

**Removal of metallic coatings from rare-earth
permanent magnets by solutions of bromine in
organic solvents**

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Electronic Supplementary Information (ESI)

Results

Table S1. Dissolution yields, η (%), from SmCo₅ PMs in 2 M HNO₃ as function of the time, (min).

t (min)	η_{Co} (%)	RSD (%)	η_{Cu} (%)	RSD (%)	η_{Ni} (%)	RSD (%)	η_{Sm} (%)	RSD (%)
0	0.0	–	0.0	–	0.0	–	0.0	–
30	0.0	–	0.0	–	28.1	0.5	0.0	–
60	0.0	–	0.0	–	58.7	1.6	0.0	–
90	0.0	–	0.0	–	80.2	0.9	0.0	–
210	0.8	1.4	0.0	–	80.8	1.5	0.8	1.7

Table S2. Dissolution yields, η (%), from Sm₂Co₁₇ PMs in in 2 M HNO₃ as function of the time, (min).

t (min)	η_{Co} (%)	RSD (%)	η_{Cu} (%)	RSD (%)	η_{Fe} (%)	RSD (%)	η_{Ni} (%)	RSD (%)	η_{Sm} (%)	RSD (%)	η_{Zr} (%)	RSD (%)
0	0.0	–	0.0	–	0.0	–	0.0	–	0.0	–	0.0	–
30	0.0	–	0.0	–	0.0	–	10.0	0.6	0.0	–	0.0	–
60	0.0	–	0.0	–	0.0	–	12.3	0.3	0.0	–	0.0	–
90	0.0	–	0.0	–	0.0	–	14.9	1.4	0.0	–	0.0	–
210	0.0	–	0.0	–	0.0	–	32.3	1.0	0.0	–	0.0	–

Table S3. Dissolution yields, η (%), of metals from Nd–Fe–B PMs in 1 vol.% Br₂ in EtOH as function of the time, (min).

t (min)	η_B (%)	RSD (%)	η_{Co} (%)	RSD (%)	η_{Cu} (%)	RSD (%)	η_{Dy} (%)	RSD (%)	η_{Fe} (%)	RSD (%)
5	0.3	18.9	0.0	–	74.1	3.8	0.0	–	0.0	5.8
10	0.3	20.6	0.2	7.9	91.7	4.0	0.1	5.6	0.1	6.0
20	0.9	13.8	1.0	2.8	89.7	3.0	0.9	2.5	1.0	4.5
30	2.8	8.5	1.0	6.3	84.1	5.5	1.2	1.9	1.1	3.4
45	3.1	7.8	2.3	2.5	91.6	5.5	2.6	2.2	2.5	4.5
60	3.6	7.4	3.3	0.2	99.9	5.1	3.6	2.1	3.3	5.2

t (min)	η_{Nd} (%)	RSD (%)	η_{Ni} (%)	RSD (%)	η_{Pr} (%)	RSD (%)
5	0.0	–	28.6	–	0.0	–
10	0.1	2.8	66.9	2.8	0.1	2.8
20	0.7	4.5	74.7	4.5	1.2	4.5
30	1.0	2.4	63.4	2.4	1.6	2.4
45	2.2	1.8	74.0	1.8	3.5	1.8
60	3.1	1.0	87.2	1.0	5.0	1.0

Table S4. Dissolution yields, η (%), of metals from Nd–Fe–B PMs in 1 vol.% Br₂ in DMF as function of the time, (min).

t (min)	η_B (%)	RSD (%)	η_{Co} (%)	RSD (%)	η_{Cu} (%)	RSD (%)	η_{Dy} (%)	RSD (%)	η_{Fe} (%)	RSD (%)
5	0.4	12.3	0.0	–	85.0	2.4	0.0	–	0.0	5.9
10	0.2	29.6	0.0	–	86.2	3.5	0.0	–	0.0	4.0
20	0.5	7.9	0.6	0.7	86.1	2.9	0.4	0.6	0.5	1.8
30	1.6	9.6	1.6	1.9	93.0	3.3	1.5	1.4	1.6	2.0
45	2.5	6.4	2.6	2.7	93.1	1.0	2.6	3.8	2.6	3.1
60	3.1	5.7	3.4	2.2	101.2	2.6	3.3	2.1	3.4	3.2

t (min)	η_{Nd} (%)	RSD (%)	η_{Ni} (%)	RSD (%)	η_{Pr} (%)	RSD (%)
5	0.0	–	32.3	1.7	0.0	–
10	0.0	–	44.7	1.7	0.0	–
20	0.4	2.6	61.7	1.0	0.6	5.5
30	1.4	1.1	86.1	1.8	2.0	5.0
45	2.2	4.4	90.5	1.8	3.3	5.8
60	2.8	2.6	102.2	1.5	4.2	3.8

