

Supplementary data

Table S1 Basic element composition analysis of PSMBC450 (point to Sections 3.1 and 3.3) wt%

Analyte	O	Na	Mg	Al	Si	P	S	Cl	K
Concentration	67.10	1.95	0.24	9.42	0.35	1.12	2.17	1.07	0.44
Analyte	Ca	Ti	Cr	Mn	Fe	Cu	Zn	Zr	Ba
Concentration	2.32	0.18	0.04	0.10	2.59	0.35	0.52	0.00	0.04

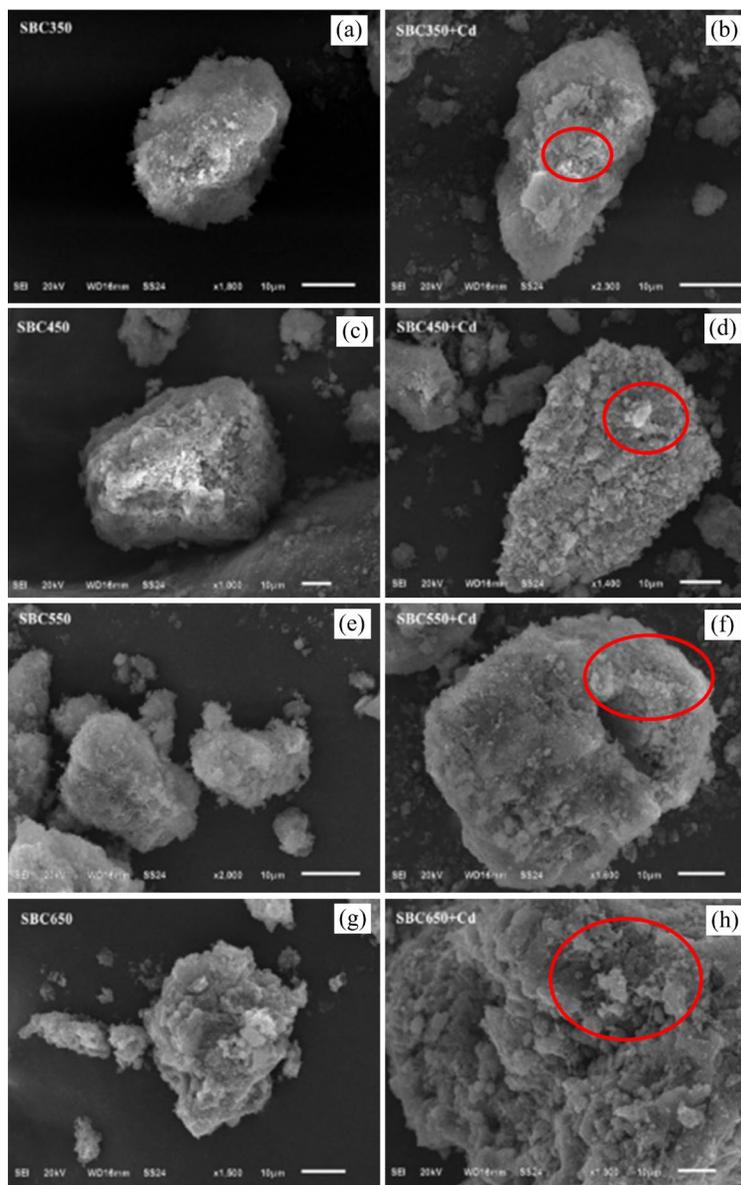


Figure S1 SEM images before and after the adsorption of Cd²⁺ by PSMBCs (point to Section 3.1)

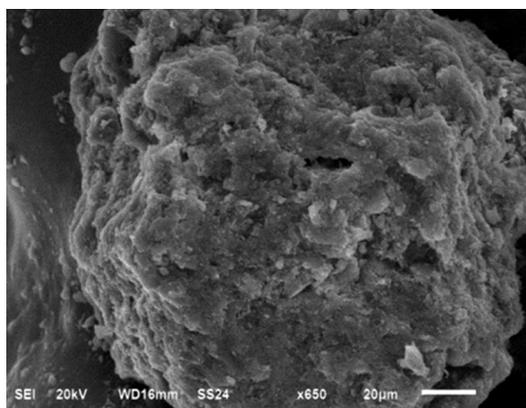


Figure S2 SEM images of the freeze-dried petrochemical sludge (point to Section 3.1)

