Supplementary Materials

Text S1 Characterization and chemical analyses

The Brunauer−Emmett−Teller (BET) surface area, pore size distribution, and pore volume of biochar were measured according to the N_2 adsorption−desorption isotherm at 77 K (Quantachrome, Autosorb EVO, USA). The surface morphologies and crystalline phases of the adsorbents were characterized by scanning electron microscopy (SEM) (S-4800, Hitachi, Japan) and X-ray diffraction (XRD) (Smartlab 9, Rigaku Corporation, Japan), respectively.

Rifampicin wastewater solution was filtered through Whatman GF/F filters with a nominal pore size 0.45-μm to obtain the DOM solution. Dissolved organic carbon (DOC) was measured by a TOC-L analyzer (Shimadzu Inc., Japan) as DOM content. Chemical oxygen demand (COD) was measured using a fast confined catalytic digestion-spectrophotometer method. Potassium dichromate was used as oxidant and mercury sulfate as a screening agent was used to remove main disturbing ion, chlorine ion.

UV–Vis spectra of DOM was collected using a Shimadzu UV-2600 spectrophotometer at 25 °C. The wavelength range was set from 200 to 600 nm with a 1 nm intervals. Ultrapure water (Milli-Q) was used for the blank reference. Absorbance values at 355 nm (a355) and 254 nm (UV_{254}) were used to quantify the relative content of CDOM and aromatic structures in rifampicin wastewater. SFS of CDOM were collected using a molecular fluorescence spectrometer (F-7000, Hitachi, Japan) in the range of 250–600 nm with a constant offset of 40 nm. Raman scattering was eliminated by deducting ultrapure water (Milli-Q) as a blank subtraction. Solid powders were collected by freeze-drying the CDOM solutions for FTIR analysis using a Nicolet Nexus FTIR spectrometer.

Figures

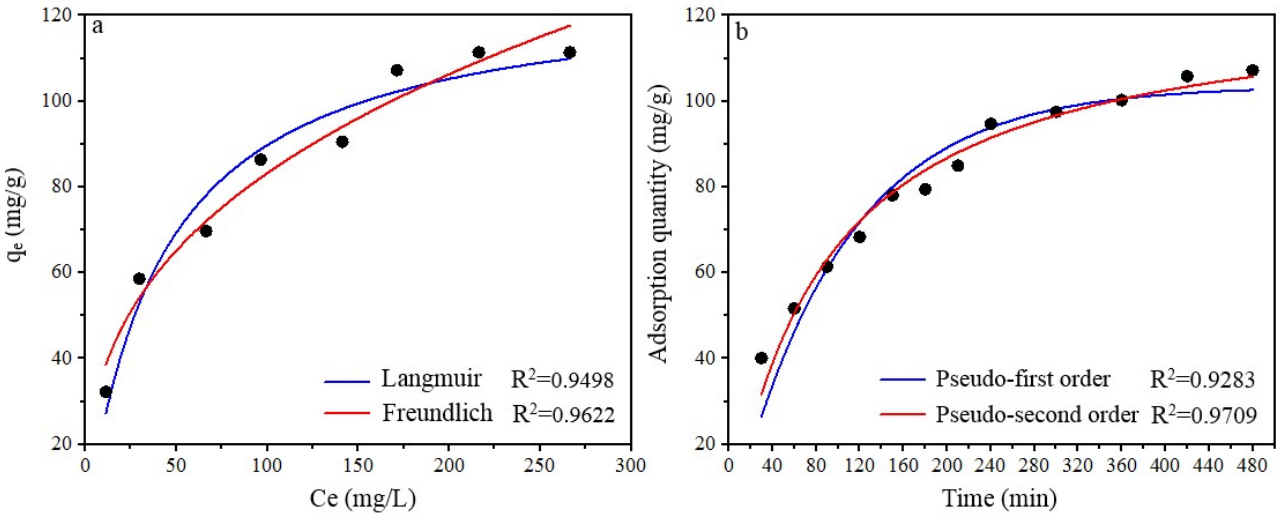

Fig. S1 The adsorption isotherm model (a) and kinetics model (b)

