SUPPLEMENTARY INFORMATION

IN-FLOW SINGLE PARTICLE DETECTION OF SUB-100 MICRON MICROPLASTICS

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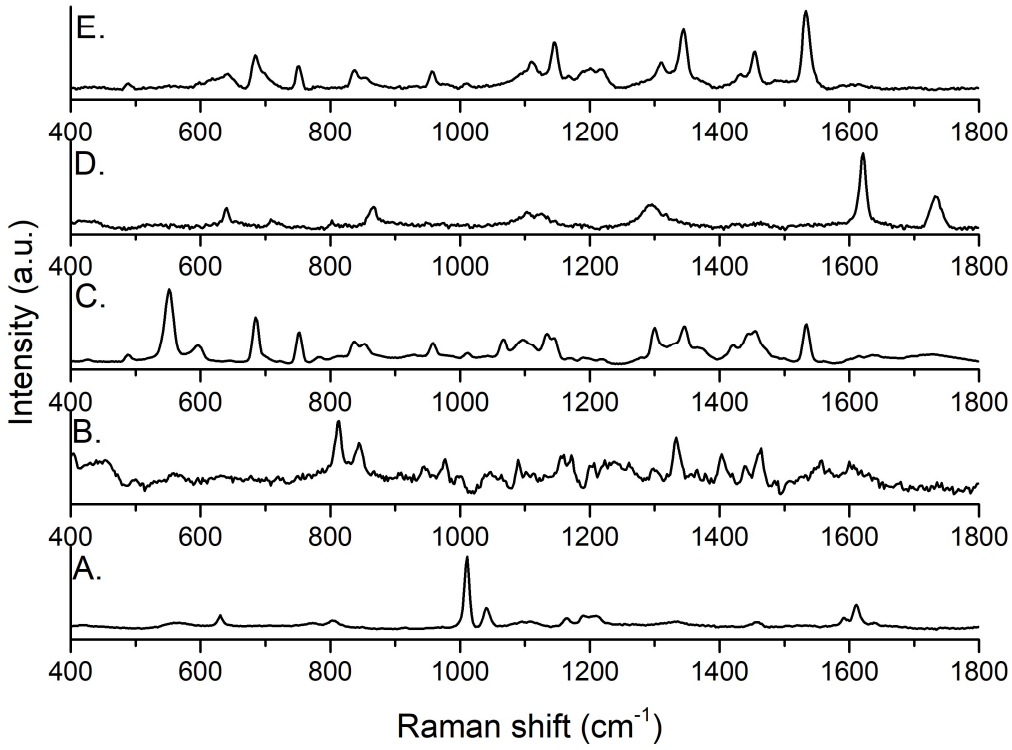
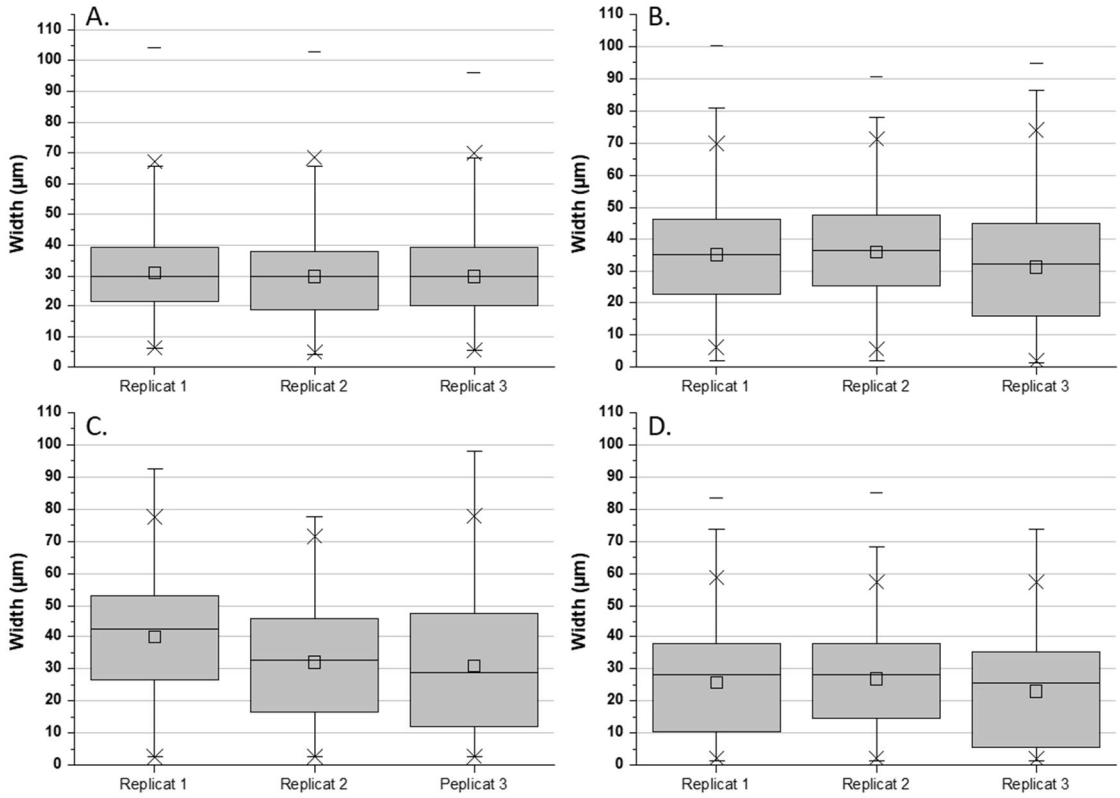