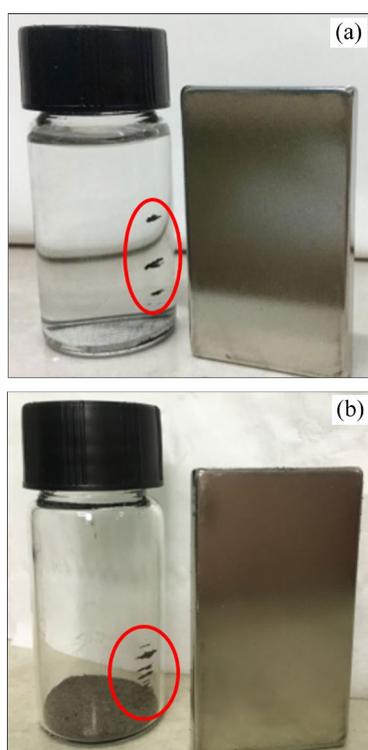


Figure S3 Magnetic separation effectiveness images of PSMBC450 in water and soil system, respectively, where the adding ratio of PSMBC450 is 3% and the recycle ratio of PSMBC450 is approximately 7% (point to Section 3.1)

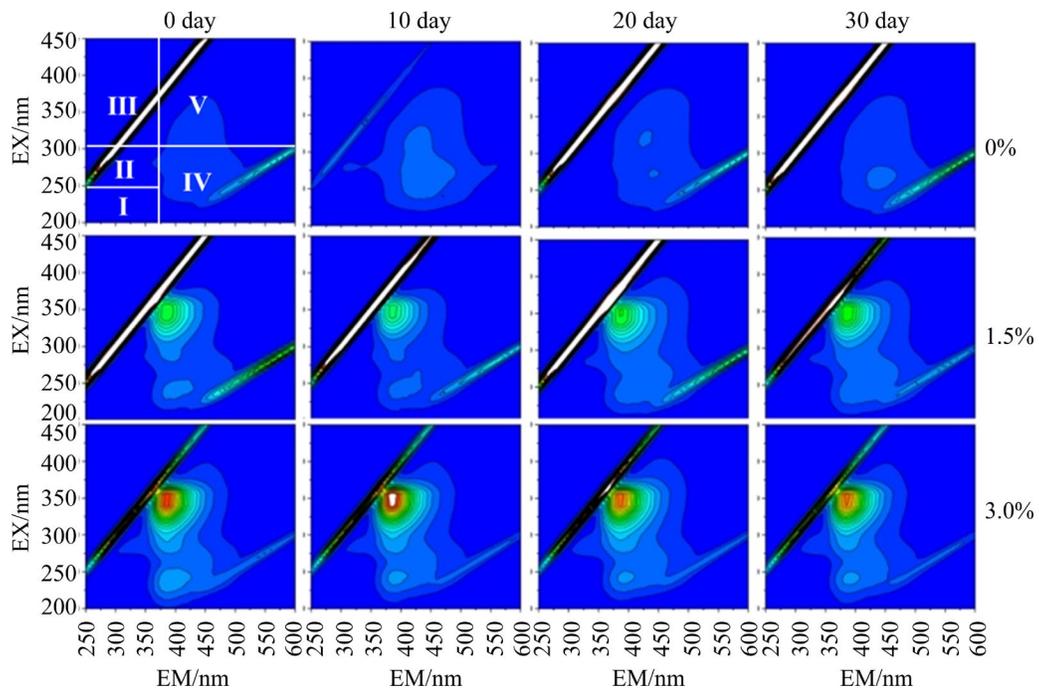


Figure S4 The SDOM changes after addition PSMBC550 (0%,1.5% and 3%) in 0 d, 10 d, 20 d and 30 d (point to Section 3.3)



Figure S5 The relative wheat root elongation cultured by leachates of PSMBCs (1g/L) (point to Section 3.4)