Supplementary Information

An Efficient Strategy for Enhancing the Adsorption Capabilities of Biochar via Sequential $KMnO_4$-Promoted Oxidative Pyrolysis and H_2O_2 Oxidation

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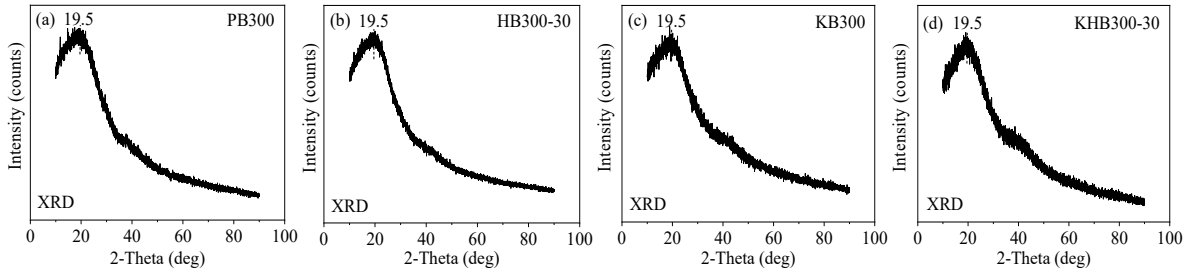


Figure S1. XRD spectra of durian shell biochar (a–d).

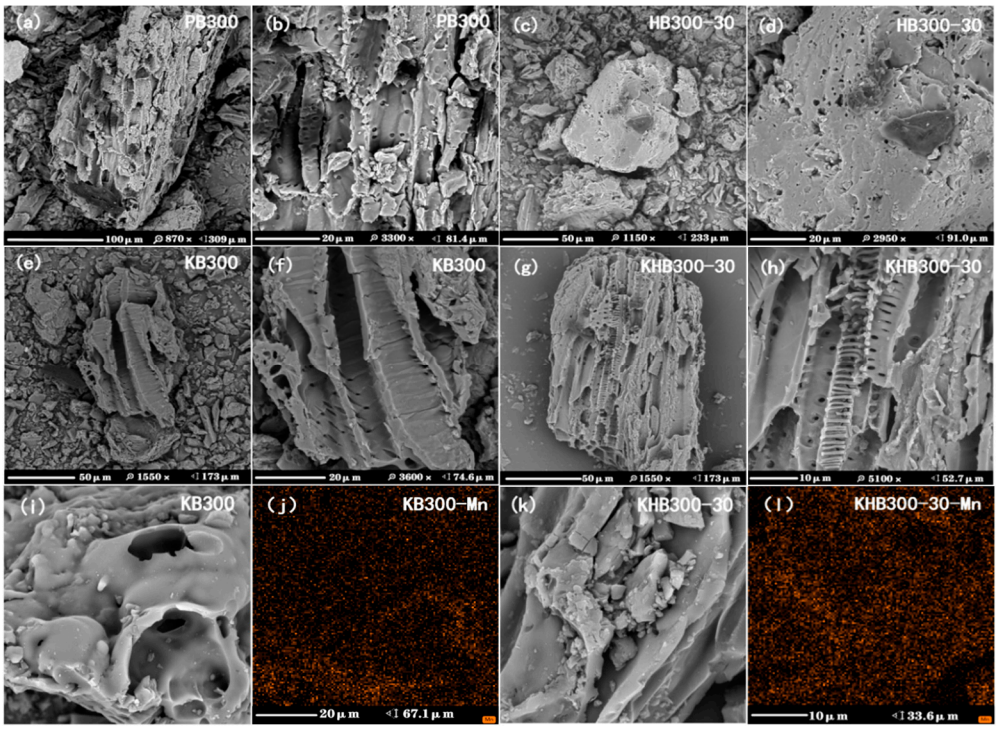


Figure S2. SEM images (a–h) and SEM-EDS spectra (i–l) of durian shell biochar

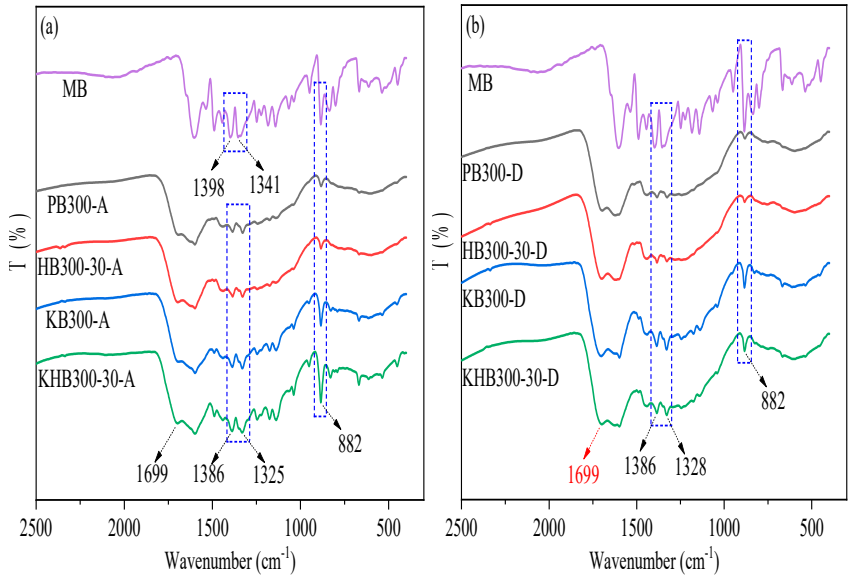


Figure S3. The FTIR spectra of durian shell biochars after absorption (a) and desorption (b) of MB.

