

Supplementary information

Manuscript title: Roles of multiwall carbon nanotubes in phytoremediation: cadmium uptake and oxidative burst in *Boehmeria nivea* (L.) Gaudich

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1. Cadmium (Cd) adsorption experiment

Cd adsorption experiment was carried out using MWCNTs as the sorbents. Cd solution was prepared by dissolving the analytic grade $\text{Cd}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$. To be specific, 100 mL conical flasks which contain different amounts of MWCNTs and 50 mL Cd solution (30 mg L^{-1}) were placed on a thermostat water bath shaker at 120 rpm and 25°C for 24 h. The used concentrations of MWCNTs were 100, 500, 1000 and 5000 mg L^{-1} . After adsorption, the solutions were collected and filtered through $0.48 \mu\text{m}$ pore size nylon filters. The concentration of Cd in the filtrates was determined by the atomic adsorption spectrometer (AAS, PEAA700, PerkinElmer). The removal efficiency (R) of Cd by MWCNTs was calculated as follows:

$$R(\%) = \frac{C_0 - C_e}{C_0} \times 100\%$$

where C_0 and C_e are the initial and equilibrium concentrations of Cd (mg L^{-1}). The adsorption experiment was performed in triplicate and the experimental data was presented as means \pm standard errors of the three replicates.

Table S1 Basic characteristics of multiwall carbon nanotubes

Parameter	Value
Purity	> 95 wt%
Diameter	10-30 nm
Length	10-30 μm
Aspect ratio	333-3000
Hydrodynamic diameter (average)	8.5 μm
Specific surface area	>100 m^2/g
Electric conductivity	>100 s/cm

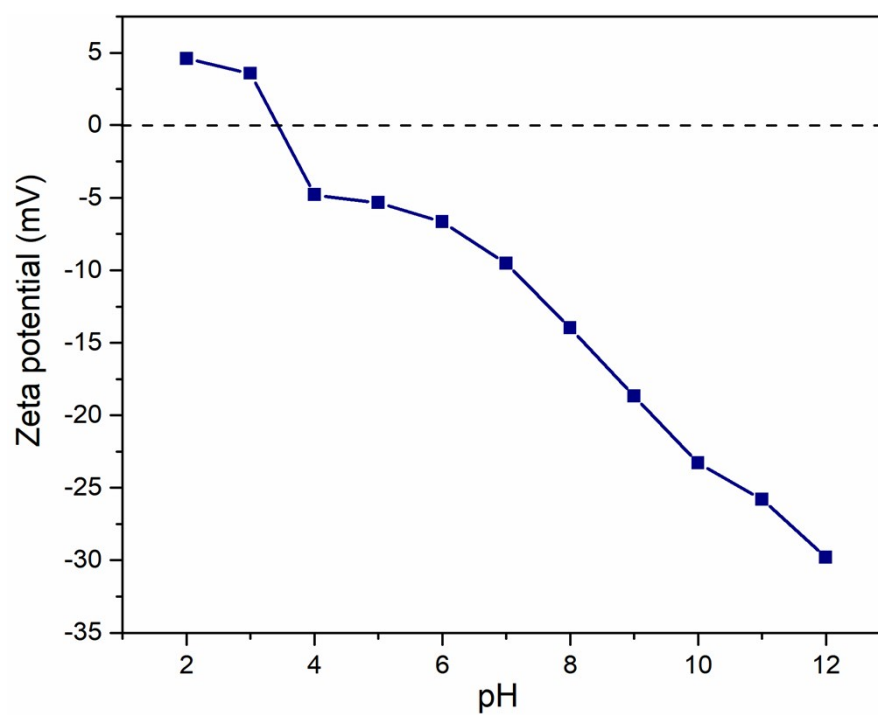


Fig. S1 Zeta potential of multiwall carbon nanotubes

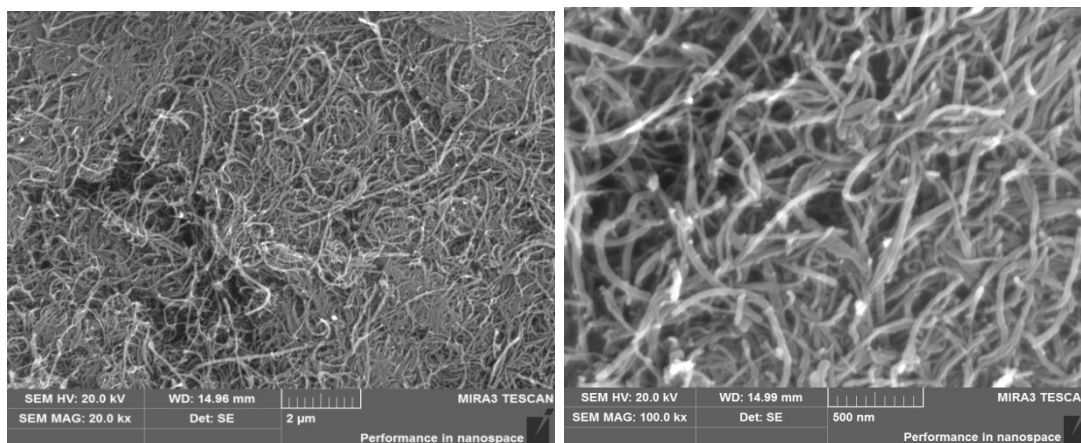


Fig. S2 SEM images of multiwall carbon nanotubes.

