Supplementary Material Figure S1 and Tables S1~S4

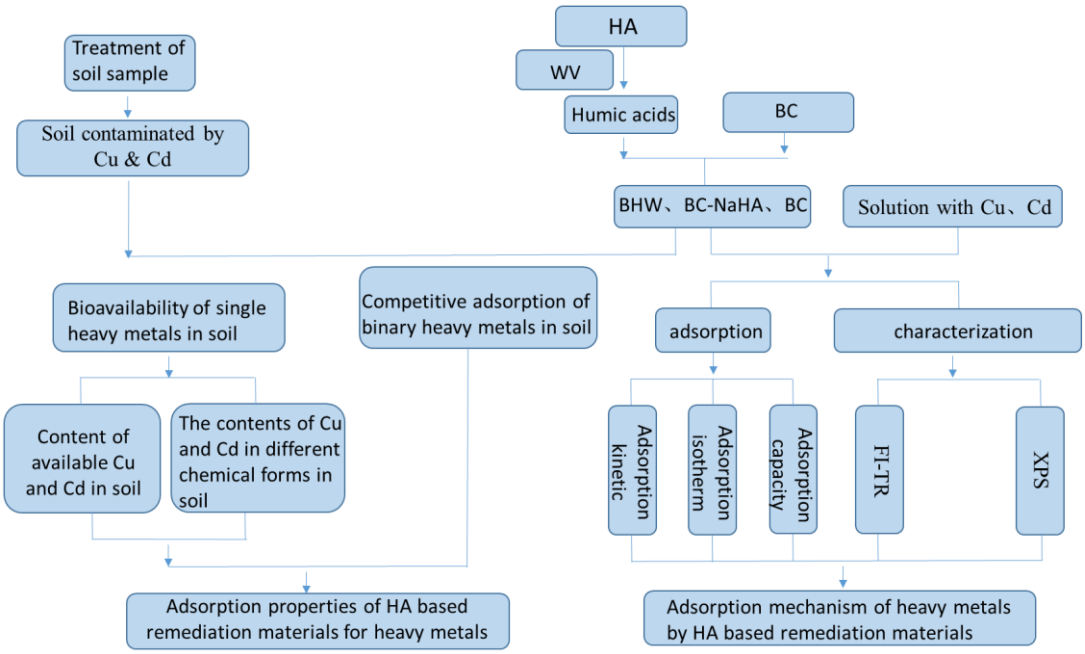

Figure S1. The diagram for the experiment route.

Table S1 The chemical and physical properties of experimental soil.

Items	clay	silt	sand	pH	TOC	CEC	P_{tot}	K_{tot}	Mg_{tot}	Ca_{tot}	Nitot
Content	5.9 %	48.3 %	46.2 %	6.5 ± 0.1	4.20 ± 0.00 %	180 ± 3.2 $mmol \cdot kg^{-1}$	0.02 ± 0.00 %	0.25 ± 0.00 %	0.12 ± 0.00 %	0.14± 0.01 %	201.3 ±18 mg·kg

Table S2 The information of chemicals in the research.

Items	Specification	Producer	Remarks
BC	300um	Kejing Technology (Hefei, China)	A crop straw powder
sodium humate	pH=9.98	Yushuo Chemical Technology (Jinan, China)	
wood vinegar	34wt%,pH=3.96	Yushuo Chemical Technology (Jinan, China)	
ultrapure water	18MΩ	Acquired from a Milli-Q pure water instrument	Used in the all experiments.
copper nitrate	AR	Shanghai Aladdin Bio-Chem Technology (Shanghai, China)	
cadmium nitrate	AR		
calcium chloride	AR		
ammonium acetate	AR		
nitric acid	AR	Kemiou Chemical Reagent (Tianjin, China)	
acetic acid	AR		
hydrofluoric acid	AR		
perchloric acid	AR		
hydroxylamine hydrochloride	AR	Alfa Aesar Chemical Reagent Co., Ltd (Shanghai, China)	
hydrogen peroxide	30wt%	Alfa Aesar Chemical Reagent Co., Ltd (Shanghai, China)	

Table S3 The material composition of each group[a].

Remediation materials	NaHA (wt%)	WV(wt%)	BC(wt%)
BHW	28.6 (±0.5)	28.6(±0.5)	42.8(±0.6)
BC-NaHA	57.2(±1.2)	0	42.8(±0.7)
BC	0	0	100(±1.5)

[a]Mean (standard deviation, *n*=3) of three percentages of constituent data (three replicates) for each materials.

Table S4 BCR sequential extraction process for Cu and Cd of soil samples

Step	Fraction	Extraction agent	Reaction conditions
1	Exchangeable fraction	0.11M CH_3COOH	16h, 25℃
2	Reducible fraction	0.1M $NH_4OH{\cdot}HCl$	16h, 25℃
3	Oxidizable fraction	8.8M H_2O_2	85℃ for 1h and room temperature
		1M CH_3COONH_4	for 16h
4	Residual fraction	HNO_3:$HClO_4$:HF=6:2:2(v/v)	under microwave digestion