

## ***Supporting Information***

### **Occurrence and migration of microplastics and plasticizers in different wastewater and sludge treatment units in municipal wastewater treatment plant**

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**Table S1 Standard microplastics recovery percentage for five different materials**

Material type	wastewater			sludge			Average recovery (%)
	1-5mm	0.15-1mm	0.1-0.15mm	1-5mm	0.15-1mm	0.1-0.15mm	
PE	99/100	90/100	89/100	99/100	89/100	88/100	92
PP	98/100	90/100	89/100	99/100	87/100	85/100	91
PET	99/100	88/100	87/100	97/100	86/100	88/100	91
PA	98/100	89/100	88/100	98/100	87/100	86/100	91
PS	99/100	90/100	89/100	98/100	87/100	87/100	92

**Table S2. The removal rates of MPs in this study and previous studies**

<b>Region</b>	<b>Treatmet processes</b>	<b>Analysis method</b>	<b>Influent (particles/L)</b>	<b>Effluent (particles/L)</b>	<b>Removal rate (%)</b>	<b>Reference</b>
China Wuhan	Primary, Secondary	Visual+micro-Raman	79.9±9.3	28.4±7.0	64.4	(Liu et al., 2019)
China Harbin	Primary, Secondary, Tertiary	Visual+Raman	126.0±14.0	30.6±7.8	75.7	(Jiang, et al., 2020)
China Xiamen	Primary, Secondary	Visual+micro-Raman	1.57-13.69	0.20-1.73	79.3-97.8	(Long, et al., 2019)
Scotland	Primary, Secondary	Visual+ FTIR	15.70±5.23	0.25±0.04	98.41	(Murphy, et al., 2016)
Korea	Primary, Secondary	Visual+FTIR+Raman	29.9、16.5、13.9	0.44、0.14、0.28	98.5、99.2、98.0	(Lee and Kim, 2018)
Canada	Primary, Secondary	Visual+FTIR	31.1±6.7	0.5±0.2	98.3	(Gies, et al., 2018)
Finland	Primary, Secondary, Tertiary	Visual +FTIR+micro-Raman	57.6	1.05	98.3	(Lares, et al., 2019)
United States	Tertiary	Visual +FTIR	1	8.8×10 <sup>-4</sup>	99.9	(Carr, et al., 2016)
MWTP	Primary, Secondary, Tertiary	Visual +FTIR	15.46±0.37	0.3±0.14	98.1	This study

**Table S3 Number of color MPs in wastewater and sludge samples**

Samples	Transparent	White	Black	Red	Orange	Green	Blue	Total
W1	103	110	32	21	15	6	17	304
W2	44	48	14	9	6	2	7	130
W3	34	36	5	4	3	0	2	84
W4	7	8	2	0	0	0	1	18
W5	1	2	1	0	0	0	0	4
S1	29	23	6	9	17	2	4	90
S2	12	20	6	2	17	1	6	64
S3	2	1	1	0	1	0	0	5
S4	2	1	1	1	1	0	0	6

**Table S4 Number of different shape MPs in wastewater and sludge samples**

Samples	Fiber	Fragment	Pellet	Film	Total
W1	128	85	18	73	304
W2	55	36	8	31	130
W3	35	24	5	20	84
W4	8	5	1	4	18
W5	2	1	1	0	4
S1	38	25	5	22	90
S2	27	18	4	15	64
S3	3	1	1	0	5
S4	3	2	1	0	6