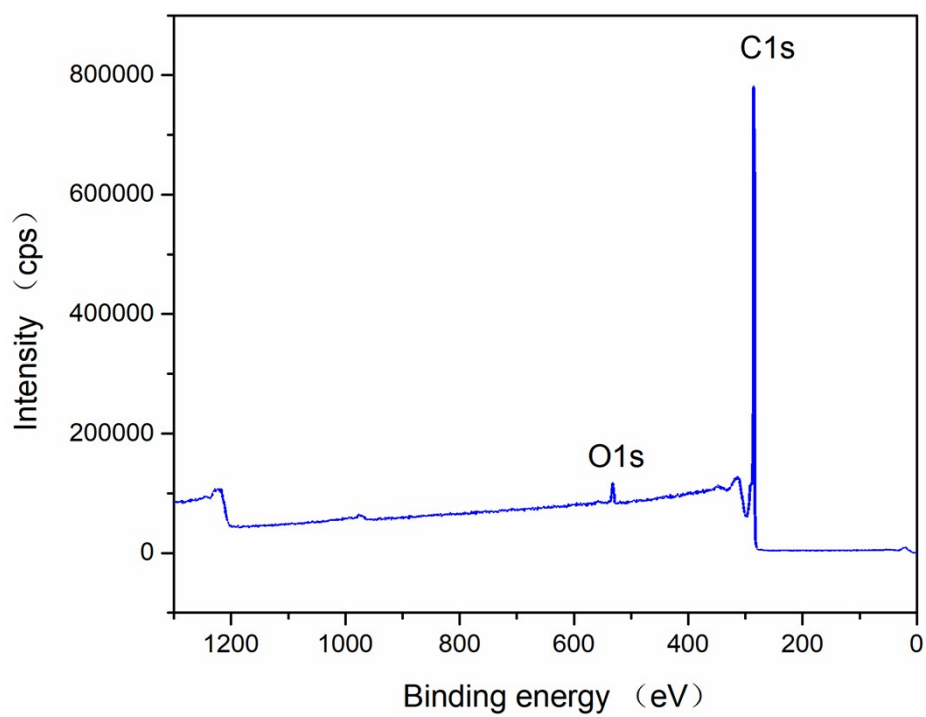


Fig. S3 XPS spectrum for multiwall carbon nanotubes

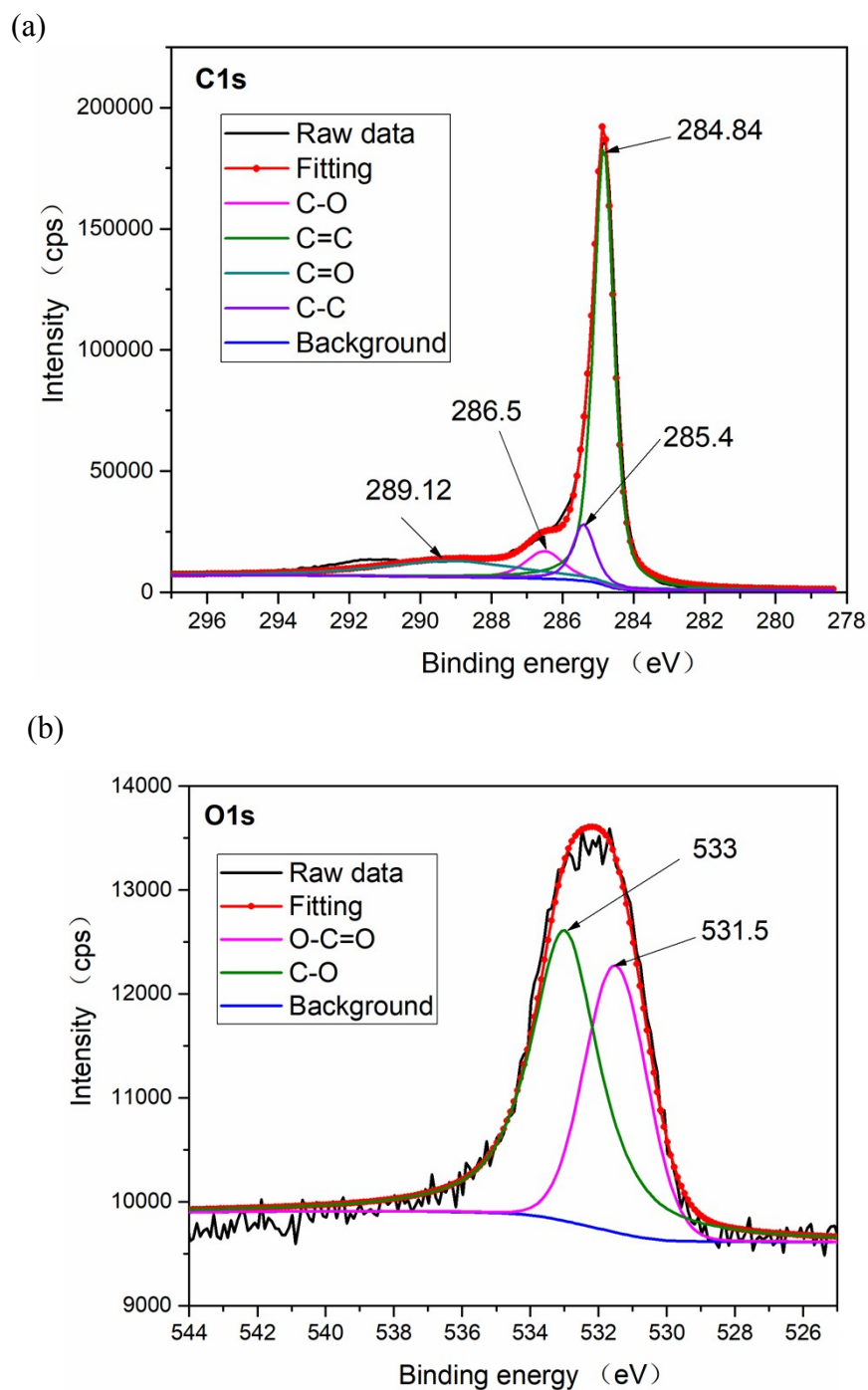


Fig. S4 XPS spectra of C1s (a) and