supplementary materials

Straw biochar at different pyrolysis temperatures passivate pyrite by promoting the electron transfer from biochar to pyrite

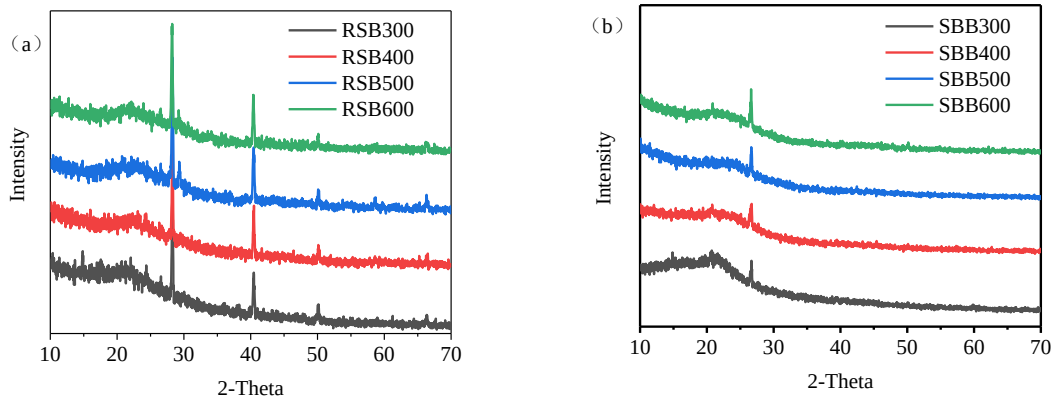

Figure S1 XRD spectra of RSB and SBB at different pyrolysis temperatures: (a) RSB; (b) SBB.

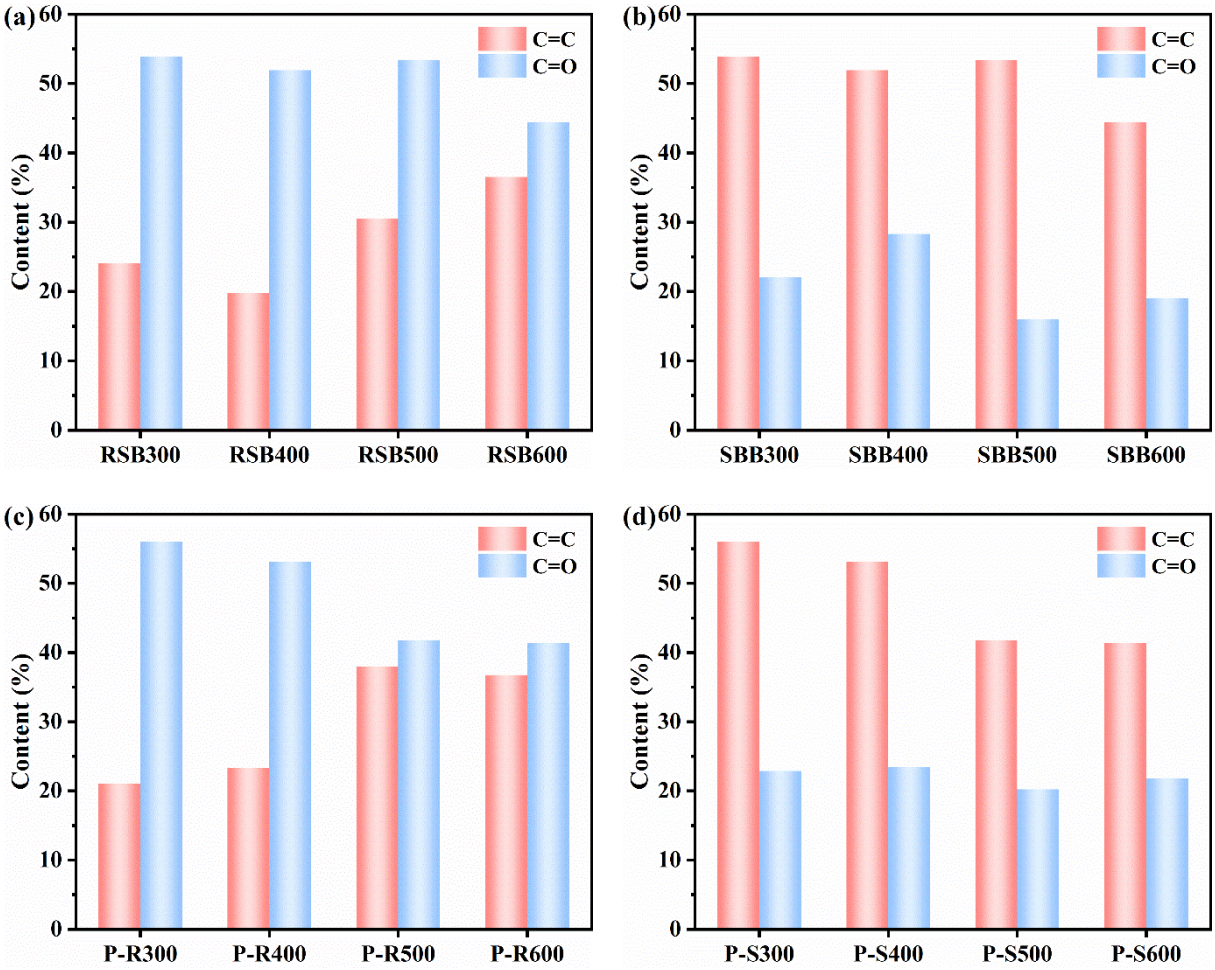

Figure S2 The C=C and C=O distributions of FTIR spectra in the range of 1800-1000 cm^{-1} were fitted: (a) RSB; (b) SBB; (c) P-R; (d) P-S.