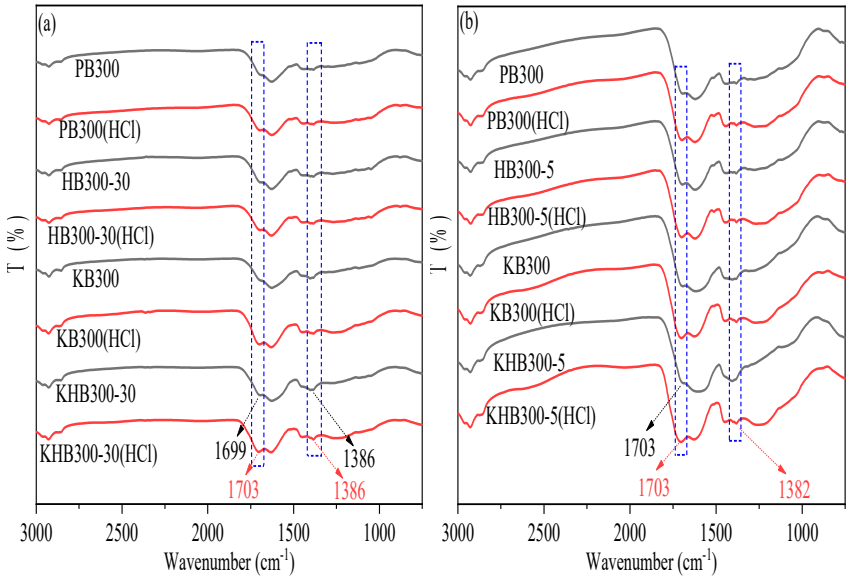


Figure S4. The FTIR spectra of durian shell biochars before and after HCl treatment (a: 1 mg biochar+1 g KBr; b: 2 mg biochar+1 g KBr)

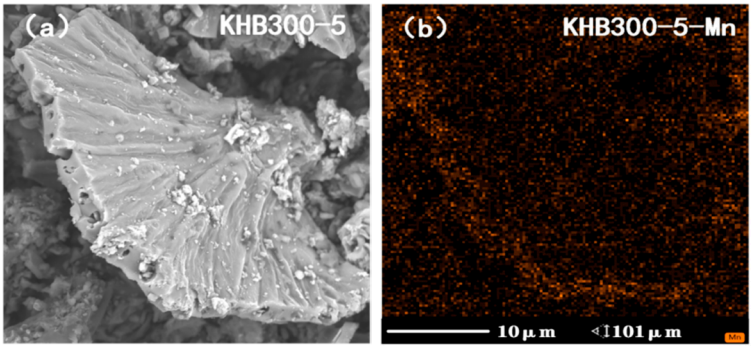


Figure S5. SEM-EDS spectrum of durian shell biochar KHB300-5.

Table S1. The fitted parameters of adsorption kinetics and isotherms.

Adsorption kinetics								
Biochar	C_0 (mg/L)	$q_{e,exp.}$ (mg/g)	Pseudo-first-order model $\ln(q_e - q_t) = \ln q_e - k_1 t$			Pseudo-second-order model $\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \frac{1}{q_e} t$		
			q_e	k_1	R^2	q_e	k_2	R^2
PB300	50	34.78	22.81	0.0566	0.9886	36.42	0.0056	0.9872
	100	35.83	19.20	0.0528	0.9192	36.450	0.0080	0.9913
	200	31.17	16.75	0.0541	0.7467	32.83	0.0077	0.9777
HB300-30	50	26.11	17.57	0.0769	0.9131	27.37	0.0094	0.9903
	100	30.81	23.57	0.0636	0.8986	32.67	0.0052	0.9737
	200	29.20	32.00	0.0112	0.7529	31.94	0.0051	0.9763
KB300	50	74.88	51.03	0.0679	0.9871	79.43	0.0027	0.9931
	100	96.67	77.69	0.0801	0.9689	105.37	0.0017	0.9906

	200	109.87	80.33	0.0546	0.9932	117.23	0.0013	0.9812
KHB300-30	50	91.19	27.32	0.1072	0.9179	92.51	0.0120	0.9998
	100	174.08	100.92	0.0728	0.9641	180.83	0.0017	0.9957
	200	209.93	131.80	0.0727	0.9577	219.30	0.0012	0.9931

Adsorption isotherms

	T (°C)	$q_{m,\,exp.}$ (mg/g)	Langmuir isotherm model $q_e = \frac{K_L q_{max} C_e}{1+K_L C_e}$, $R_L = \frac{1}{1+K_L C_0}$			Freundlich isotherm model $q_e = K_F C_e^{1/n}$		
			q_m	K_L	R^2	K_F	n	R^2
PB300	25 °C	45.66	45.91	1.1192	0.9998	32.6672	12.9651	0.8096
	35 °C	64.77	65.66	1.6518	0.9994	43.1672	10.2764	0.8549
	45 °C	80.52	80.97	8.5172	0.9998	48.5362	7.9962	0.7463
HB300-30	25 °C	33.96	33.94	3.7386	0.9999	27.8430	21.5378	0.4948
	35 °C	48.81	48.01	1.2054	0.9986	38.1418	18.7547	0.6049
	45 °C	65.23	65.66	0.9651	0.9996	42.5892	10.0827	0.7202
KB300	25 °C	135.20	132.10	0.1092	0.9873	85.9925	15.0308	0.7687
	35 °C	146.84	152.21	0.6329	0.9965	102.9167	12.5597	0.8915
	45 °C	195.20	200.00	0.2103	0.9974	109.0962	8.7520	0.9880
KHB300-30	25 °C	246.11	242.13	0.3945	0.9968	139.4519	8.7974	0.9400
	35 °C	300.83	269.54	0.5400	0.9796	149.3511	7.7724	0.9199
	45 °C	298.15	299.40	0.3981	0.9968	153.0722	7.0393	0.9462