Supporting Materials

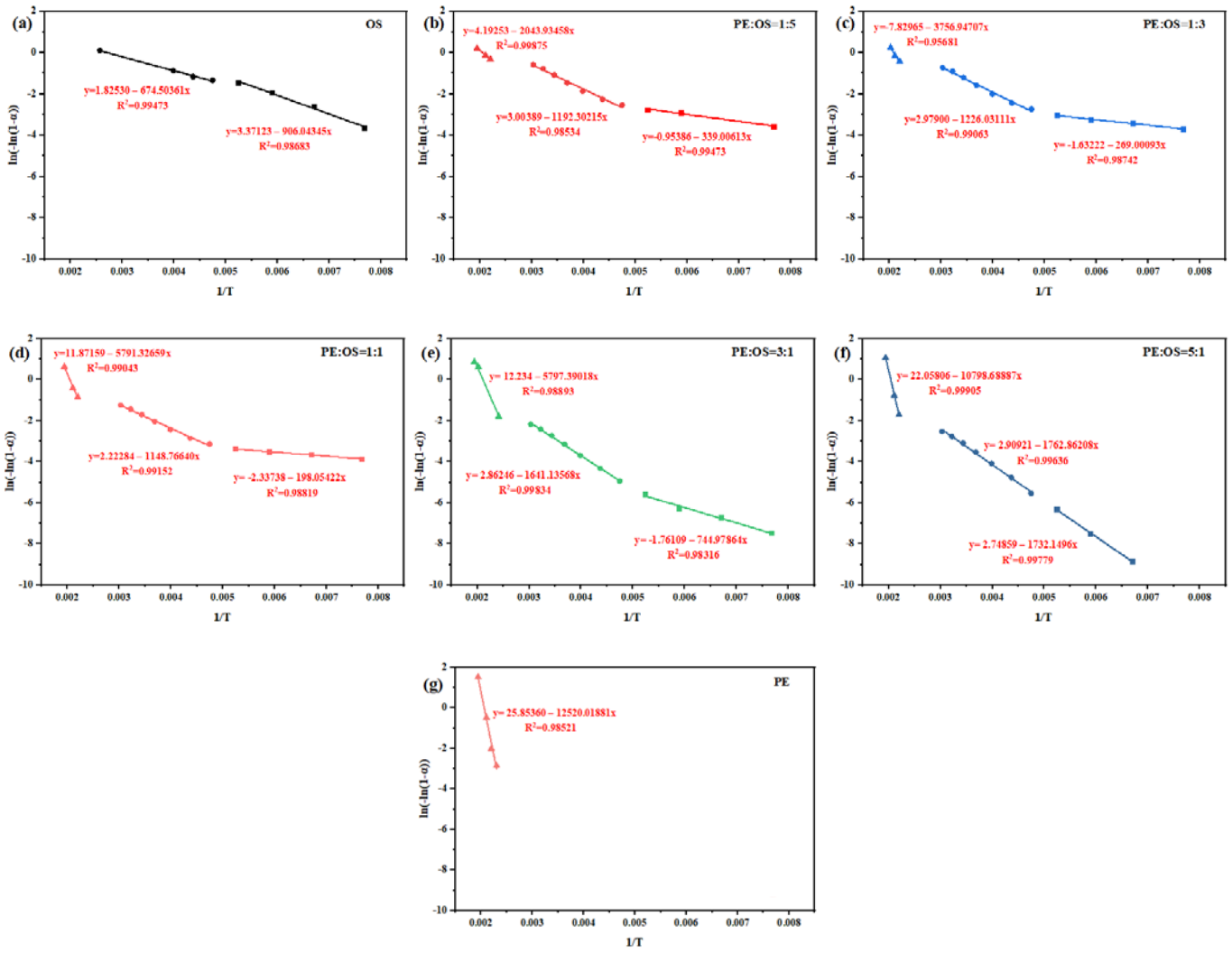

Fig. S1 Fitting curves of calculation values of pyrolysis dynamic parameters of OS, PE, and their mixtures. (a) OS; (b) PE:OS=1:5; (c) PE:OS=1:3; (d) PE:OS=1:1; (e) PE:OS=3:1; (f) PE:OS=5:1; (g) PE.