**Table S5 Standard curve, detection limit and correlation coefficient of PAEs**

Name	Abbreviation	Retention time/min	Standard curve	R <sup>2</sup>	Quantitative ion
Phthalates	PAEs				
Dimethyl Phthalate	DMP	7.847	$y=217243.57x-5028.37$	0.9992	163、77、194
Diethyl Phthalate	DEP	8.744	$y=374474.23x-91.13$	0.9998	149、76、177
1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester	DIBP	10.548	$y=537415.35x-6286.91$	0.9989	149、57、223
Dibutyl phthalate	DBP	11.332	$y=384691.92x-3124.91$	0.9983	149、76、223
Benzyl butyl phthalate	BBP	15.54	$y=360883.17x-2628.79$	0.9988	149、91、206.1
Bis(2-ethylhexyl) phthalate	DEHP	17.879	$y=581020.48x-3502.24$	0.9941	149、57.1、167.1

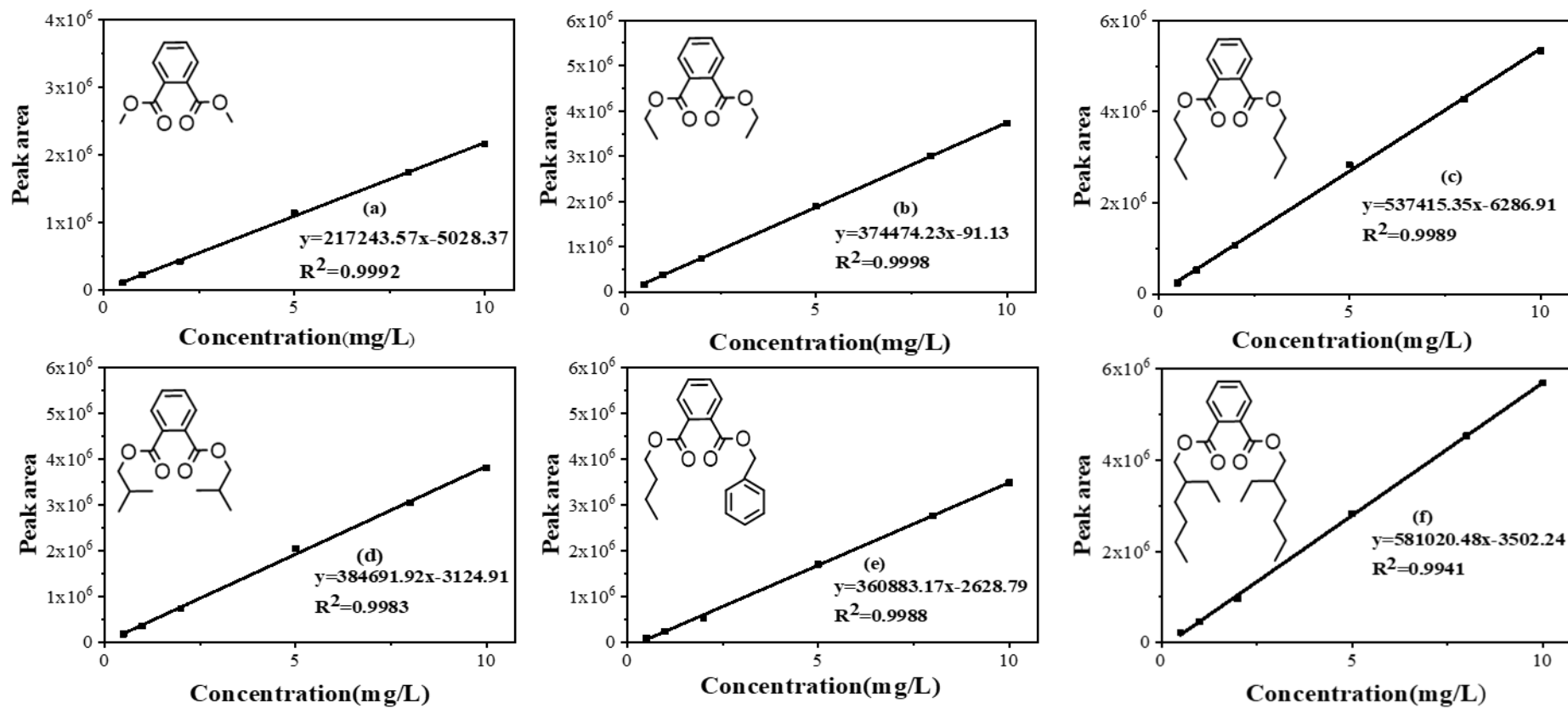
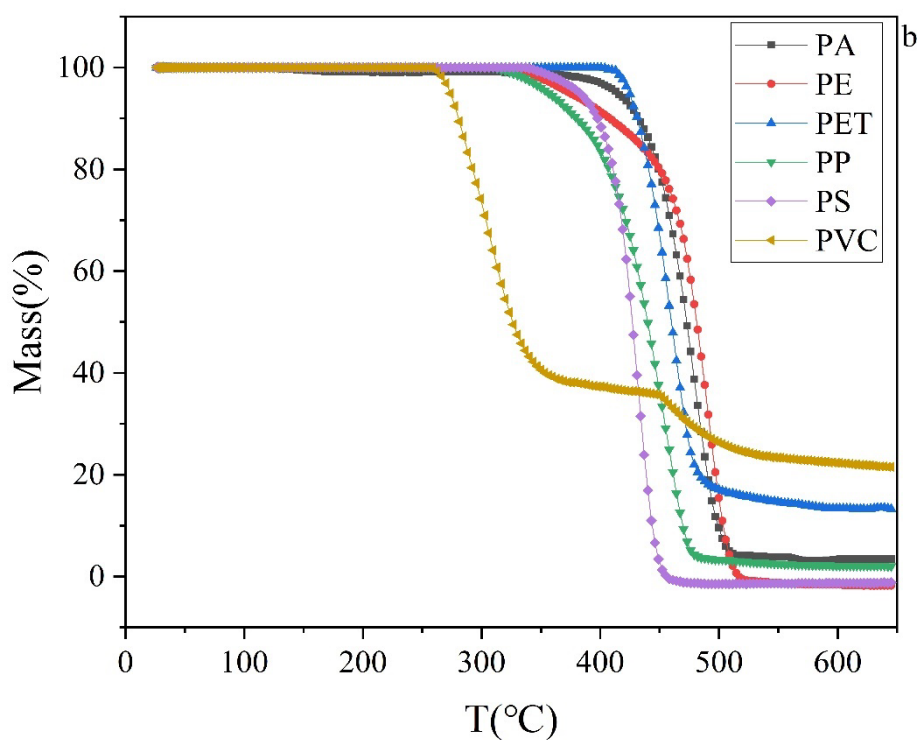