Figure S1. Reference Raman spectra of (A) PS microbeads, (B) PP, (C) PE, (D) PET and (E) PVC fragments acquired in static mode (λ_{exc} = 633 nm; 300 tr/mm; Obj. 20x, Acq. = 30 s) after background subtraction.



E.

	PE					PP				
	Replicat 1	Replicat 2	Replicat 3	Mean	SD	Replicat 1	Replicat 2	Replicat 3	Mean	SD
N	5092,00	5381,00	5591,00	5354,67	250,54	1094,00	1203,00	1421,00	1239,33	166,50
mean_Aspect Ratio	0,56	0,56	0,55	0,55	0,00	0,58	0,60	0,64	0,61	0,03
mean_Length (µm)	56,91	56,49	55,68	56,36	0,62	64,91	63,84	54,46	61,07	5,75
mean_Width (µm)	28,68	28,33	27,69	28,23	0,50	35,27	36,06	31,46	34,26	2,46
median_Aspect Ratio	0,55	0,55	0,54	0,55	0,01	0,59	0,62	0,64	0,62	0,03
median_Length (µm)	55,97	57,35	55,97	56,43	0,80	62,88	62,88	57,35	61,04	3,19
median_Width (µm)	28,33	28,33	28,33	28,33	0,00	35,24	36,62	32,48	34,78	2,11
	PET					PVC				
	Replicat 1	Replicat 2	Replicat 3	Mean	SD	Replicat 1	Replicat 2	Replicat 3	Mean	SD
N	946,00	618,00	815,00	793,00	165,10	1542,00	1486,00	1762,00	1596,67	145,89
mean_Aspect Ratio	0,64	0,63	0,62	0,63	0,01	0,67	0,65	0,66	0,66	0,01
mean_Length (µm)	63,90	51,63	51,08	55,54	7,25	42,58	45,03	39,42	42,34	2,81
mean_Width (µm)	40,00	32,07	30,90	34,32	4,95	25,71	26,84	23,12	25,22	1,91
median_Aspect Ratio	0,65	0,64	0,62	0,64	0,02	0,69	0,67	0,69	0,68	0,01
median_Length (µm)	65,21	53,23	50,35	56,26	7,88	47,68	47,68	44,91	46,76	1,60
median_Width (µm)	42,40	32,63	28,88	34,64	6,98	28,33	28,33	25,57	27,41	1,59

Figure S2. Width size distribution of (A) PE, (B) PP, (C) PET, and (D) PVC microparticles for fraction F5 triplicates (25 µm> F5>50µm) as measured by FlowCam and (E) their associated morphological statistics.

Table S1. 27 optimal experimental design used in the study.

Flow rate(µL/min)	Frequency (MHz)	Experimental mean speed (µm/s)	Predicted mean speed (µm/s)
2	1	31	26
2	1	31	31
2	5	28	28
2	10	28	30
2	15	30	31
2	15	30	31
3	1	46	44
3	5	42	43
3	10	47	44
3	15	42	45
4	1	60	62
4	5	57	60
4	10	57	59
4	15	58	61
5	1	70	72
5	1	75	76
5	5	80	76
5	10	78	76
5	15	83	79
5	15	82	77
6	1	84	88
6	1	90	89
6	5	90	90
6	10	87	88
6	10	90	91
6	15	90	92
6	15	92	90

Table S2. Percentage of particles for each polymer type (PS microbeads, PE fragments, and PP fragments) passing through the funnel stem, with (5MHz and 20 Vpp) and without the effect of DEP, based on an initial injection of 100 particles