Table S1 Pyrolysis dynamic parameters of OS, PE, and their mixtures.

Sample	Stage	Fitting equation	R^2	E_a (kJ/mol)	A (K^{-1})
OS	1	y=3.37123 – 906.04345x	0.98683	7.53	66.36
	2	y=1.82530 – 674.50361x	0.99473	5.60	19.02
	3	–	–	–	–
PE:OS=1:5	1	y= –0.95386 – 339.00613x	0.99473	2.82	15.80
	2	y=3.00389 – 1192.30215x	0.98534	9.91	34.92
	3	y=4.19253 – 2043.93458x	0.99875	16.99	66.87
PE:OS=1:3	1	y= –1.63222 – 269.00093x	0.98742	2.34	1.43
	2	y=2.97900 – 1226.03111x	0.99063	10.19	33.13
	3	y=7.82965 – 3756.94707x	0.95681	31.24	1.38×10^3
PE:OS=1:1	1	y= –2.33738 – 198.05422x	0.98819	1.65	1.00
	2	y=2.22284 – 1148.76640x	0.99152	9.55	16.59
	3	y=11.87159 – 5791.32659x	0.99043	48.15	5.10×10^4
PE:OS=3:1	1	y= –1.76109 – 744.97864x	0.98316	6.19	0.48
	2	y=2.86246 – 1641.13568x	0.99834	13.64	22.03
	3	y=12.234 – 5797.39018x	0.98893	48.20	7.32×10^4
PE:OS=5:1	1	y=2.74859 – 1732.14960x	0.99779	14.40	18.62
	2	y=2.90921 – 1762.86208x	0.99636	14.66	21.47
	3	y=22.05806 – 10798.68887x	0.99905	89.78	7.26×10^8
PE	1	–	–	–	–
	2	–	–	–	–
	3	y=25.85360 – 12520.01881x	0.98521	104.09	2.79×10^{10}

Table S2 Difference values (DV) between practical and calculated releasing amounts of hydrocarbons during pyrolysis of OS/PE mixtures.

PE:OS	DV			
	CH_4	C_2H_6	C_4H_{10}	C_5H_{12}
1:5	−0.07	+0.49	+0.16	+0.13
1:3	−0.37	+0.47	−0.08	−0.22
1:1	−0.38	+1.07	+0.66	+0.73
3:1	−0.82	+1.88	+0.09	+1.62
5:1	−0.77	+2.40	+1.59	+5.75

