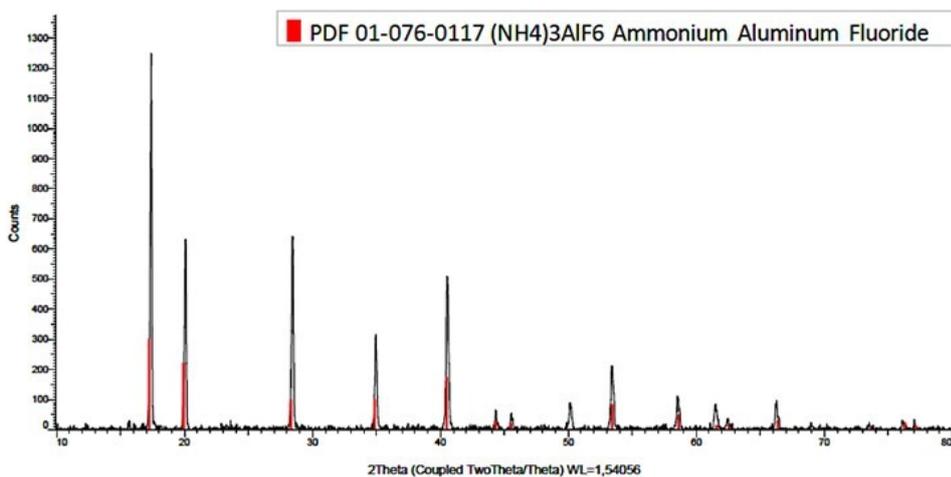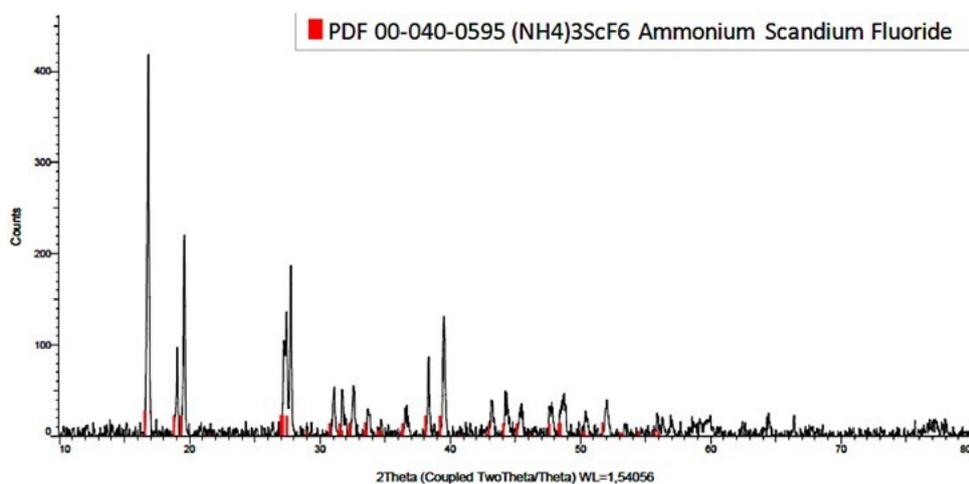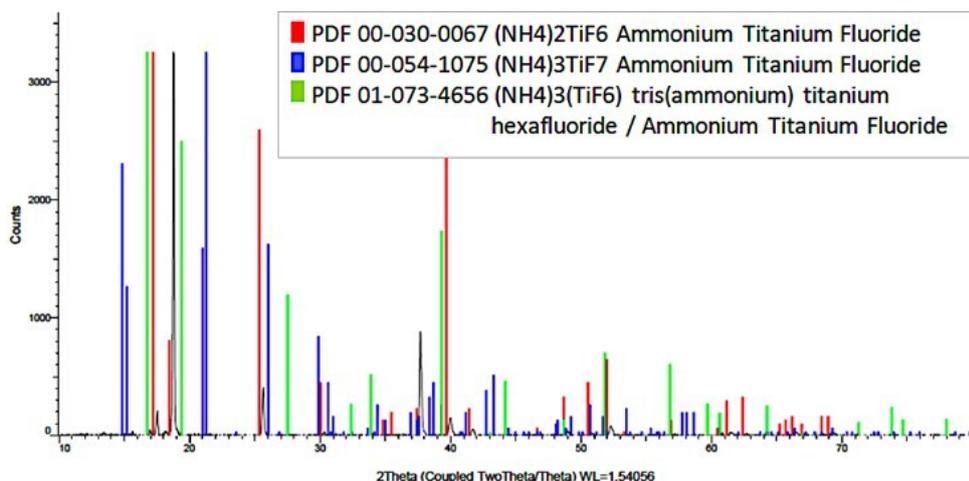# Supplementary Information