Fig. S1 (a)~(f): The fitting regression line of DMP, DEP, DIBP, DBP, BBP, and DEHP

**Table S6 The concentrations of PAEs in samples**

Name	W1	W2	W3	W4	W5	S1	S2	S3	S4
DMP	5.55	13.82	2.69	3.7	nd	28.73	5.07	21.58	nd
DEP	11.82	1.0	nd	nd	nd	28.68	21.28	18.65	5.04
DIBP	8.02	1.29	nd	nd	nd	43.33	20.4	15.77	nd
DBP	22.97	23.92	16.37	7.7	2.24	34.56	28.3	100.55	19.93
BBP	16.7	17.4	10.7	5.2	1.51	6.2	38.03	8.8	4.2
DEHP	11.6	12.5	8.4	4.4	2.53	11.14	38.24	19.58	2.53
ΣPAEs	76.66	69.93	38.16	21	6.28	152.64	151.32	184.93	31.7

nd, no data



**Fig. S2** The mass loss of different types of MPs

**Table S7** The mass of MPs in sludge samples

sludge	Mass loss/mg		sample/mg	MPs( $\mu\text{g/g}$ )
	300°C	550°C		
S1	-2.75	-3.31	7.00	80.00
S2	-2.70	-3.33	8.00	78.80
S3	-1.94	-2.42	9.00	53.33
S4	-1.50	-1.96	10.00	46.00

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