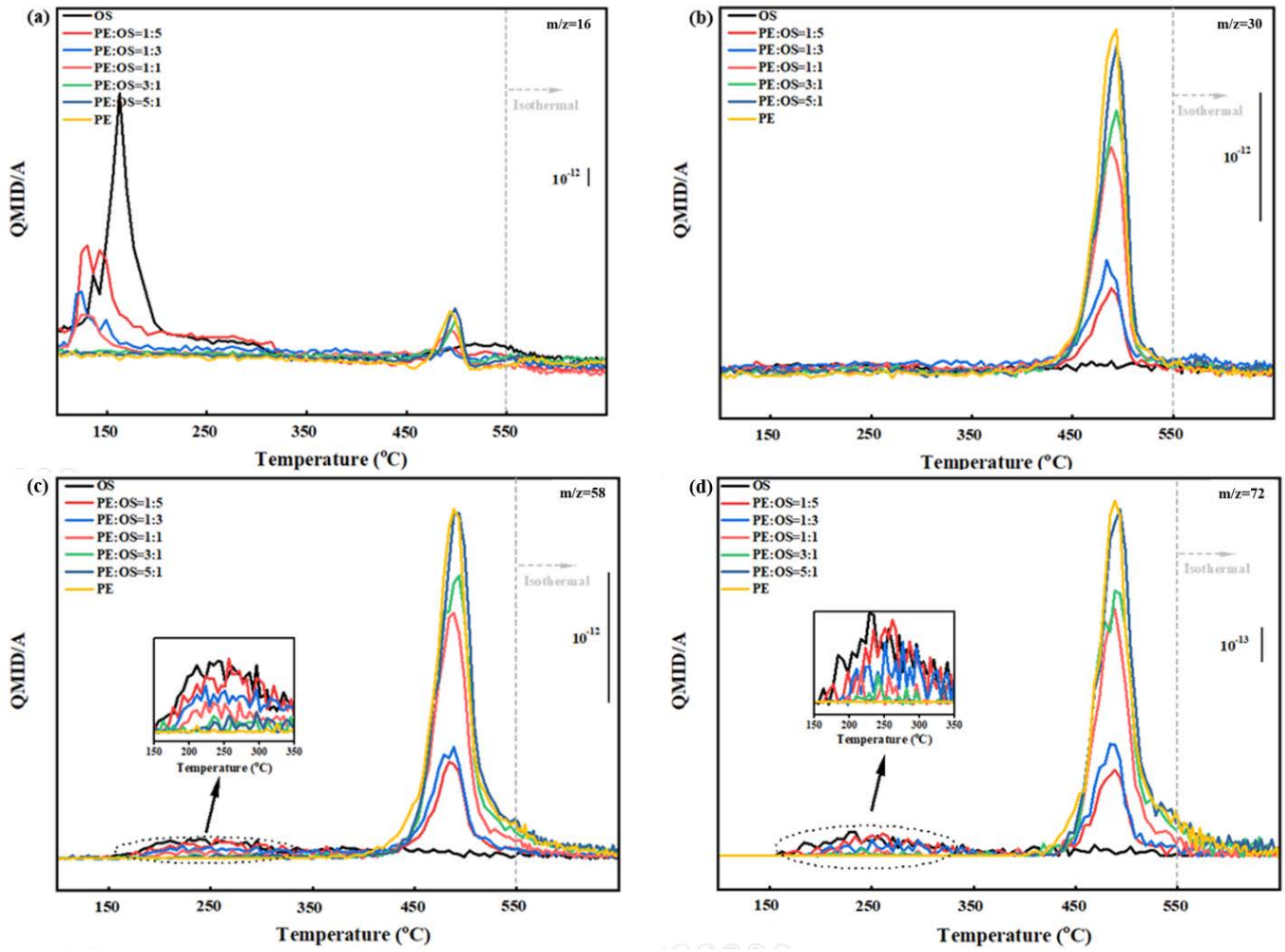

Fig. S2 The releasing profiles of hydrocarbons during pyrolysis of OS, PE, and their mixtures. (a) m/z=16; (b) m/z=30; (c) m/z=58; (d) m/z=72.

