-order			Pseudo-second-order		
	k_1 1/min	q_e mg/g	R^2 -	k_2 g/(mg·min)	q_e mg/g	R^2 -
1	0.112	2.736	0.978	0.141	18.65	0.999
2	0.062	3.526	0.944	0.069	21.71	0.999
3	0.056	2.041	0.991	0.119	15.73	0.999
4	0.076	2.314	0.969	0.133	21.58	0.999
5	0.085	3.064	0.995	0.100	17.43	0.999
6	0.046	1.416	0.948	0.146	6.414	0.998
7	0.047	1.653	0.949	0.140	27.97	0.999
8	0.045	3.559	0.982	0.053	12.88	0.998

S2 – Adsorption Isotherms:

Table S2: Freundlich, Langmuir and BET equation parameters of phosphate adsorption for all samples.

Sample	Freundlich			Langmuir			BET		
	K_F (mg/g)/ (mg/L)^n	n -	R^2 -	q_m mg/g	K_L L/mg	R^2 -	K_{BET} -	q_{max} mg/g	R^2 -
1	11.00	0.231	0.974	19.19	1.493	0.965	331	5,032	0,924
2	13.87	0.212	0.980	20.26	4.277	0.990	1822	2,073	0,647
3	9.566	0.128	0.915	12.34	5.689	0.987	1647	2,074	0,922
4	13.79	0.191	0.941	19.82	4.089	0.981	1,98	3,797	0,912
5	10.03	0.196	0.996	14.77	6.132	0.988	765	2,127	0,874
6	0.264	1.128	0.455	8.368	0.056	0.094	--	--	--
7	7.275	0.406	0.989	17.18	1.266	0.948	134	2,729	0,792
8	5.269	0.296	0.946	11.70	0.632	0.938	52,6	1,297	0,723

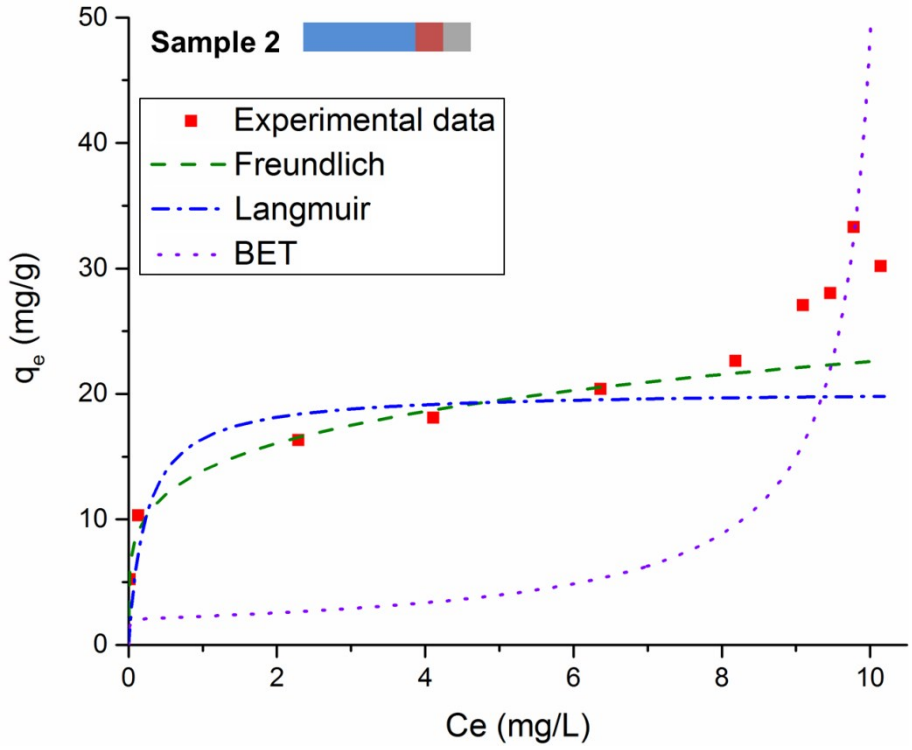

Figure S1: Phosphate adsorption isotherm of sample 2 at room temperature and pH 7 - 8 developed with Freundlich, Langmuir and BET models (q_e = amount of adsorbed phosphate in mg per gram adsorber at equilibrium; C_e = concentration of phosphate in the solution at equilibrium)

