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Supplementary data

2 **Phototransformation of extracellular polymeric substances**
3 **in activated sludge and their interaction with microplastics**

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23 This Supplementary data includes a total of 7 pages (including this page) with 2 sections

24 for experimental, references, and 4 figures and 2 tables.

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26 1. Experimental

27 1.1 Adsorption kinetics

28 The adsorption kinetics of EPS on PSMPs were described using the pseudo first-
29 (Eq. (1)) and second-order model (Eq. (2)), respectively ¹:

$$30 \quad \ln (q_e + q_t) = \ln q_e - k_1 t \quad (1)$$

$$31 \quad \frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \frac{t}{q_e} \quad (2)$$

32 where k_1 (h^{-1}) and k_2 ($\text{g mg C}^{-1}\text{h}^{-1}$) were the rate constants for the pseudo first- and
33 second-order models, respectively, q_e (mg C g^{-1}) and q_t (mg C g^{-1}) were the amounts of
34 solute adsorbed per unit adsorbent at equilibrium and at time t (h), respectively.

35 1.2 Adsorption isotherm

36 The Langmuir (Eq. (3)), and Freundlich (Eq. (4)) model were employed to fit the
37 equilibrium adsorption data of EPS on PSMPs ^{1,2}.

$$38 \quad q_e = \frac{q_{\max} K_L C_e}{1 + K_L C_e} \quad (3)$$

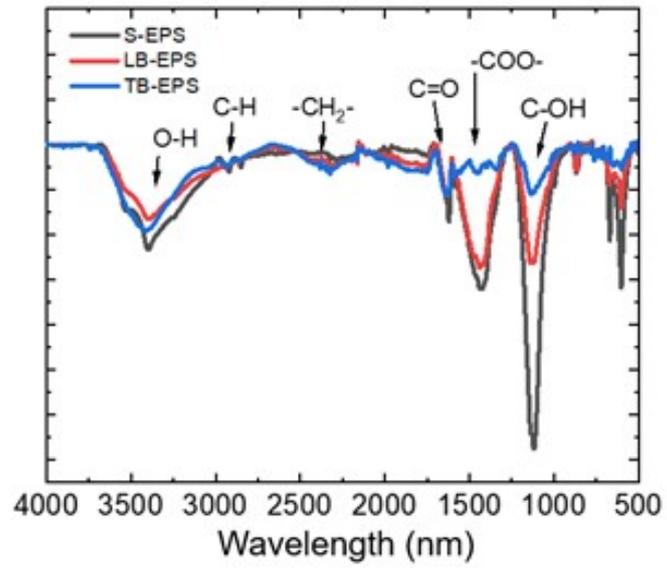
$$39 \quad q_e = K_F C_e^{1/n} \quad (4)$$

40 where q_e (mg C/g) and q_{\max} (mg C /g) were absorbed amount of EPS on PSMPs at
41 equilibrium and the maximum sorption capacity of EPS (mg C/g), respectively. K_L
42 (L/(mg C)) is the Langmuir adsorption equilibrium constant related to the energy or net
43 enthalpy. K_F (L/(mg C)) was the Freundlich adsorption equilibrium constant indicating
44 the relative adsorption capacity of the adsorbent, n was the Freundlich constant
45 representing the intensity of adsorption.

46 2. Reference

- 47 1. F. Wang, J. Yao, H. Chen, Z. Yi and B. Xing, *Environ. Pollut.*, 2013, **180**, 1-6.
 - 48 2. F. F. Liu, J. L. Fan, S.-g. Wang and G.-h. Ma, *Chem. Eng. J.*, 2013, **219**, 450-458.
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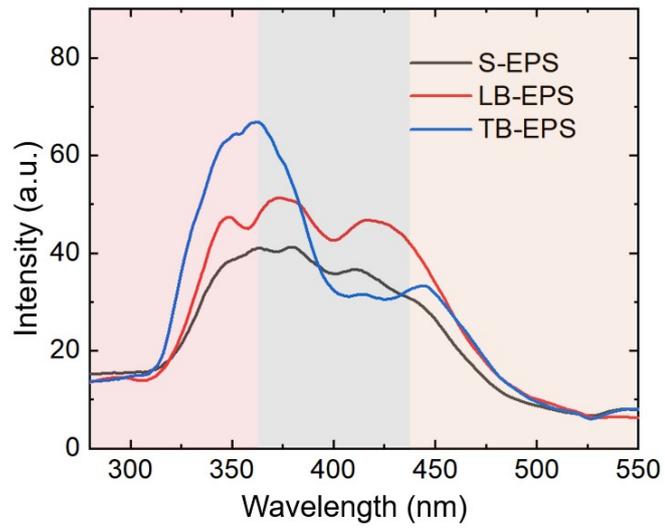
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Figure S1 FTIR spectra of EPS