O1s (b) for multiwall carbon nanotubes

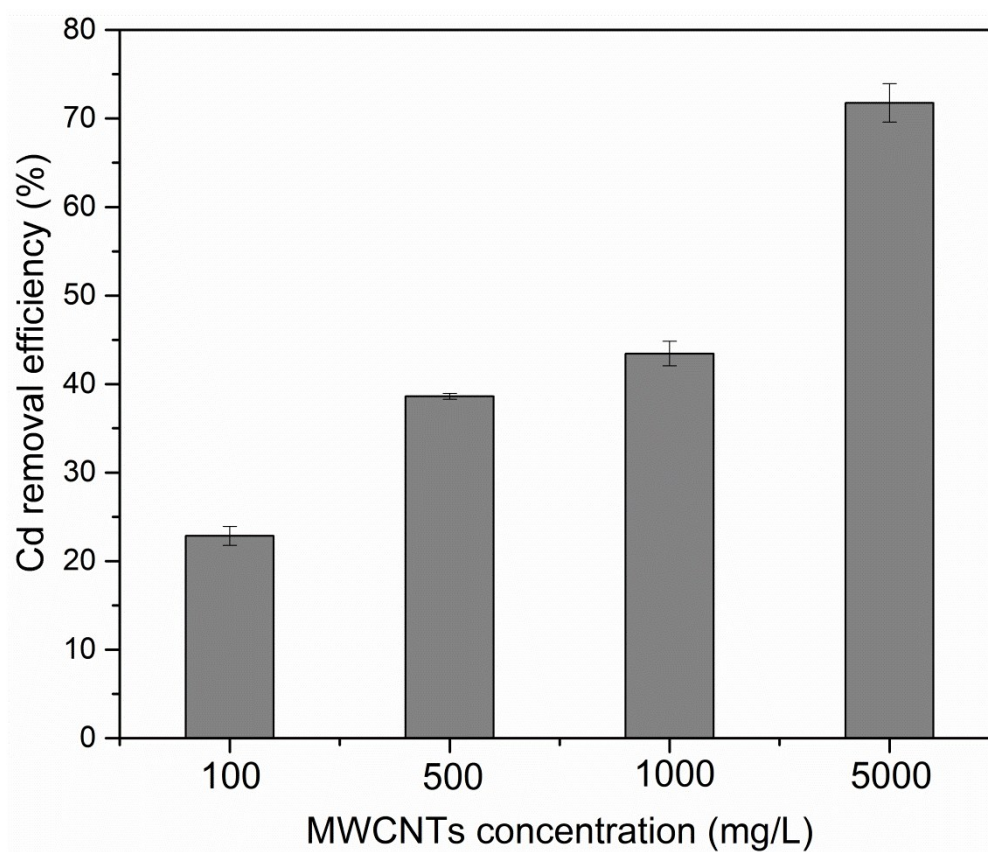


Fig. S5 Adsorption of cadmium by multiwall carbon nanotubes at different concentrations