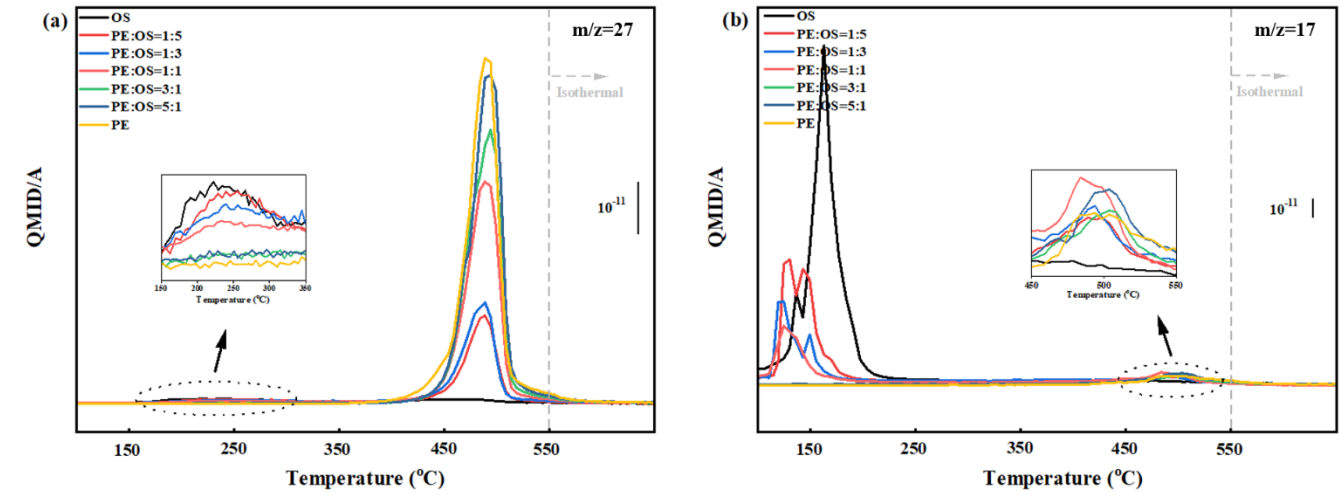

Fig. S3 Nitrogen containing pollutants emission curves during pyrolysis of OS, PE, and their mixtures. (a) m/z=27; (b) m/z=17.

Scanning electron microscopy (SEM) of solid residues were measured by a microscopy (Quanta 450 FEG, Thermo Fisher Scientific, USA) with an accelerating voltage of 20 kV. Figure S4 presents the morphology of solid residues. The solid residue from OS pyrolysis exhibited rough surface with irregular channels, while the channels in solid residue from PE pyrolysis was surrounded by agglomerated particles. Interestingly, the morphology of solid residues from pyrolysis of OS/PE mixtures exhibited a large number of shallow pits and smoother surface, implying the synergistic effect on solid residues, especially during PE:OS=1:1 and 3:1 pyrolysis. On one hand, because of successive pyrolysis of OS and PE, secondary reactions from PE addition occurred on the surface of solid residues from OS pyrolysis at higher temperature. On the other hand, the lower E_a values of stage 3 caused by the synergy between OS and PE contributed to the uniform and violent gas release on the surface of solid residues, which created these shallow pits.

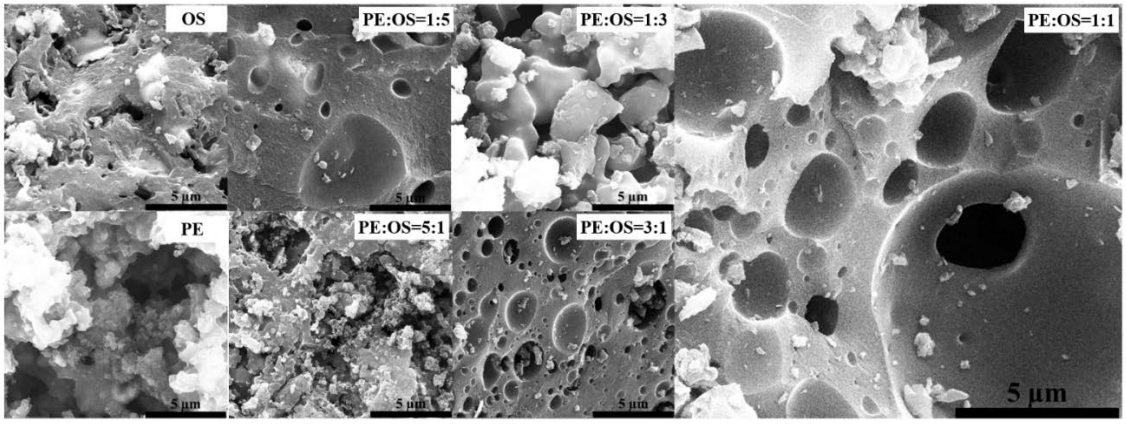

Fig. S4 SEM images of solid residues from pyrolysis of OS, PE, and their mixtures.