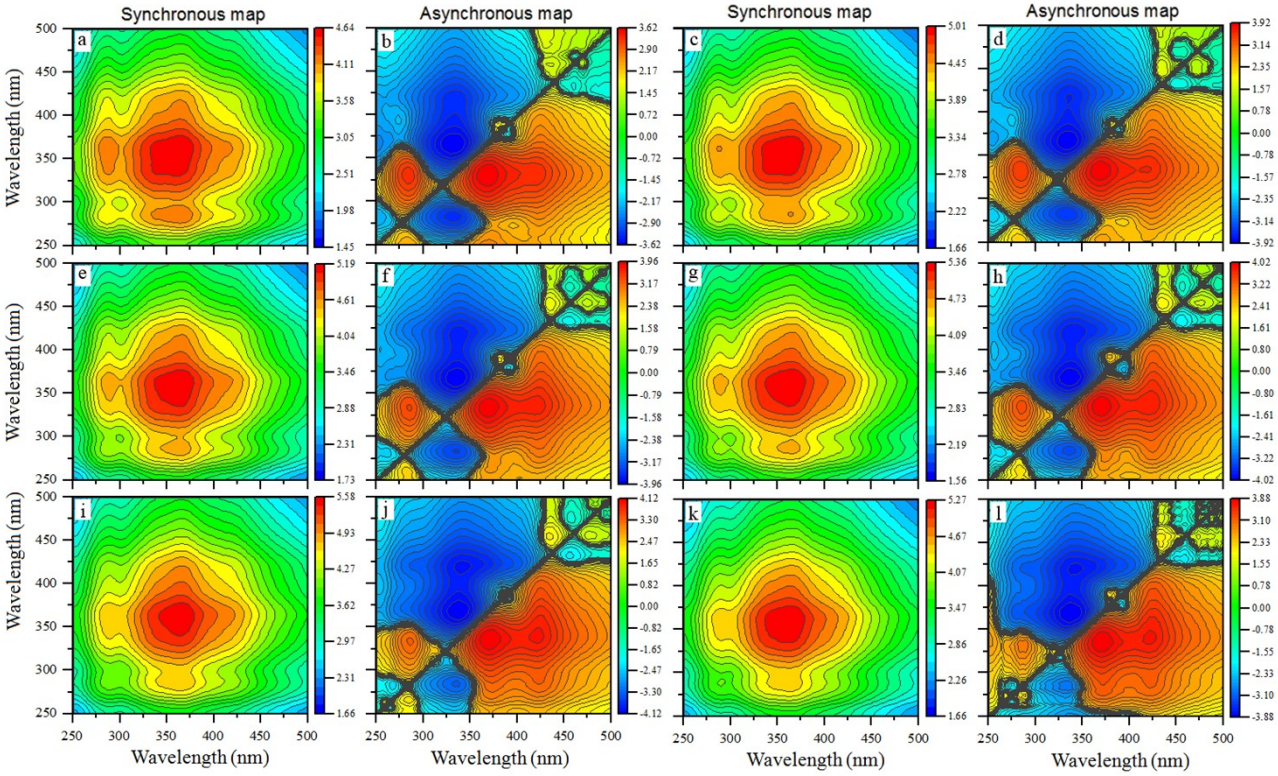

Fig. S2 2D-COS maps of rifampicin wastewater adsorbed by CSB in different COD concentrations: (a, b) 150 mg/L; (c, d) 200 mg/L; (e, f) 250 mg/L; (g, h) 300 mg/L; (i, j) 350 mg/L; and (k, l) 400 mg/L;

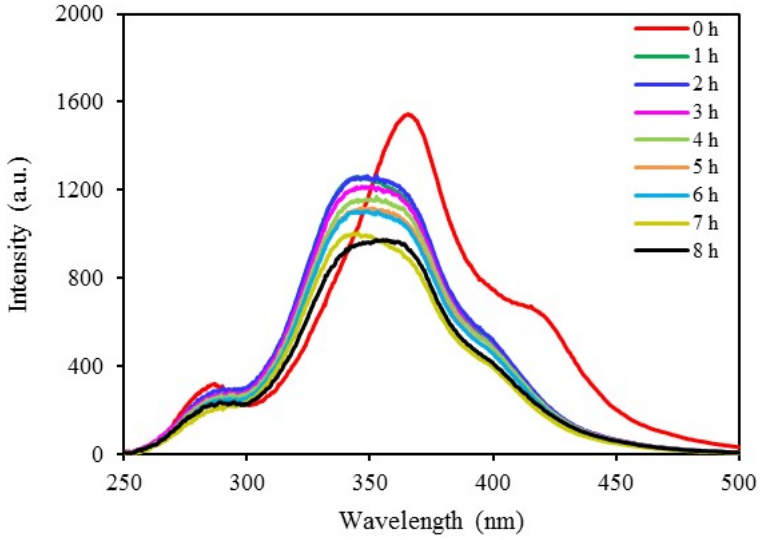

Fig. S3 The changes of fluorescent CDOM in adsorption dynamics process (COD=300 mg/L)