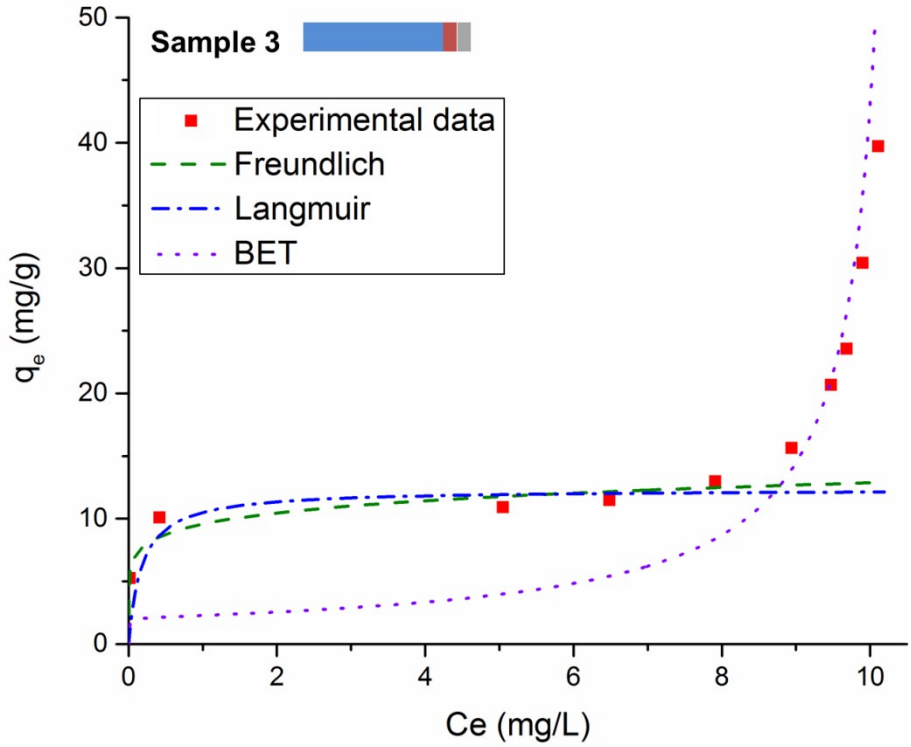

Figure S2: Phosphate adsorption isotherm of sample 3 at room temperature and pH 7 - 8 developed with Freundlich, Langmuir and BET models (q_e = amount of adsorbed phosphate in mg per gram adsorber at equilibrium; C_e = concentration of phosphate in the solution at equilibrium)

