

Supplementary information

Flow-driven enhancement of neodymium and dysprosium separation from aqueous solutions

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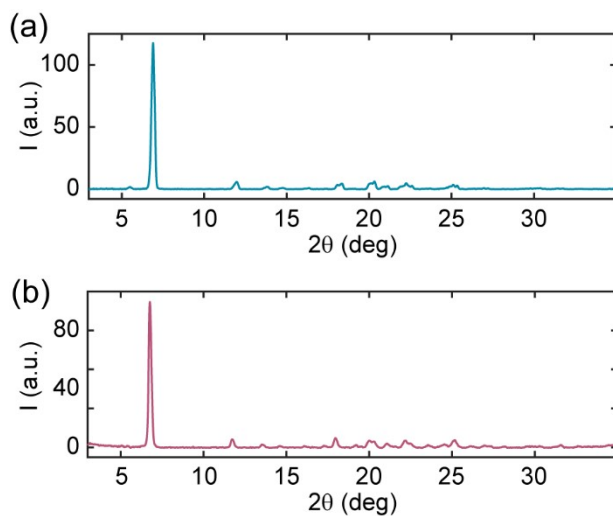


Fig. S1 Powder XRD patterns the pure $\text{Nd}(\text{DBP})_3$ (a) and $\text{Dy}(\text{DBP})_3$ (b) precipitates obtained using BMM. In these experiments, 5 mL of 12 mM NaDBP were added to 5 mL 4 mM NdCl_3 or DyCl_3 , and then stirred for 45 min at room temperature.

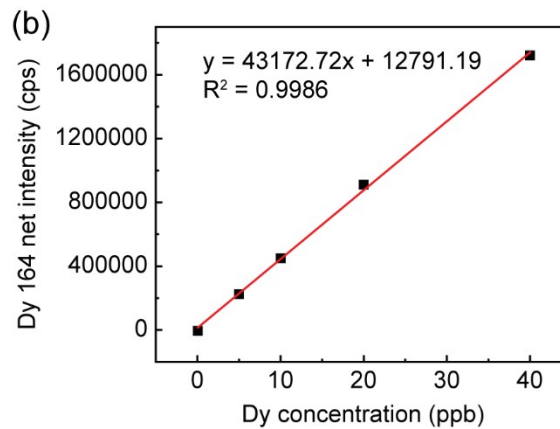
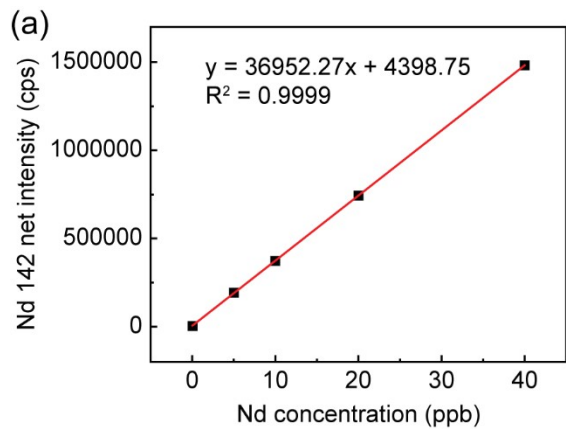


Fig. S2 ICP-MS calibration curves for Nd(a) and Dy(b). The concentrations of the standard solutions were 0.05, 5, 10, 20, and 40 ppb, respectively. The red lines are linear fits.

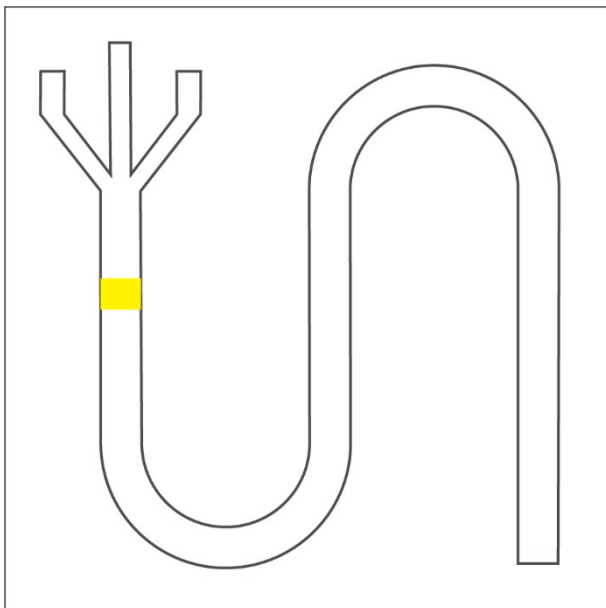


Fig. S3 Location where the time-lapse data were collected.

