

### Supplementary Information for

## Optimization of an Infrared-Heated Sample Introduction System for Single-Particle Inductively Coupled Plasma Mass Spectrometry Analysis of Metal-Labelled Ion-Exchange Polymer Microparticles

By

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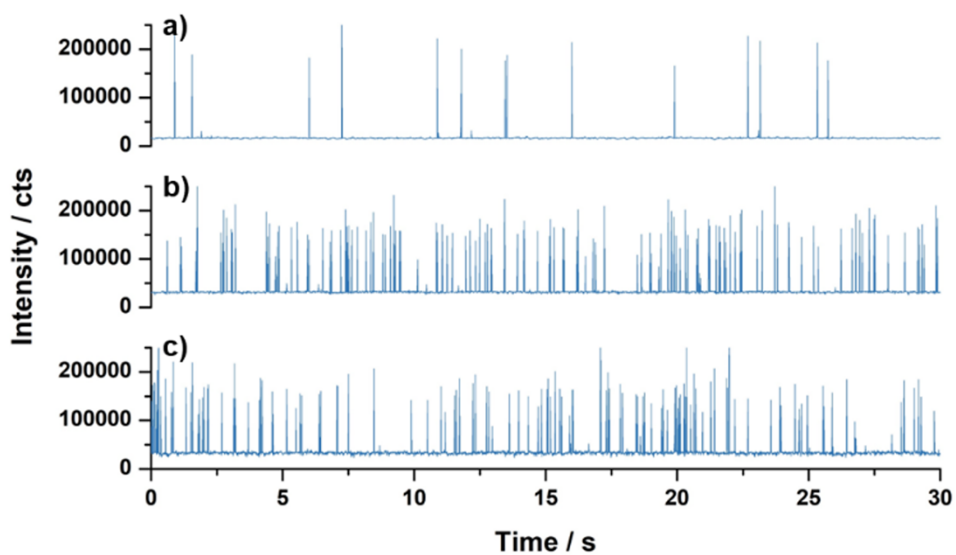
Type	Origin	Size (μm)	Size distribution	Functional group	% (m/m) s*	Mass concentration (mg L <sup>-1</sup> )	PNC (number of MPs/L)
A	Self-prepared resin	4.5	Narrow	SO <sub>3</sub> <sup>-</sup>	7.212	20	7.7 * 10 <sup>8</sup>
B	Commercially available	10	Heterogeneous	SO <sub>3</sub> <sup>-</sup>	0.31 ± 0.03	100	2.9 * 10 <sup>8</sup>

**Table S1.** Characteristics of cation-exchange resins and their respective slurry stock solutions.

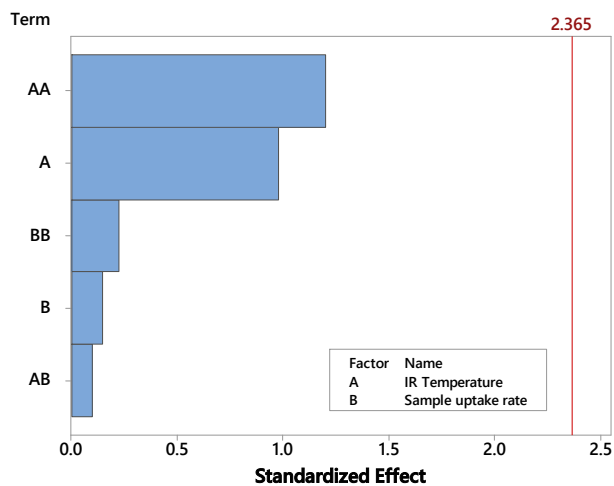
\* determined using a Schoeniger combustion with subsequent sulfate quantitation using anion-exchange chromatography (Offline Combustion IC)

**Table S2.** Operating conditions used for 2-parameter optimization (with a central composite design) of the IR-heated sample introduction system

StdOrder	RunOrder	PtType	Blocks	IR temperature (°C)	Sample uptake rate (μL min <sup>-1</sup> )
6	1	0	1	135	50
3	2	1	1	20	75
1	3	1	1	20	25
4	4	1	1	250	75
2	5	1	1	250	25
7	6	0	1	135	50
5	7	0	1	135	50
13	8	0	2	135	50
11	9	-1	2	135	75
14	10	0	2	135	50
10	11	-1	2	135	25
9	12	-1	2	250	50
12	13	0	2	135	50



**Fig. S1** Exemplary datasets at  $50 \mu\text{L min}^{-1}$  sample uptake rate using the IR-heated system for  $\text{Ba}^{2+}$ -labelled resin of type A ( $1 \text{ mg L}^{-1}$ ) at different IR-heating temperatures: **a)**  $20 \text{ }^\circ\text{C}$ ,  $1210 \pm 110 \text{ MPs}$ , **b)**  $135 \text{ }^\circ\text{C}$ ,  $5550 \pm 260 \text{ MPs}$ , **c)**  $250 \text{ }^\circ\text{C}$ ,  $5490 \pm 220 \text{ MPs}$ .