Table S5. Dissolution yields, η (%), of metals from SmCo₅ PMs in 1 vol.% Br₂ in EtOH as function of the time, (min).

t (min)	η_{Co} (%)	RSD (%)	η_{Cu} (%)	RSD (%)	η_{Ni} (%)	RSD (%)	η_{Sm} (%)	RSD (%)
5	0.0	–	1.4	4.2	34.7	1.3	0.0	–
10	0.0	–	19.8	1.3	60.2	0.8	0.0	–
20	0.2	0.2	66.9	1.9	83.6	0.9	0.2	1.8
30	0.7	3.6	80.1	5.9	92.7	3.4	0.7	4.7
50	1.9	1.8	74.0	3.8	94.0	1.7	1.9	2.5
80	3.2	2.2	74.4	6.3	94.3	2.2	3.4	6.5

Table S6. Dissolution yields, η (%), of metals from SmCo₅ PMs in 1 vol.% Br₂ in DMF as function of the time, (min).

t (min)	η_{Co} (%)	RSD (%)	η_{Cu} (%)	RSD (%)	η_{Ni} (%)	RSD (%)	η_{Sm} (%)	RSD (%)
5	0.0	–	28.9	0.8	55.0	1.4	0.0	–
10	0.2	0.2	69.7	6.0	73.8	0.2	0.1	5.0
20	0.6	1.0	76.6	2.8	84.3	0.5	0.6	2.5
30	1.2	1.0	81.1	1.5	84.9	0.9	1.4	1.6
50	2.4	0.6	75.6	1.5	89.2	0.5	2.4	2.4
80	6.0	1.1	75.8	2.2	87.4	1.3	6.7	2.0

Table S7. Dissolution yields, η (%), of metals from $\text{Sm}_2\text{Co}_{17}$ PMs in 1 vol.% Br_2 in EtOH as function of the time, (min).

t (min)	η_{Co} (%)	RSD (%)	η_{Cu} (%)	RSD (%)	η_{Fe} (%)	RSD (%)	η_{Ni} (%)	RSD (%)	η_{Sm} (%)	RSD (%)	η_{Zr} (%)	RSD (%)
5	0.0	–	11.6	2.0	0.0	–	56.6	1.7	0.0	–	0.0	–
10	0.0	–	89.6	3.7	0.0	–	77.0	2.4	0.0	–	0.0	–
20	0.5	1.0	100.0	–	0.5	16.2	103.2	1.1	0.5	3.9	0.4	8.8
30	1.0	1.7	100.0	–	1.7	1.1	103.5	1.2	1.1	6.5	0.8	4.4
50	1.8	1.0	100.0	–	2.0	1.9	93.5	1.0	1.9	2.1	1.5	1.6
80	2.7	1.1	100.0	–	3.0	2.5	101.9	3.6	2.8	4.8	2.2	3.9

Table S8. Dissolution yields, η (%), of metals from $\text{Sm}_2\text{Co}_{17}$ PMs in 1 vol.% Br_2 in DMF as function of the time, (min).

t (min)	η_{Co} (%)	RSD (%)	η_{Cu} (%)	RSD (%)	η_{Fe} (%)	RSD (%)	η_{Ni} (%)	RSD (%)	η_{Sm} (%)	RSD (%)	η_{Zr} (%)	RSD (%)
5	0.0	–	53.9	5.0	0.0	–	60.2	0.5	0.0	–	0.0	–
10	0.1	0.4	87.9	1.4	0.1	0.7	82.9	1.4	0.1	0.4	0.0	–
20	1.0	1.8	100.0	–	1.1	0.4	101.2	1.1	1.0	2.4	0.0	–
30	2.2	1.6	100.0	–	2.5	1.8	102.3	0.8	2.4	2.3	0.0	–
50	3.6	1.9	100.0	–	4.0	1.9	102.4	2.2	3.9	5.6	0.0	–
80	4.4	1.1	100.0	–	4.9	1.7	103.5	1.3	4.5	2.0	0.0	–