Supplementary Material

The sorption of sulfamethoxazole by aliphatic and aromatic carbons from lignocellulose pyrolysis

Gang Chu [a, *], Zifeng Han [a], Zimo Wang [a], Defeng Kong [a], Wenxiu Qin [a], Youbin Si [a, *], Guozhong Wang [b], Christian E.W. Steinberg [c]

[a] *Anhui Province Key Laboratory of Farmland Ecological Conservation and Pollution Prevention, Faculty of Resources and Environment, Anhui Agricultural University, Hefei 230036, Anhui, China*

[b] *Key Laboratory of Materials Physics, Centre for Environmental and Energy Nanomaterials, Institute of Solid State Physics, Chinese Academy of Sciences, Hefei, 230031, China*

[c] *Faculty of Life Sciences, Institute of Biology, Freshwater & Stress Ecology, Humboldt-University at Berlin, Arboretum, Späthstr. 80/81, 12437 Berlin, Germany*

*Corresponding author,

Gang Chu (Ph. D.), E-mail: gangchu@aliyun.com;

Youbin Si (Ph. D., Prof.), E-mail: youbinsi@ahau.edu.cn;

Figures

Figure S1

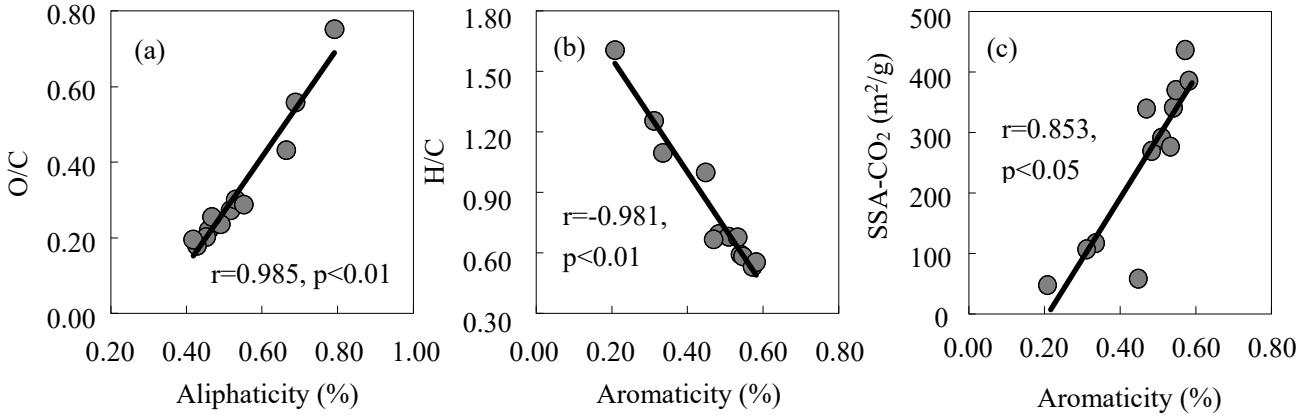


Figure S1. The correlation between O/C and aliphaticity (a), H/C and aromaticity (b), SSA-CO_2 and aromaticity (c) for biochars produced from BA, PS, CE and LI.