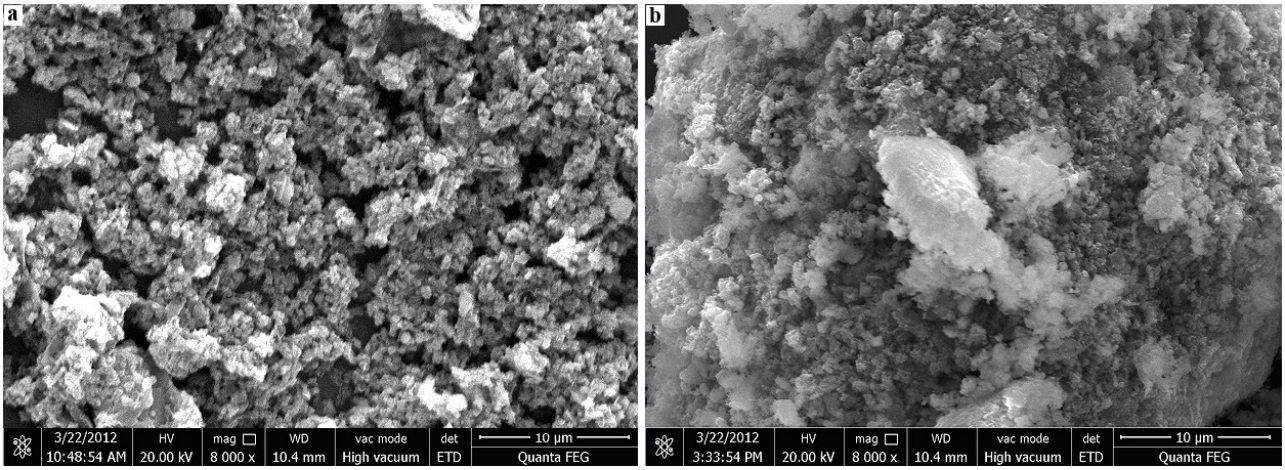

Fig. S4 SEM of CSB (a) before adsorption; (b) after adsorption

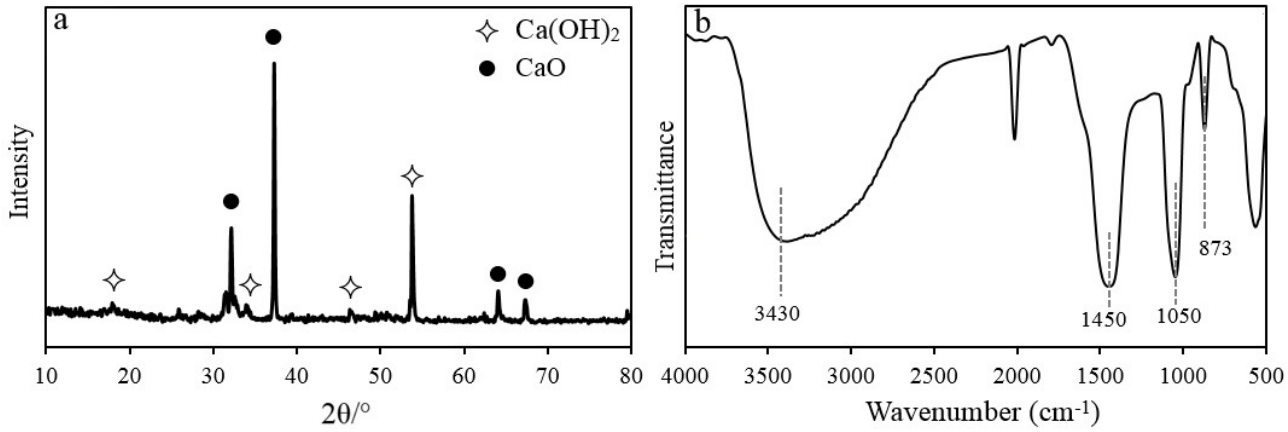

Fig S5 XRD and FTIR of CSB

Tables

Table S1 The positive and negative correlation coefficient of cross-peaks identified by the 2D-SFS-COS

*x*1 / *x*2	334	367	375	390	402	422	465
284	−	+	+	+	+	+	+
334		+	+	+	+	+	+
367			+	−	+	+	−
375				−	−	+	−
390					+	+	−
402						+	−
422							−

1450 cm^{-1} (carboxyl δ_{O-H}, alkane δ_{CH3} or skeleton vibration $v_{C=C}$), 1050 cm^{-1} (alcohol or ethers v_{C-O}), 873 cm^{-1} (the rocking vibration of CaO, nitro-compounds v_{C-N}), 920 cm^{-1} (carboxyl γ_{C-OH}), 1225 cm^{-1} (aryl group v_{C-N}, phenolic v_{C-O}), 722 cm^{-1} (amide γ_{N-H}), and 1700-2000 cm^{-1} (carbonyl group $v_{C=O}$).

Table S2 2D-FTIR-COS results on the assignment of cross- and auto- peaks in synchronous and asynchronous maps.

Wavenumber (cm^{-1})	Assignment
1700-2000	carbonyl group $v_{C=O}$
1450	carboxyl δ_{O-H}, alkane δ_{CH3} or skeleton vibration $v_{C=C}$
1225	aryl group v_{C-N}, phenolic v_{C-O}
1050	alcohol or ethers v_{C-O}
920	carboxyl γ_{C-OH}
873	the rocking vibration of CaO, nitro-compounds v_{C-N}
722	amide γ_{N-H}

Table S3 The positive and negative correlation coefficient of cross-peaks identified by the 2D-FTIR-COS

*x*1 / *x*2	873	914	1050	1225	1450	1700-2000
722	+	+	+	+	+	−
873		−	+	−	+	−
914			+	−	+	−
1050				−	+	−
1225					+	−
1450						−

Table S4 BET parameters of CSB before and after adsorption

Sample	BET (m^2/g)	Pore volume (cm^3/g)	Pore size (Å)
Before	111.86	0.614	219.31
After	61.41	0.476	167.88