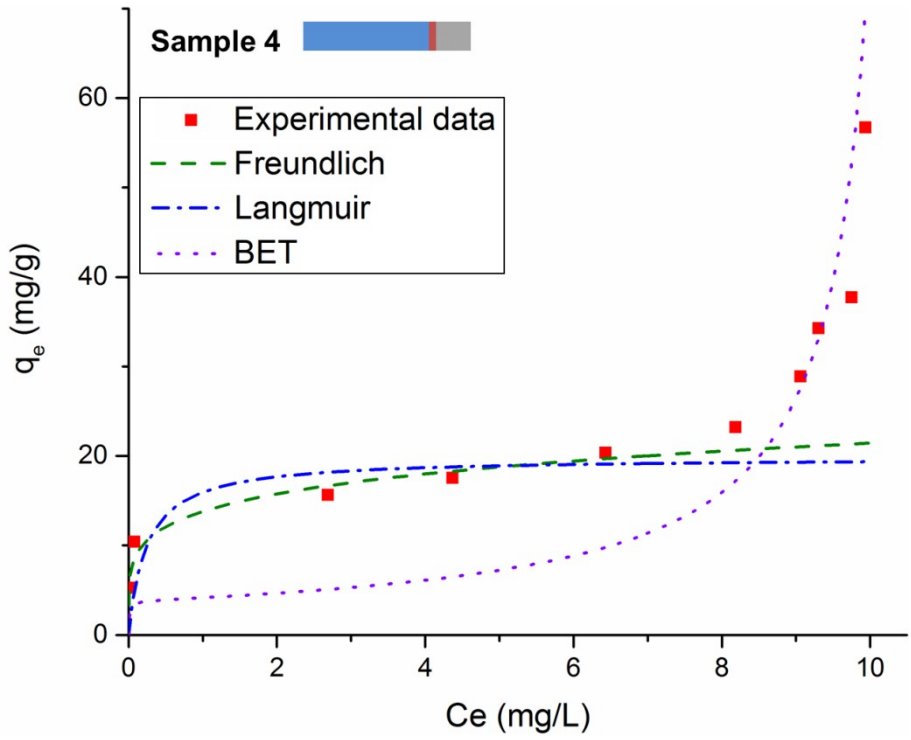

Figure S3: Phosphate adsorption isotherm of sample 4 at room temperature and pH 7 - 8 developed with Freundlich, Langmuir and BET models (q_e = amount of adsorbed phosphate in mg per gram adsorber at equilibrium; C_e = concentration of phosphate in the solution at equilibrium)

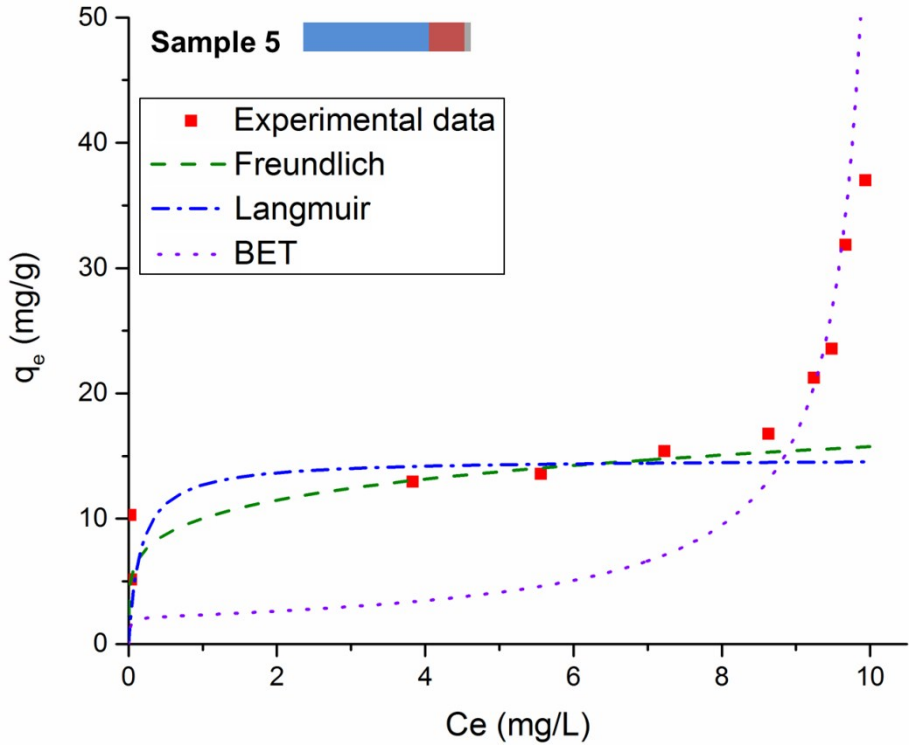

Figure S4: Phosphate adsorption isotherm of sample 5 at room temperature and pH 7 - 8 developed with Freundlich, Langmuir and BET models (q_e = amount of adsorbed phosphate in mg per gram adsorber at equilibrium; C_e = concentration of phosphate in the solution at equilibrium)