I. Phase determination of synthesized solids before and after solubility tests
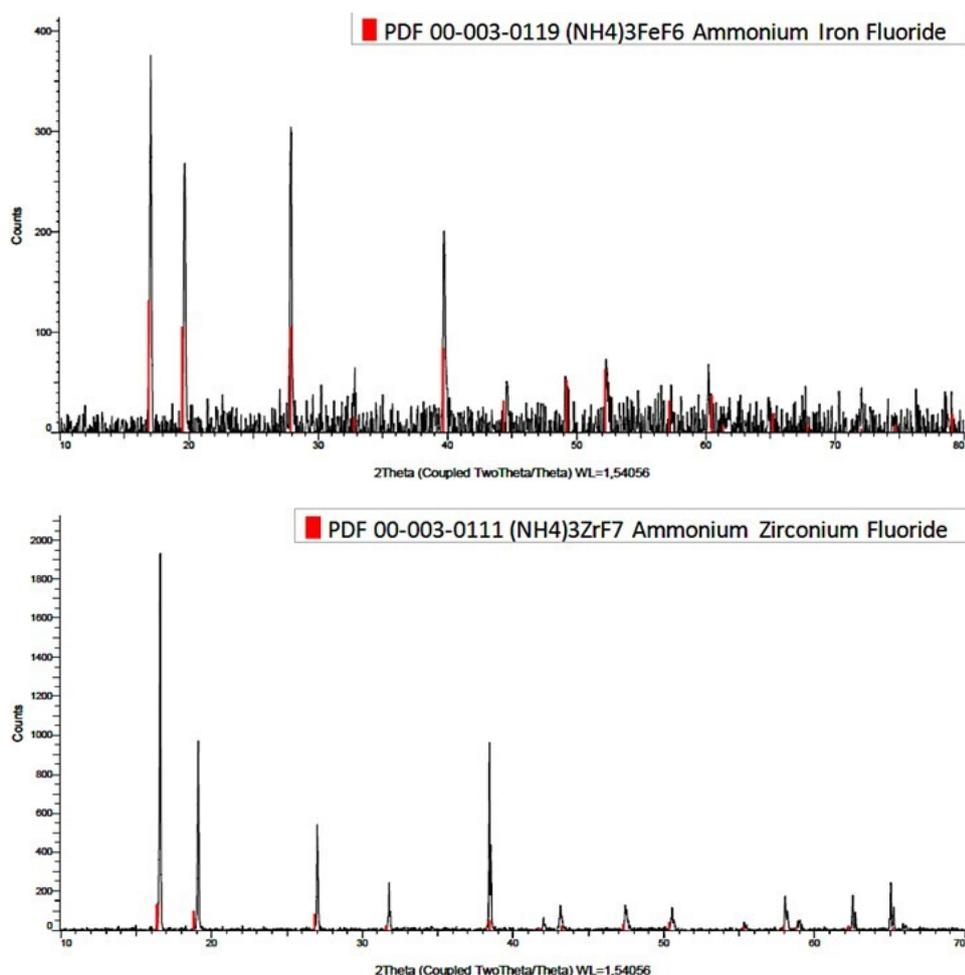
Figure S1. XRD patterns of synthesized solids (corresponds to Figure 1 in the article)

II.   Volumetric charge densities of the metal ions

Table S1. Volumetric charge densities of the metal ions.

	Valency	Ionic radii (pm)	Atomic number	Electronic structure	Computed Ionic volume (pm³)	Computed Charge density (e/pm³)
Zr	4	72.0	40	[Kr] 4d² 5s²	$1.56 \times 10^{+6}$	2.56×10^{-6}
Sc	3	74.5	21	[Ar] 3d¹ 4s²	$1.73 \times 10^{+6}$	1.73×10^{-6}
Fe	3	55.0	26	[Ar] 3d⁶ 4s²	$6.97 \times 10^{+5}$	4.30×10^{-6}
Al	3	54.0	13	[Ne] 3s² 3p¹	$6.60 \times 10^{+5}$	4.55×10^{-6}
Ti	4	61.0	22	[Ar] 3d² 4s²	$9.51 \times 10^{+5}$	4.21×10^{-6}

References: Lide, David R., 1995, CRC Handbook of Chemistry and Physics, 76th edition, CRC Press; Peters, E. M., 2022, Recovery of Scandium using Antisolvent Crystallization in the Valorization of Scandium-containing Waste Streams, KTH Royal Institute of Technology, Doctoral thesis

III. Phase determination of mixed solids after solubility tests in the mixed metal systems
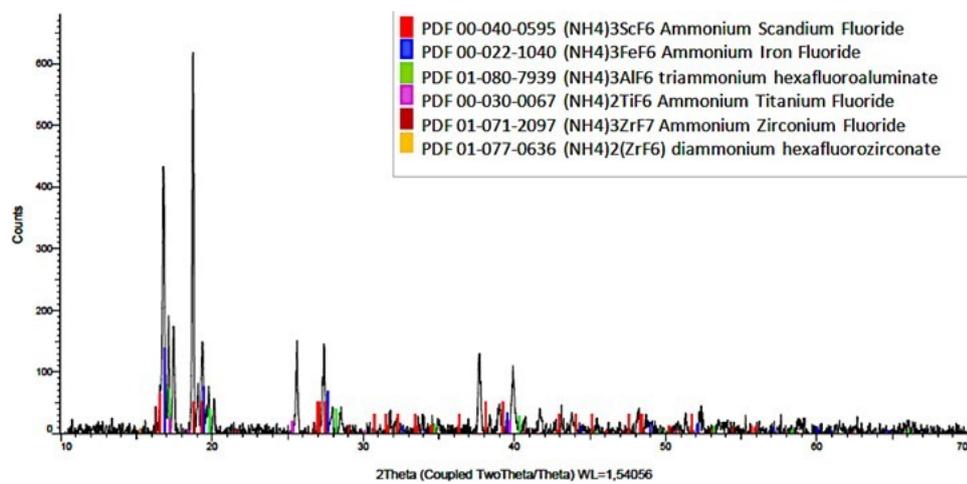

Figure S2. XRD patterns of mixed solids after solubility tests for the mixed-metal system