**Fig. S2** Pareto chart of the standardized effects for IR heating temperature and sample uptake rate. The dashed red bar is the threshold for a statistically significant effect.

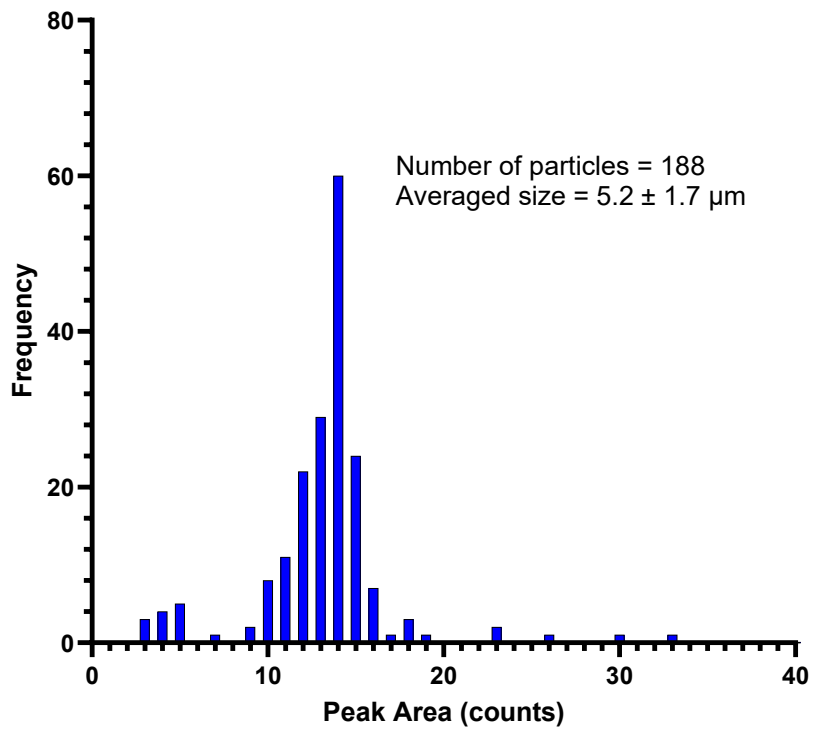


Fig. S3 Peak area distribution of the 4  $\mu\text{m}$  MPs of type A obtained using a standard cyclonic spray chamber

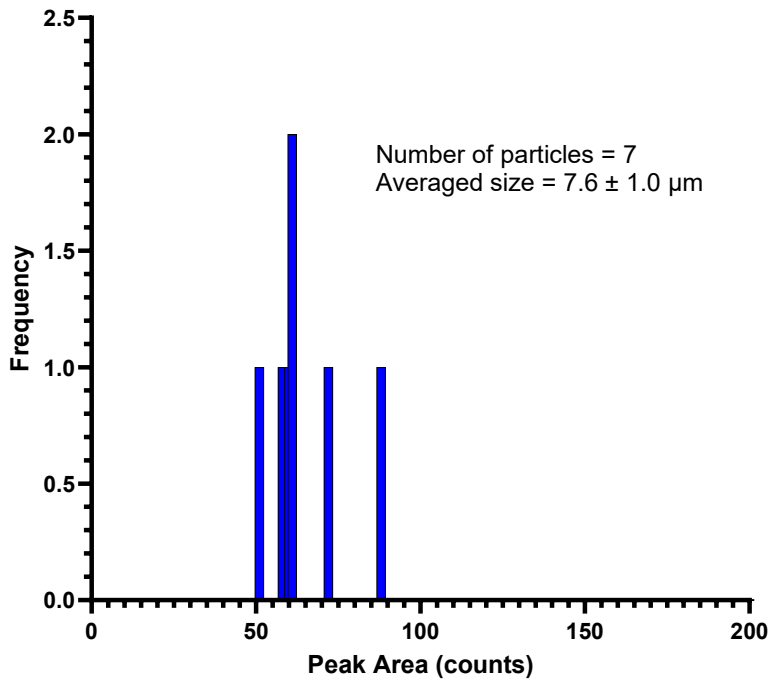


Fig. S4 Peak area distribution of the 10  $\mu\text{m}$  MPs of type B obtained using a standard cyclonic spray chamber