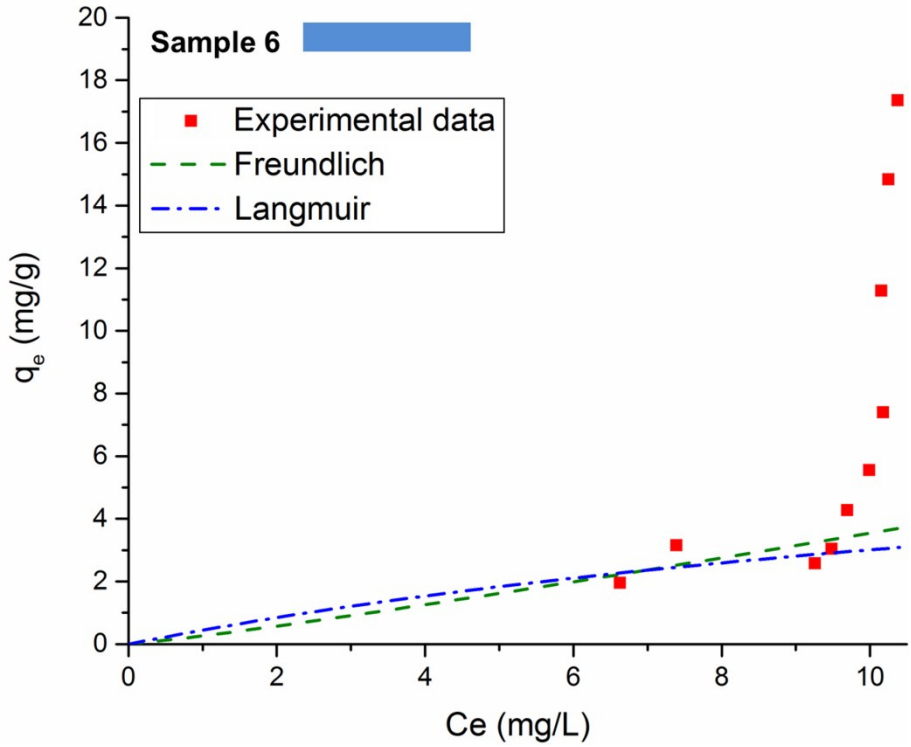

Figure S5: Phosphate adsorption isotherm of sample 6 at room temperature and pH 7 - 8 developed with Freundlich, Langmuir and BET models (q_e = amount of adsorbed phosphate in mg per gram adsorber at equilibrium; C_e = concentration of phosphate in the solution at equilibrium)