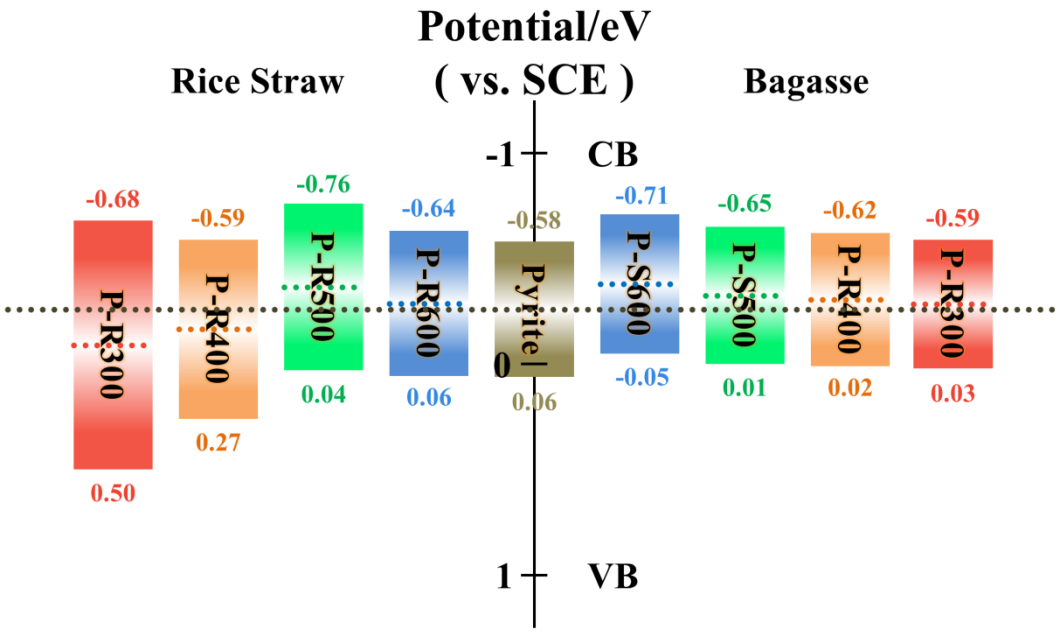

Figure S3 The positions of conduction bands, valence bands and Fermi energy levels of each material (vs. SCE).

Table S1 Corrosion currents of probiochar and pyrite–biochar mixtures.

Samples	Corrosion potential (V)	Corrosion current (μA)
PY	0.107	0.171
P-R300	-0.383	0.292
P-R400	-0.031	0.252
P-R500	0.065	0.119
P-R600	0.037	0.102
P-S300	-0.173	0.179
P-S400	-0.057	0.226
P-S500	0.065	0.299
P-S600	-0.102	0.409

Table S2 pH and elemental contents of biochar and pyrite–biochar mixtures.

Samples	pH	Elemental content (%)				Atomic ratio
		C	H	N	S	H/C
RSB300	8.57	45.52	3.58	1.53	0.20	0.94
RSB400	9.92	46.44	2.95	1.53	0.28	0.76
RSB500	10.77	46.34	2.10	1.51	0.36	0.54
RSB600	10.92	47.48	1.53	1.28	0.32	0.39
P-R300	2.71	25.74	2.15	0.82	15.79	1.00
P-R400	3.02	12.84	0.84	0.40	32.38	0.79
P-R500	5.03	16.07	0.70	0.50	22.66	0.52
P-R600	5.47	11.44	0.37	0.31	15.56	0.39
SBB300	4.76	61.34	2.97	0.89	0.52	0.58
SBB400	4.71	58.33	2.90	1.15	0.52	0.60
SBB500	5.63	64.07	2.23	1.02	0.41	0.42
SBB600	6.22	61.76	1.80	0.95	0.33	0.35
P-S300	2.09	36.72	1.41	0.49	13.59	0.46
P-S400	2.08	27.47	1.37	0.55	14.87	0.60
P-S500	2.11	34.22	1.45	0.71	8.22	0.51
P-S600	2.09	23.58	0.85	0.69	7.87	0.43

Table S3 Redox potentials and flat band potentials of pyrite and pyrite–biochar mixtures

Samples	Redox potential (V)	Flat band potential (eV vs. SCE)
PY	-0.50	-0.26
RSB300	-0.53	-0.04
RSB400	-0.56	-0.12
RSB500	-0.58	-0.49
RSB600	-0.59	-0.44
SBB300	-0.56	-0.45
SBB400	-0.51	-0.55
SBB500	-0.52	-0.62
SBB600	-0.55	-0.71
P-R300	-0.41	-0.09
P-R400	-0.50	-0.16
P-R500	-0.57	-0.36
P-R600	-0.53	-0.29
P-S300	-0.41	-0.28
P-S400	-0.46	-0.30
P-S500	-0.48	-0.32
P-S600	-0.43	-0.38