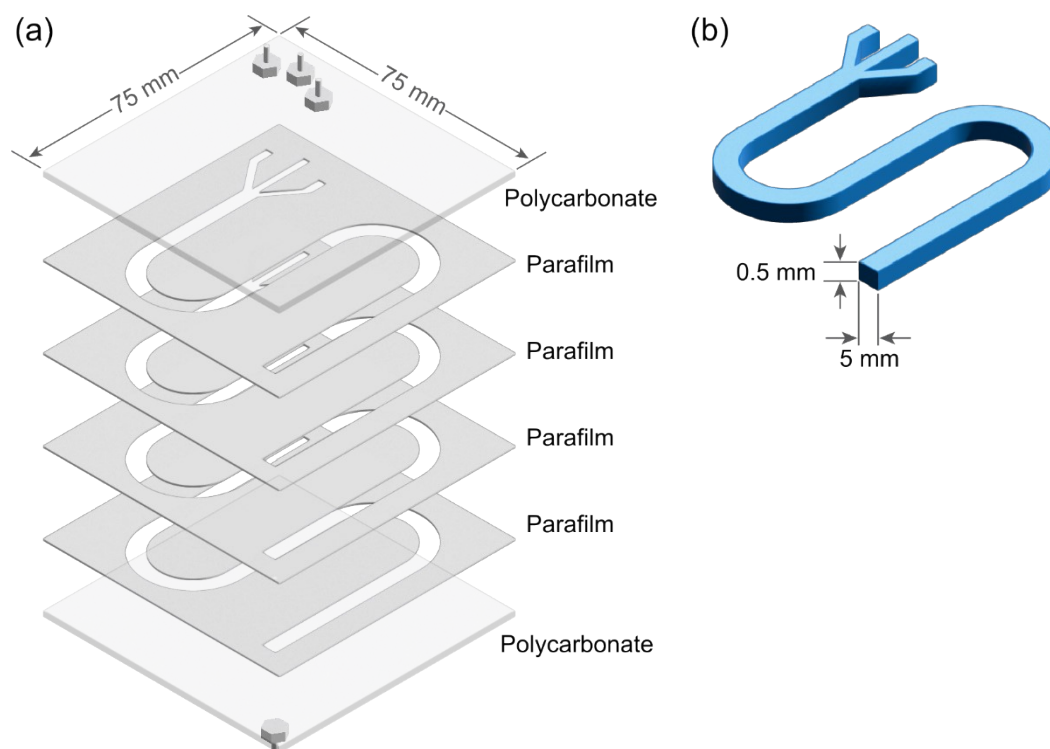


Fig. S4 Schematics of the flow device for separation. (a) Deconstructed view. (b) Reaction chamber with four layers of parafilm.

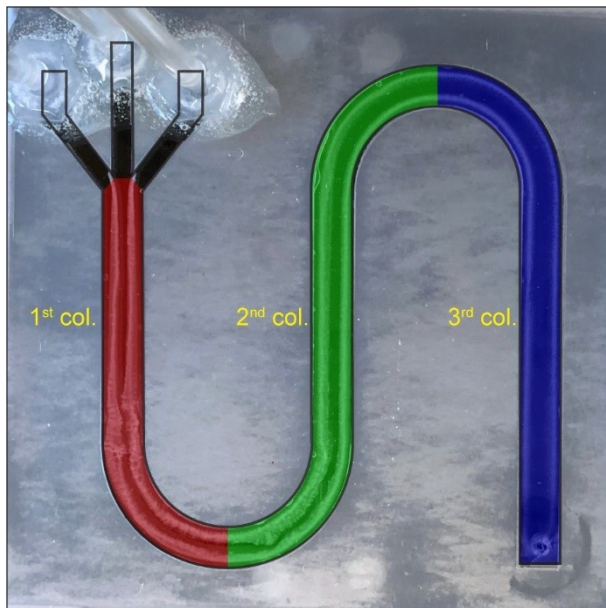


Fig. S5 Definition of the column numbers.

Table S1. Crystallite sizes of Nd(DBP)₃ and Dy(DBP)₃ precipitates obtained by LCM and BMM. The values were calculated using the Scherrer equation. The instrumental broadening was obtained using the XRD pattern of a LaB₆ standard.

Method	Nd(DBP) ₃ (Å)	Dy(DBP) ₃ (Å)
LCM	1620.8	757.7
BMM	511.5	779.2

Table S2. Saturation indices (SI) for Nd(DBP)₃ and Dy(DBP)₃ at different concentration conditions.

[NdCl ₃] (mM)	[DyCl ₃] (mM)	[NaDBP] (mM)	SI for Nd(DBP) ₃	SI for Dy(DBP) ₃
4	4	120	8.7	12.4
4	4	36	7.2	10.8
4	4	12	5.7	9.4
4	4	4	4.3	7.9
4	4	1.2	2.7	6.4
4	9.33	1.2	2.7	6.7
4	1	1.2	2.7	5.8

Movie S1. Time-lapse movie showing precipitation formation in the microfluidic device for different NaDBP concentrations. In these experiments, the middle subchannel contained 1.2-120 mM NaDBP, while solutions of 4 mM NdCl₃ and 4 mM DyCl₃ were on the sides.