

## Electronic Supplementary Information (ESI)

Design and combine magnetic ionic liquids and hydrophobic  
deep eutectic solvents for safer extraction of titanium:  
physicochemical properties and toxicity studies

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Table S1. The cumulative extraction efficiency (%) of metal ions in each stage after the five-stage countercurrent extraction reached equilibrium<sup>a</sup>.

Stage	Al	Ca	Mn	V	Mg	Cr	Ti
1	0	0	0	0	0	4.27	54.74
2	0	0	0	0	0	13.56	82.57
3	0	0	0	0	0	20.01	92.59
4	0	0	0	0	0	25.00	97.35
5	0	24.74	1.23	11.90	14.33	35.71	99.23

<sup>a</sup>O/A=1, time = 5 min, temperature = 40 °C.

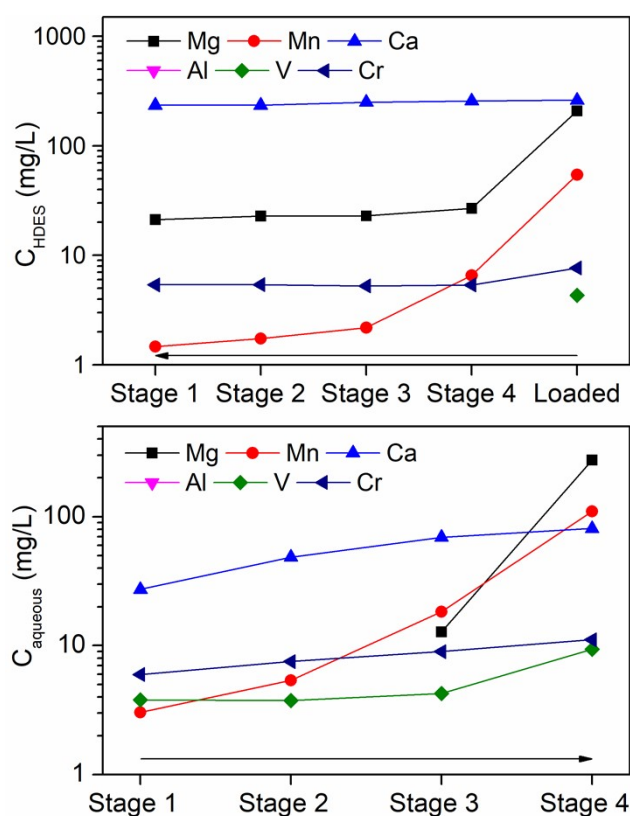


Figure S1. The distribution of metal ions in the HDES-4 and the aqueous phase of each stage after the four-stage countercurrent scrubbing was balanced. The concentration of unmarked points is 0. The 10 mol/L HCl was selected as the scrubbing agent in order to reduce the loss of titanium during the scrubbing process. O/A=2, time = 5 min,

temperature = 40 °C.

Table S2. The purity (%) of titanium in each stage of the stripping solution after the three-stage countercurrent stripping was balanced<sup>a</sup>.

Stage	Al	Ca	Mn	V	Mg	Cr	Ti	Fe
1	0	0.72	0.06	0	0	0.16	98.93	0.13
2	0	0.14	0.02	0	0	0.07	99.75	0.03
3	0	0.08	0.01	0	0	0.04	99.87	0.00

<sup>a</sup>O/A=1.5, time = 5 min, temperature = 40 °C.