Figure S2

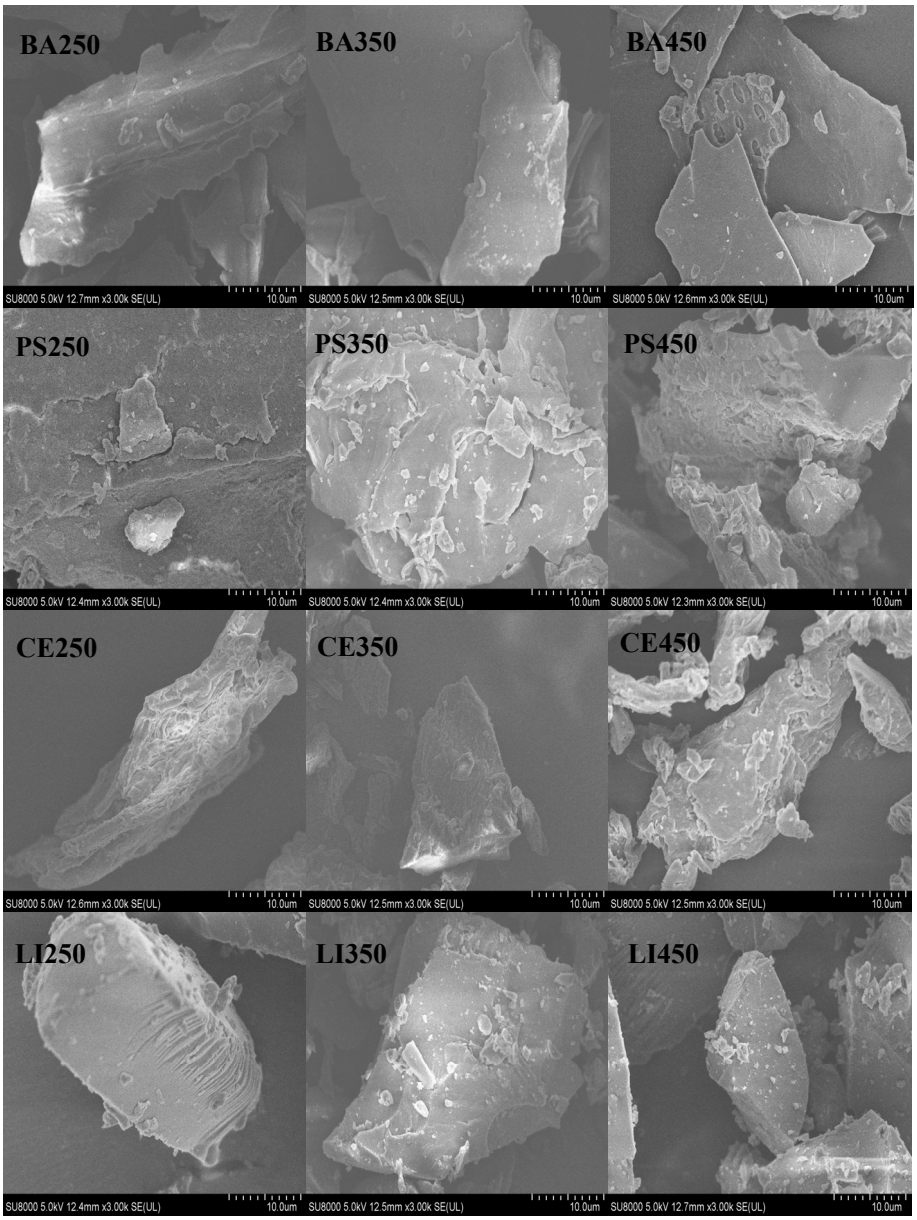


Figure S2. Scanning electron microscope (SEM) images of biochars from BA, PS, CE and LI, respectively.

Tables

Table S1. The content of cellulose, hemicellulose and lignin in precursor biomasses according to the literatures.

Biomass	Cellulose	Hemicellulose	Lignin	Literatures
PS	48.6%	10.5%	25.3%	[23]
BA	42.2%	27.6%	21.6%	[24]

Table S2. Selected physico-chemical properties of SMX.

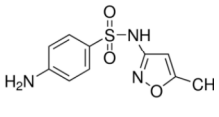
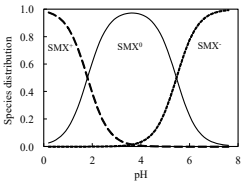
Sorbates	Chemical Formula	M[a] (g/mol)	p*K*a[b]	C_s[c](mg/L)	logK_{ow}[d]	Molecular structure	Species distribution
SMX	$C_{10}H_{11}N_3O_3S$	253.3	1.7 5.7	365	0.48		

Table S3. The titration results of acidic groups of biochars.

Content (μmol/g)	BA250	BA350	BA450	PS250	PS350	PS450
Acidity	0.079	0.073	0.055	0.054	0.050	0.030
carboxyl	0.037	0.038	0.034	0.032	0.033	0.027
phenol	0.042	0.035	0.021	0.022	0.017	0.003
Content (μmol/g)	CE250	CE350	CE450	LI250	LI350	LI450
Acidity	0.067	0.071	0.054	0.029	0.029	0.025
carboxyl	0.035	0.033	0.036	0.024	0.023	0.021
phenol	0.032	0.038	0.018	0.005	0.006	0.003

Table S4. Fitting results of sorption isotherms of SMX on various biochars.

Samples		Freundlich model			K_d[b]	Dubinin-Astakhov model			
	pH	K_F[a]	*n*	R_{adj}^2	(0.1C_s)	Q^0 (mg/g)	E (kJ/mol)	*b*	R_{adj}^2
GAN250	4.00	0.81	0.49	0.85	0.13	1.77	9.99	2.76	0.96
	7.00	0.54	0.54	0.92	0.10	2.02	7.27	1.54	0.98
GAN350	4.00	0.21	0.81	0.99	0.11	-	-	-	-
	7.00	0.33	0.36	0.87	0.03	0.36	11.04	2.51	0.88

GAN450	4.00	1.04	0.81	1.00	0.52	5.17	2.36	0.90	0.95
	7.00	0.73	0.40	0.90	0.08	1.38	10.43	2.04	0.93
WD250	4.00	0.28	0.67	0.98	0.08	1.95	6.45	1.52	0.99
	7.00	0.26	0.52	0.91	0.05	1.18	7.52	1.65	0.98
WD350	4.00	0.40	0.46	0.84	0.06	1.35	7.92	1.56	0.91
	7.00	0.17	0.40	0.93	0.02	-	-	-	-
WD450	4.00	0.44	0.60	0.98	0.10	2.90	3.56	0.94	0.98
	7.00	0.30	0.34	0.89	0.03	0.18	11.71	2.46	0.97
CE250	4.00	0.37	0.73	0.98	0.14	3.09	4.12	1.14	0.99
	7.00	0.33	0.58	0.97	0.07	1.48	8.13	1.91	0.97
CE350	4.00	0.16	0.72	0.98	0.06	2.00	4.88	1.30	0.99
	7.00	0.11	0.42	0.95	0.01	-	-	-	-
CE450	4.00	0.08	0.89	0.97	0.05	2.83	2.58	1.00	0.99
	7.00	0.09	0.49	0.90	0.01	-	-	-	-
LI250	4.00	0.05	0.66	0.94	0.01	0.21	6.13	1.62	0.94
	7.00	0.03	0.70	0.80	0.01	0.28	4.92	1.35	0.94
LI350	4.00	0.14	0.46	0.82	0.02	0.19	8.82	1.92	0.95
	7.00	0.08	0.50	0.93	0.01	-	-	-	-
LI450	4.00	0.05	0.62	0.83	0.01	-	-	-	-
	7.00	0.04	0.62	0.83	0.01	0.20	5.76	1.61	0.92

[a] K_F [(mg/g)/(mg/L)^n]; [b] sorption coefficient calculated at $0.1C_s$;