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Supplementary Information

Adsorption of Copper by Naturally and Artificially Aged Polystyrene

Microplastics and Subsequent Release in Simulated Gastrointestinal Fluid

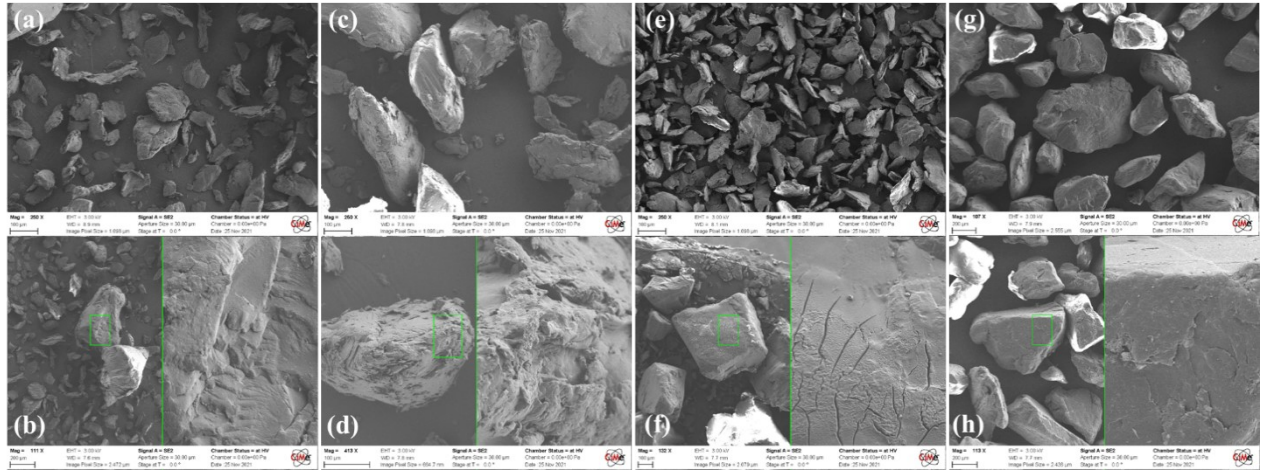
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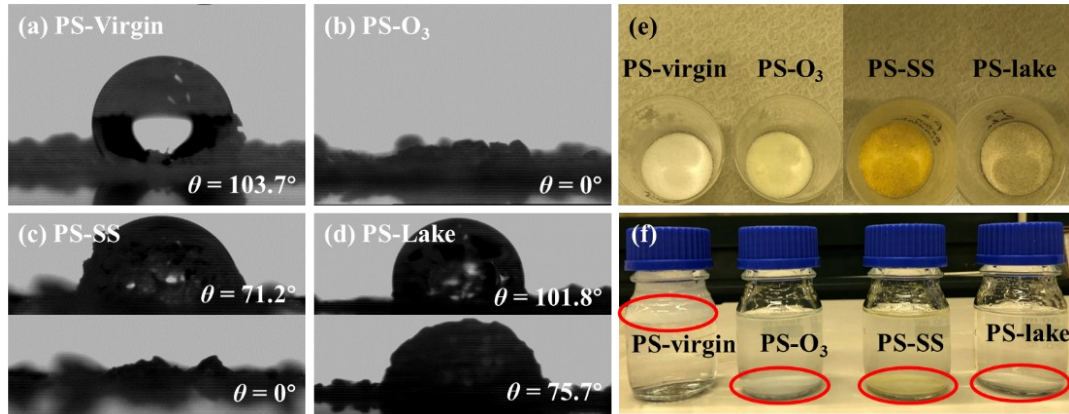


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14 Figure S1. SEM images of (a), (b) PS-Virgin; (c), (d) PS-O₃; (e), (f) PS-SS; (g), (h) PS-

15 Lake.

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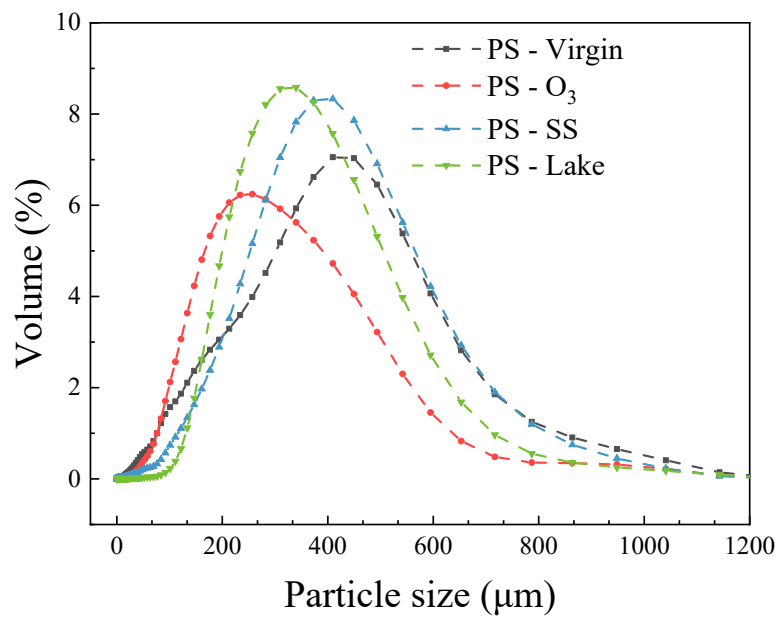


