Supplementary data

for

Biological transport and transformation mechanism of copper, cadmium, and zinc by Chlorella

List of Supplementary data

Table S1. The compositions of BG11 culture medium.

Table S2. The adsorption kinetic model parameters.

Table S3. The adsorption isotherm model parameters.

Table S4. Peak wavelengths before and after chlorella adsorption of heavy metals.

Figure S1. Standard curve of chlorella dry weight.

Table S1. The compositions of BG11 culture medium.

Component	Dosage (mL L^{-1})	Concentrations of stock solutions (g L^{-1})
K_2HPO_4	1	40
$NaNO_3$	4	375
Na_2CO_3	1	20
$CaCl_2 \cdot 2H_2O$	1	36
$MgSO_4 \cdot 7H_2O$	1	75
Citric acid	1	6
Ferric ammonium citrate	1	6
$EDTANa_2$	1	1
A5 solution	1	-
A5 solution component		Concentrations (mg L^{-1})
H_3BO_3		2.86
$MnCl_2 \cdot 4H_2O$		1.86
$Na_2MoO_4 \cdot 2H_2O$		0.39
$CuSO_4 \cdot 5H_2O$		0.08
$ZnSO_4 \cdot 7H_2O$		0.22
$Co(NO_3)_2 \cdot 6H_2O$		0.05

Table S2. The adsorption kinetic model parameters.

Kinetic models	Parameters	CV-Cu(II)	CV-Cd(II)	CV-Zn(II)
Pseudo first-order	q_e (mg/g)	8.482	24.038	13.403
kinetic model	k_1(min^{-1})	0.200	0.028	0.042
	R^2	0.999	0.992	0.995
Pseudo second-	q_e (mg/g)	8.562	27.526	14.813
order kinetic model	k_2(g/mg/min))	0.129	0.001	0.004
	R^2	1.000	0.994	0.996
Internal diffusion	k_{f1} (mg/g·$min^{1/2}$)	0.139	2.079	1.419
kinetics model	C_1	7.536	1.955	1.352
	R^2	1.000	0.993	0.998
	K_{f2} (mg/g·$min^{1/2}$)	0.006	0.261	0.107
	C_2	8.427	20.180	12.012
	R^2	0.929	0.944	0.962

Table S3. The adsorption isotherm model parameters.

Isothermal model	Parameters	CV-Cu(II)	CV-Cd(II)	CV-Zn(II)
	q_e (mg/g)	764.547	187.972	453.193
Langmuir model	K_L(L/mg)	0.007	0.018	0.013
	R_L^2	0.999	0.950	0.937
	K_F(L/g)	10.371	6.277	11.890
Freundlich model	n	0.751	0.683	0.675
	R_L^2	0.997	0.922	0.897

Table S4. Peak wavelengths before and after chlorella adsorption of heavy metals.

Biomass	Wavenumber (cm^{-1})										
CV	3394.10	2927.38	1732.88	1656.49	1542.44	1451.33	1244.00	1157.57	1075.87	861.06	547.02
CV-Cu^{2+}	3394.60	2927.44	1734.65	1655.65	1543.01	1450.21	1244.10	1159.57	1075.56	861.69	547.64
CV-Cd^{2+}	3394.59	2927.47	1731.27	1656.44	1542.9	1447.8	1242.76	1158.44	1075.21	861.19	547.00
CV-Zn^{2+}	3418.09	2927.19	1733.17	1654.98	1544.61	1443.94	1242.42	1157.67	1074.75	861.26	547.49
Functional group	O-H	C-H	COOH	C-N	C-N	C-H	P=O	C-O-C	C-OH	C-H	C-Br

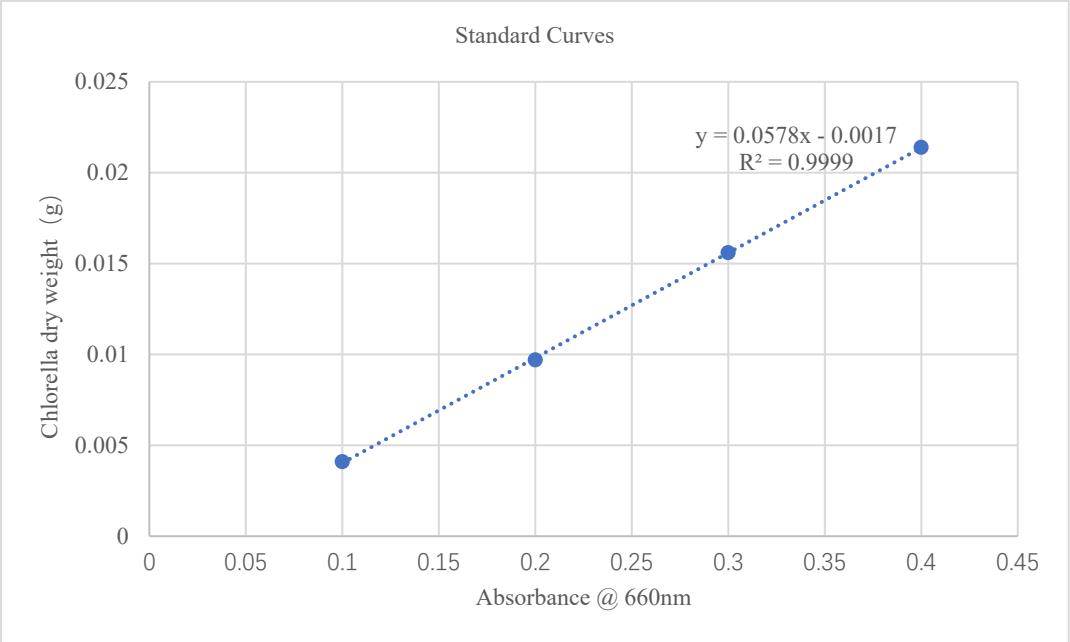


Figure S1. Standard curve of chlorella dry weight.