Supplemental Information

Adsorption/Desorption Behavior of Bisphenol A by Degradable Polylactic Acid Microplastics under different Aged Conditions

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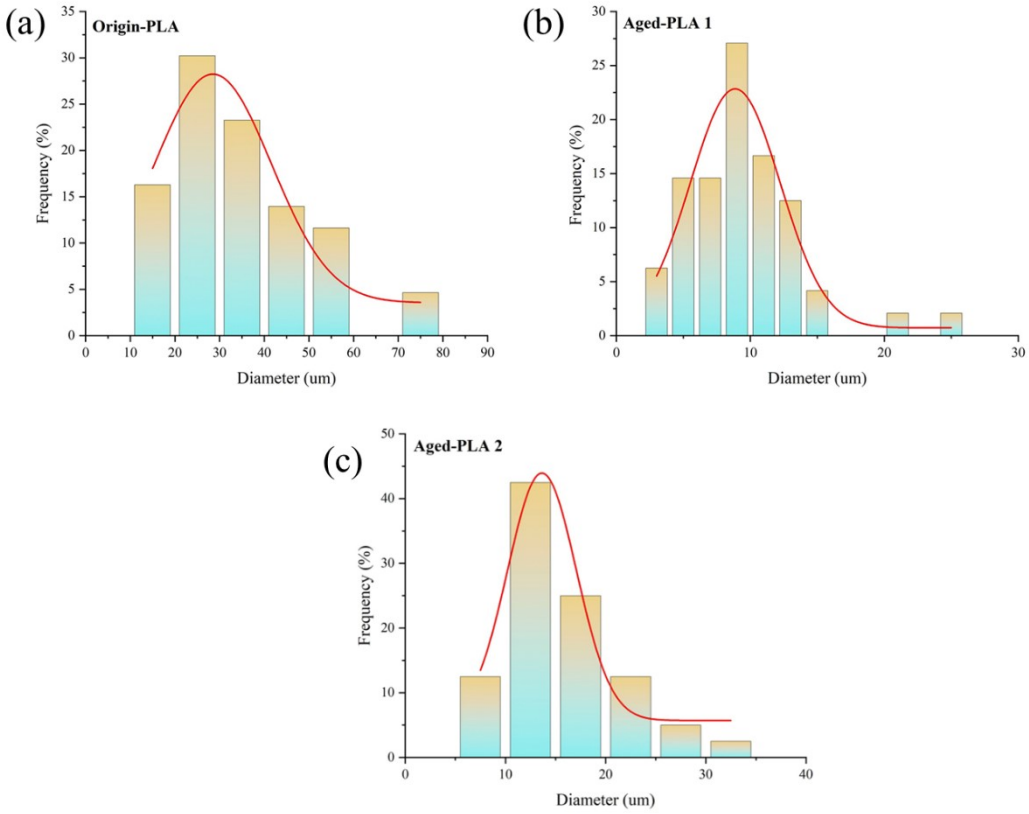

Fig. S1 Statistical analysis of particle size before and after aging

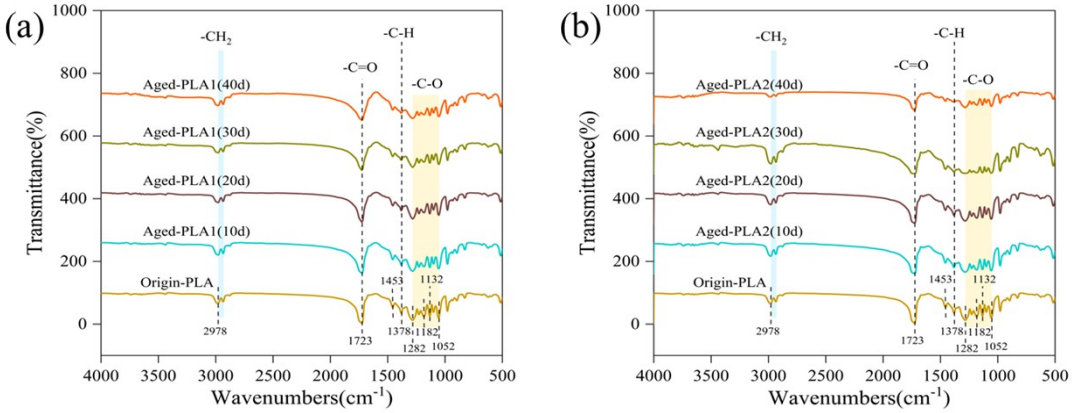

Fig. S2 FTIR spectra of PLA MPs (a) Aged-PLA 1, (b) Aged-PLA 2

Table S1 Carbonyl index (CI) of PLA MPs

UV aging time	Carbonyl index (CI)	
	Aged-PLA 1	**Aged-PLA 2**
0d	5.266	5.266
10d	4.565	4.021
20d	5.117	4.383
30d	3.726	3.657
40d	2.737	2.598

Table S2 Fitting parameters of adsorption kinetics of PLA to BPA

Absorbent	Pseudo-first-order			Pseudo-second-order		
	K_1 (h^{-1})	$Q_{e,cal}$ (mg/g)	R^2	K_2 ($g \cdot mg^{-1} \cdot h^{-1}$)	$Q_{e,cal}$ (mg/g)	R^2
Origin PLA	2.935	10.734	0.474	0.209	11.087	0.837
Aged PLA 1	3.696	9.128	0.499	0.392	9.341	0.818
Aged PLA 2	3.181	11.157	0.387	0.171	11.555	0.740