Polymers	With DEP	Without DEP
PS	100 %	6 %
PE	100 %	7 %
PP	87 %	9 %

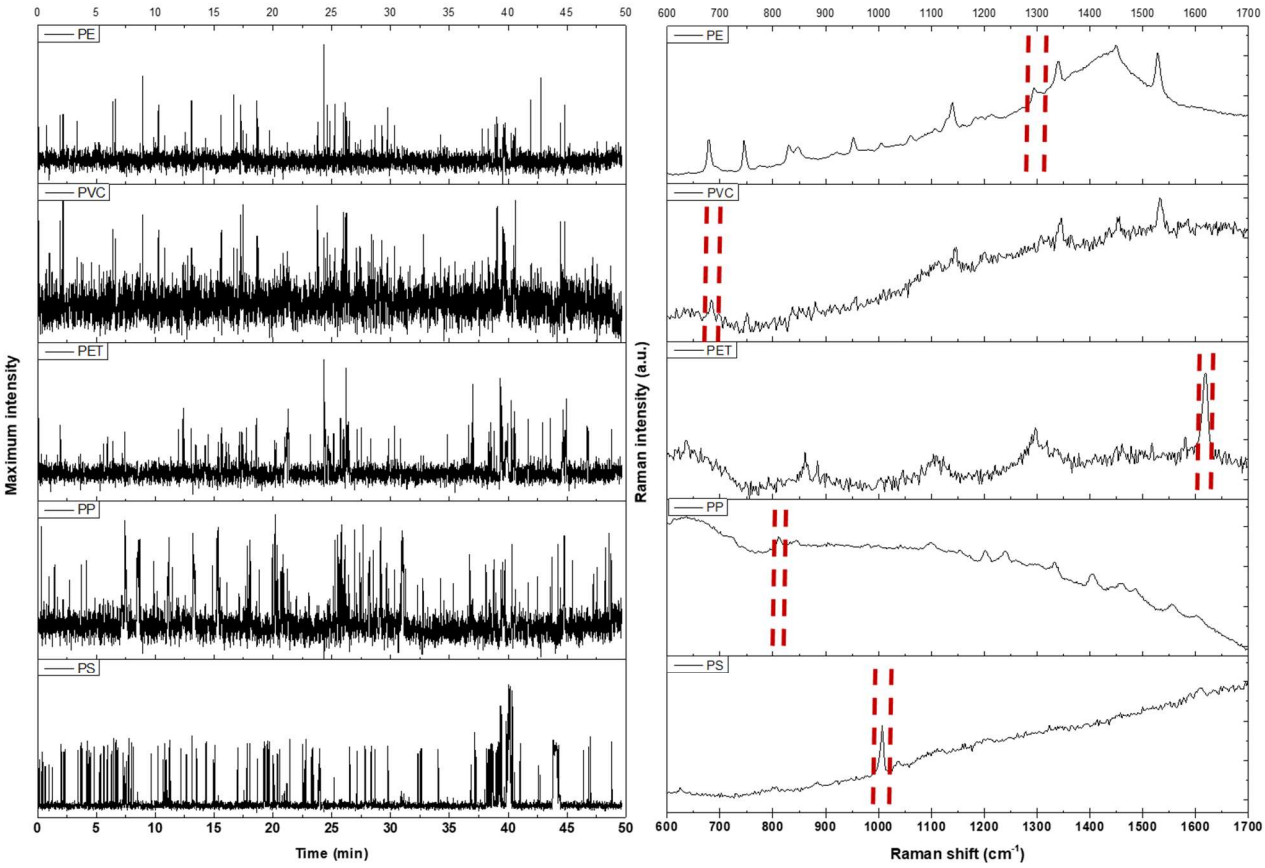


Fig. S3. Discrimination of PS, PP, PET, PVC, and PE by monitoring the maximum intensity within their characteristic Raman spectral ranges (980–1020 cm^{-1}; 814–847 cm^{-1}; 1600–1650 cm^{-1}; 670–720 cm^{-1}; and 1277–1317 cm^{-1}, respectively), as highlighted on the raw Raman spectra (right, red line) over time.

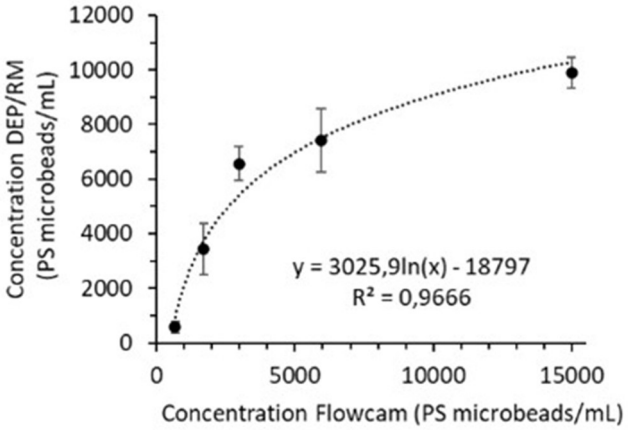


Figure S4. *Comparison plot of the concentrations obtained via DEP/RM coupling and via FlowCam (n=3) for PS microbeads.*