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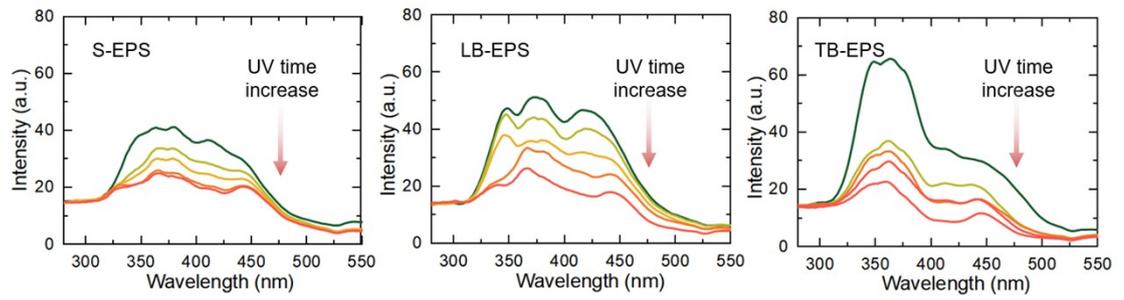
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Figure S2 Synchronous fluorescence of EPS

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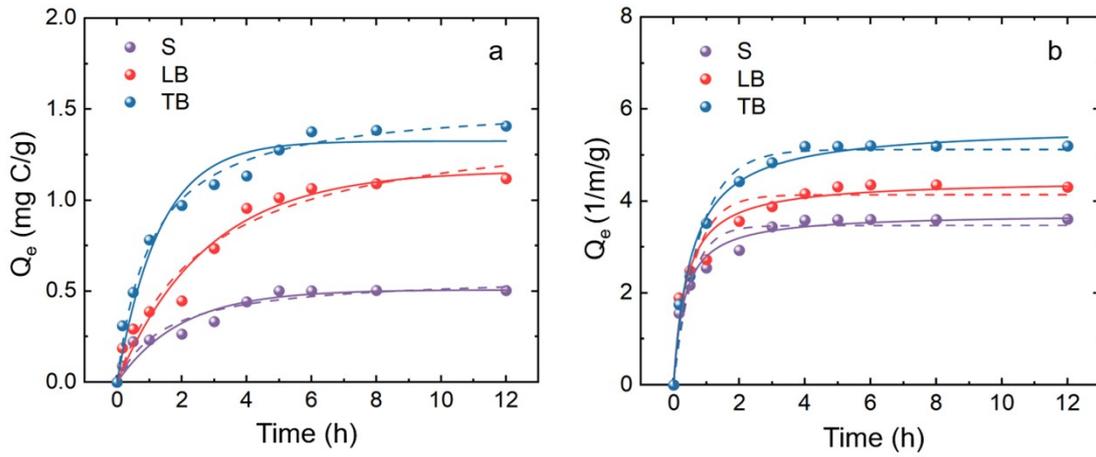
62 Figure S3 Synchronous fluorescence of S-EPS, LB-EPS, TB-EPS during S2

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phototransformation

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67 Figure S4 Based on (a) TOC and (b) UV₂₅₄ analysis, adsorption kinetics of PSMPs on

68 S-EPS, LB-EPS and TB-EPS, primary kinetics (dashed line), secondary kinetics

69 (solid line)

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Table S1 Adsorption kinetics of EPS adsorbed by PSMPs

Measurements	EPSs	Pseudo first-order model			Pseudo second-order model			
		q_e (mg C·g ⁻¹)	k_1 (h ⁻¹)	R ²	q_e (mg C·g ⁻¹)	k_2 (g mg C ⁻¹ h ⁻¹)	v_0 (mg C·g ⁻¹ ·h ⁻¹)	R ²
TOC (mg C·L ⁻¹)	S-EPS	0.508	0.509	0.925	0.588	0.454	0.157	0.940
	LB-EPS	1.16	0.363	0.966	1.46	0.600	1.28	0.961
	TB-EPS	1.32	0.764	0.964	1.55	1.14	2.74	0.988
UV ₂₅₄ (m ⁻¹)	S-EPS	3.47	1.26	0.937	3.73	0.325	4.52	0.979
	LB-EPS	4.14	1.63	0.917	4.46	0.586	11.7	0.966
	TB-EPS	5.12	1.91	0.976	5.63	0.606	19.2	0.987

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Table S2 Langmuir and Freundlich isothermal parameters of the phototransformation of EPS onto PSMPs

Measurements	EPS	Phototransformation time	Langmuir model			Freundlich model		
			q_m (mg C·g ⁻¹)	K_L (L·(mg C) ⁻¹)	R ²	K_F (L (mg C) ⁻¹)	n	R ²
DOC (mg C·L ⁻¹)	S-EPS	0 h	1.38	0.603	0.973	0.483	2.224	0.987
		8 h	1.22	0.240	0.992	0.263	1.81	0.998
		48 h	0.954	0.149	0.973	0.146	1.63	0.972
	LB-EPS	0 h	1.51	1.46	0.968	0.835	3.61	0.990
		8 h	1.58	0.191	0.985	0.290	1.71	0.986
		48 h	0.978	0.273	0.998	0.229	1.87	0.991
	TB-EPS	0 h	1.87	1.86	0.994	1.23	5.13	0.985
		8 h	1.59	0.244	0.995	0.351	1.84	0.998
		48 h	0.924	0.455	0.978	0.313	2.37	0.998
a_{254} (m ⁻¹)	S-EPS	0 h	3.13	0.280	0.986	0.866	2.45	0.987
		8 h	2.70	0.177	0.992	0.518	1.92	0.991
		48 h	1.93	0.115	0.947	0.267	1.70	0.950