Absorbent	W-M Models					
	K_{id1} ($mg \cdot g^{-1} \cdot h^{-0.5}$)	R_1^2	K_{id2} ($mg \cdot g^{-1} \cdot h^{-0.5}$)	R_2^2	K_{id3} ($mg \cdot g^{-1} \cdot h^{-0.5}$)	R_3^2
Origin PLA	0.818	0.972	0.073	0.504	-0.004	0.971
Aged PLA 1	0.810	0.982	0.220	0.901	-0.151	0.754
Aged PLA 2	0.925	0.881	0.158	0.658	-0.135	0.206

Table S3 Linear, Freundlich and D-R model parameters for adsorption of BPA on PLA with different particle sizes

Models	**Absorbent**	**Parameters**			
Linear Model		K_d(L/g)		C	R^2
	PLA -550μm	0.016		-0.330	0.709
	PLA -150μm	0.134		-0.640	0.968
	PLA -75μm	0.446		1.402	0.994
	PLA -45μm	0.435		1.784	0.992
Freundlich Model		$K_F((ug/g)/(mg/L)^{1/n})$		1/n	R^2
	PLA -550μm	3.164×10^{-10}		5.059	0.979
	PLA -150μm	0.0254		1.378	0.991
	PLA -75μm	0.7485		0.888	0.996
	PLA -45μm	0.8839		0.845	0.998
D-R Model		Q_m(mg/g)	B	E_a(kJ/mol)	R^2
	PLA -550μm	9.431	20.600×10^{-4}	15.579	0.966
	PLA -150μm	14.743	3.802×10^{-4}	36.262	0.872
	PLA -75μm	35.661	1.021×10^{-4}	69.973	0.833
	PLA -45μm	34.731	0.927×10^{-4}	73.449	0.857

Table S4 Fitting parameters of different models in the BPA adsorption isotherm experiment

Models	Absorbent	Parameters			
Langmuir Model		q_m（mg/g）		K_L	R^2
	Origin PLA	212.747		0.0025	0.994
	Aged PLA 1	995.025		0.0004	0.998
	Aged PLA 2	142.128		0.0041	0.997
Freundlich Model		$K_F((ug/g)/(mg/L)^{1/n})$		1/n	R^2
	Origin PLA	0.725		0.895	0.995
	Aged PLA 1	0.469		0.977	0.998
	Aged PLA 2	0.856		0.851	0.998
D-R Model		q_m (mg/g)	B	E_a(J/mol)	R^2
	Origin PLA	34.682	0.99×10^{-4}	70.918	0.812
	Aged PLA 1	33.106	1.18×10^{-4}	64.975	0.840
	Aged PLA 2	33.194	0.88×10^{-4}	75.221	0.858

Table S5 The equilibrium parameter dimensionless (R_L) calculated from Langmuir equation for BPA adsorption on PLA

MPs samples	**R_L values in different concentration of BPA**								
	5mg/L	**10mg/L**	**15mg/L**	**20mg/L**	**25mg/L**	**30mg/L**	**40mg/L**	**60mg/L**	**80mg/L**
Origin PLA	0.988	0.976	0.964	0.952	0.941	0.930	0.909	0.870	0.833
Aged PLA 1	0.998	0.996	0.994	0.992	0.990	0.988	0.984	0.977	0.969
Aged PLA 2	0.980	0.961	0.942	0.924	0.907	0.890	0.859	0.803	0.753

Table S6 Desorption isotherm fitting parameters of BPA by PLA in ultrapure water

Models	**Absorbent**	**Parameters**					
Liner Model		K_d(L/g)		C		R^2	
	Origin PLA	0.315		1.091		0.993	
	Aged PLA 1	0.309		0.698		0.998	
	Aged PLA 2	0.307		1.226		0.991	
Freundlich Model		K_F((ug/g)/(mg/L)$^{1/n}$)		1/n		R^2	
	Origin PLA	0.548		0.880		0.997	
	Aged PLA 1	0.448		0.920		0.999	
	Aged PLA 2	0.579		0.863		0.998	
Desorption Hysteresis（HI）		C_e=5mg/L	C_e=10mg/L	C_e=20mg/L	C_e=25mg/L	C_e=40mg/L	C_e=80mg/L
	Origin PLA	0.313	0.275	0.291	0.280	0.288	0.304
	Aged PLA 1	0.204	0.156	0.197	0.180	0.248	0.267
	Aged PLA 2	0.323	0.293	0.294	0.305	0.285	0.295

Table S7 Desorption isotherm fitting parameters of BPA by PLA in simulated intestinal fluid

Models	**Absorbent**	**Parameters**		
Liner Model		K_d(L/g)	C	R^2
	Origin PLA	0.269	3.064	0.974
	Aged PLA 1	0.327	1.634	0.998
	Aged PLA 2	0.337	2.340	0.994
Freundlich Model		K_F((ug/g)/(mg/L)$^{1/n}$)	1/n	R^2
	Origin PLA	1.164	0.689	0.997
	Aged PLA 1	0.670	0.847	0.999
	Aged PLA 2	0.867	0.800	0.995

Desorption Hysteresis（HI）	C_e=5mg/L	C_e=10mg/L	C_e=20mg/L	C_e=25mg/L	C_e=40mg/L	C_e=80mg/L
Origin PLA	0.082	0.112	0.151	0.195	0.282	0.358
Aged PLA 1	-0.222	0.049	0.095	0.121	0.140	0.199
Aged PLA 2	-0.023	0.126	0.142	0.163	0.197	0.175

Table S8 Changes in O/C ratio in PLA before and after adsorption/desorption of BPA

Samples	Species O/C ratio			
	Before adsorption	After adsorption	Ultrapure water desorption	Simulated intestinal fluid desorption
Origin-PLA	0.8315	0.6636	0.5198	0.5239
Aged-PLA 1	0.5962	0.5721	0.5971	0.6534
Aged-PLA 2	0.6442	0.5094	0.3856	0.2450