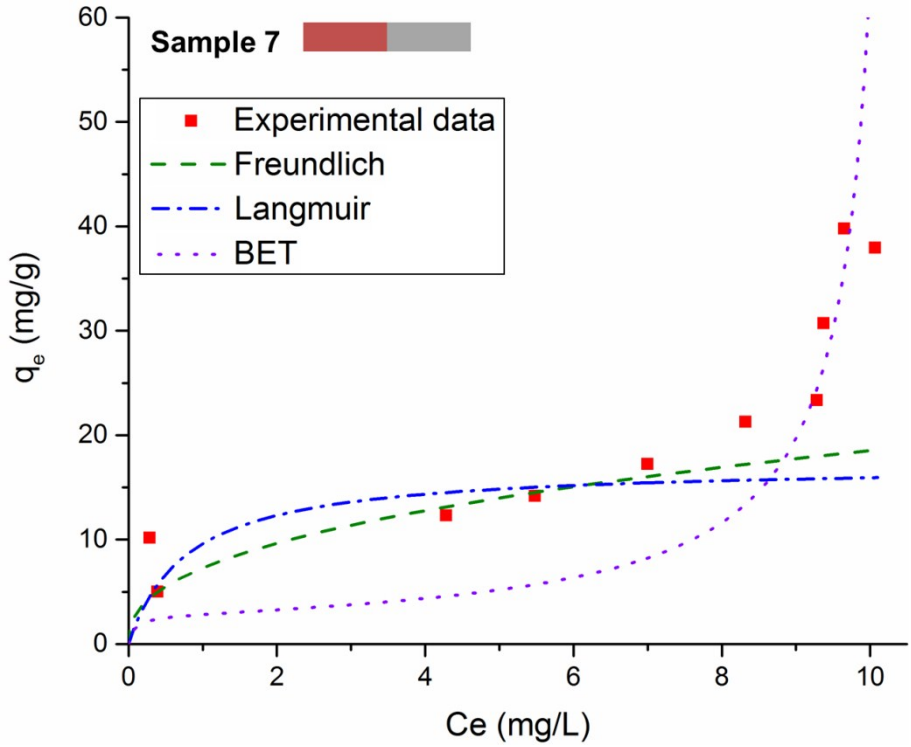

Figure S6: Phosphate adsorption isotherm of sample 7 at room temperature and pH 7 - 8 developed with Freundlich, Langmuir and BET models (q_e = amount of adsorbed phosphate in mg per gram adsorber at equilibrium; C_e = concentration of phosphate in the solution at equilibrium)

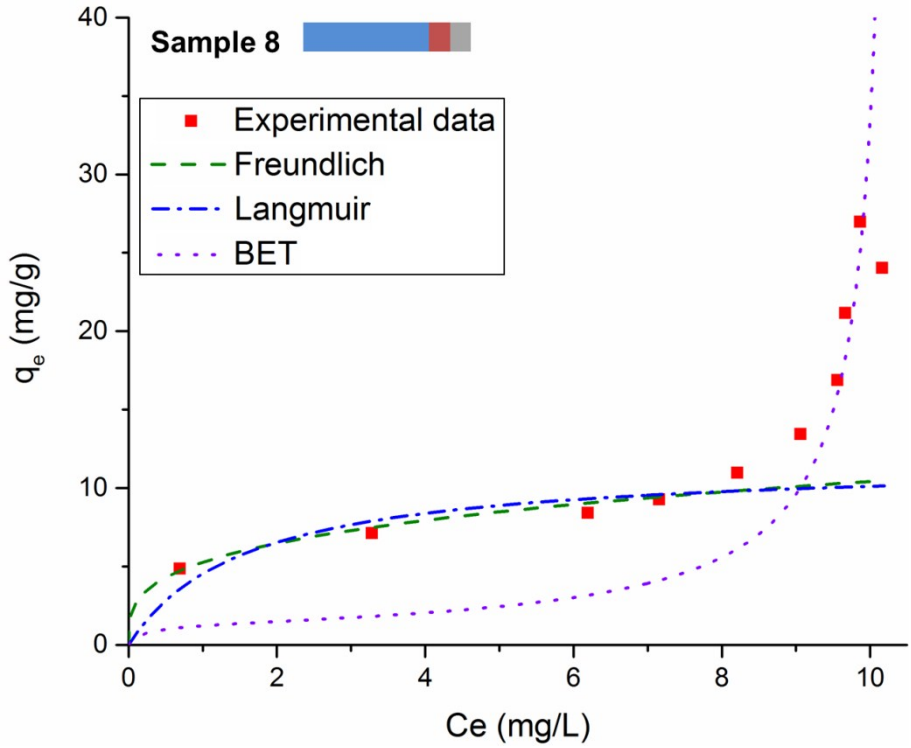

Figure S7: Phosphate adsorption isotherm of sample 8 at room temperature and pH 7 - 8 developed with Freundlich, Langmuir and BET models (q_e = amount of adsorbed phosphate in mg per gram adsorber at equilibrium; C_e = concentration of phosphate in the solution at equilibrium)