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18 Figure S2 Contact angle values of ultrapure water on (a) PS-Virgin, (b) PS-O₃, (c) PS-

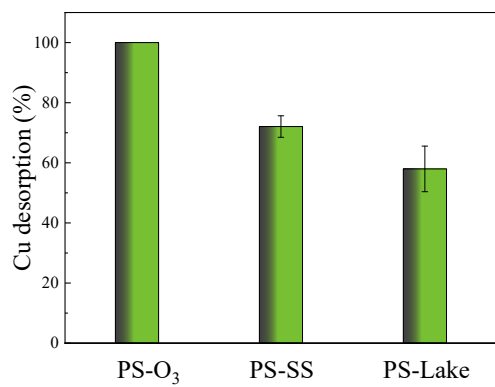
19 SS, (d) PS-Lake; (e) Color, and (f) Standing state in water of PS-Virgin, PS-O₃, PS-SS,

20 PS-Lake.



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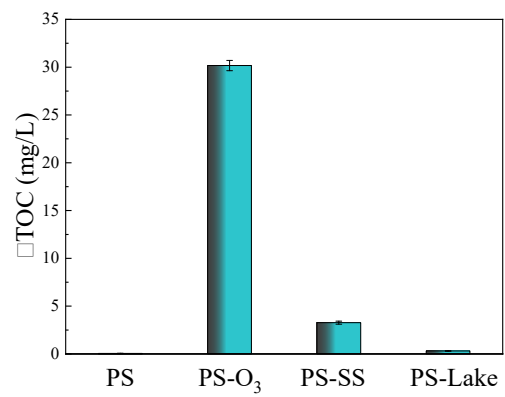
22 Figure S3 Size distribution of PS-Virgin, PS-O₃, PS-SS, PS-Lake.



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24 Figure S4. Cu desorption ratio from PS-O₃, PS-SS, and PS-Lake in SGF.

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27 Figure S5 TOC of released from microplastics after Cu adsorption.

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29 Table S1 Composition of simulated gastric fluids.¹

Composition	Concentration (mmol/L)
Cl ⁻	153.5
SO ₄ ²⁻	0.9
Na ⁺	148.0
K ⁺	3.0
Mg ²⁺	0.9
Ca ²⁺	1.3
Galactose	5.0
Na-Pyruvate	5.0
Pepsin	0.2
pH	2.0

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31 Table S2 The D10, D50 and D90 for the size distribution of PS-Virgin, PS-O₃, PS-SS,

32 PS-Lake.

	D10/ μm	D50/ μm	D90/ μm
PS-Virgin	92	310	594
PS-O ₃	101	233	449
PS-SS	146	338	593
PS-Lake	175	308	494

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34 Table S3 The pseudo-second-order kinetic constants for Cu adsorption on PS-SS and

35 PS-Lake.

MPs	$k_2(10^{-2} \mu\text{g/g min})$	$q_e(\mu\text{g/g})$	R^2
PS-SS	0.87	81.97	0.999
PS-Lake	0.20	113.64	0.993

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37 Table S4 Change of dissolved Cu in SGF with the existence of PS particles compared

38 with food only.

Food	Food quantity	PS-Virgin	PS-O ₃	PS-SS	PS-Lake
<i>Lemna minor</i>	low food	-2.50%	63.19%	204.63%	197.21%
	medium food	8.79%	27.01%	94.05%	103.81%
	high food	1.49%	1.92%	59.59%	73.85%
<i>Gammarus pulex</i>	low food	-0.89%	12.34%	39.16%	106.90%
	medium food	1.13%	5.77%	30.65%	61.35%
	high food	-0.92%	2.18%	9.17%	16.96%

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40 **REFERENCES**

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42 K.; Bergmann, A.; Vermeirssen, E.; Breider, F., In Vitro Digestion of Tire
43 Particles in a Fish Model (*Oncorhynchus mykiss*): Solubilization Kinetics of
44 Heavy Metals and Effects of Food Coingestion. *Environ Sci Technol* **2021**, *55*
45 (23), 15788-15796.