Supplementary materials

Tailoring a bio-based adsorbent for sequestration of Late Transition and Rare Earth Elements

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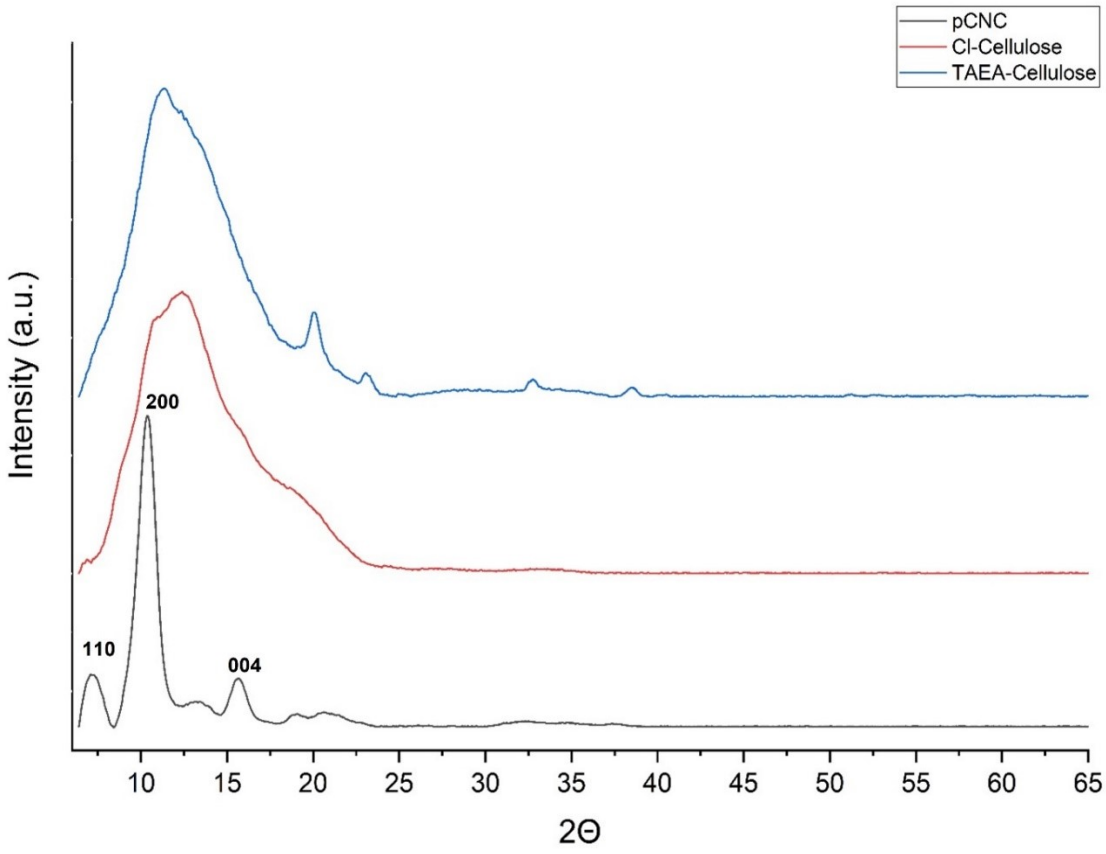

Figure S1. X-ray powder diffraction patterns of Pristine nanocellulose derived from cotton via sulfuric acid hydrolysis (black) – Cellulose I, Monoclinic, Space group $P2_1$, a = 0.778 nm, b = 0.820 nm, c = 1.038 nm, gamma = 96.51 deg,[S1,S2] Cellulose chlorinated in $SOCl_2$ in DMF (red) and tris(2-aminoethyl)amine modified cellulose.

References

S1. J. Gong, J. Li, Z. Xu, Z.Y. Xiang, L.H. Mo, Research on cellulose nanocrystals produced from cellulose sources with various polymorphs, *RSC Advances*, 2017, **7**, 33486-33493.

S2. M. Ioelovich, E. Larina, Parameters of crystalline structure and their influence on the reactivity of cellulose I, *Cellulose Chem. Technol*., 1999, **33**, 3-12.

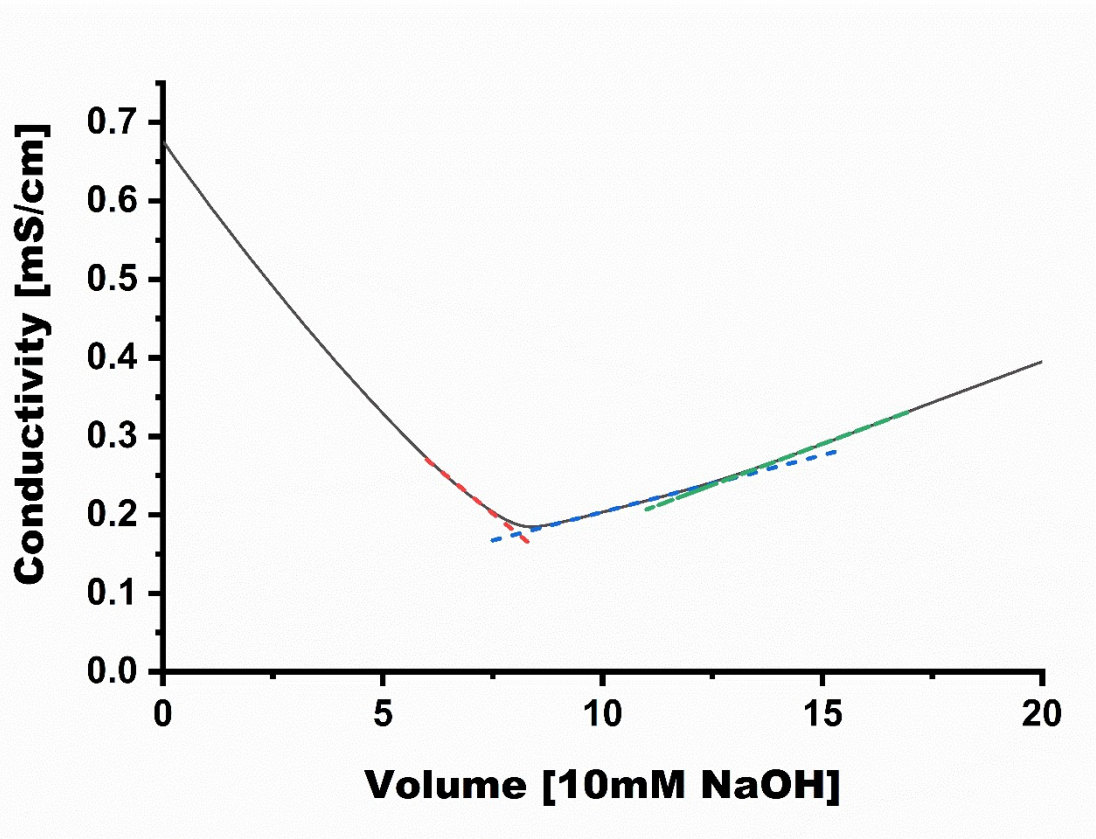

Figure S2. Conductometric titration of acidified tris(2-aminoethyl)amine modified cellulose

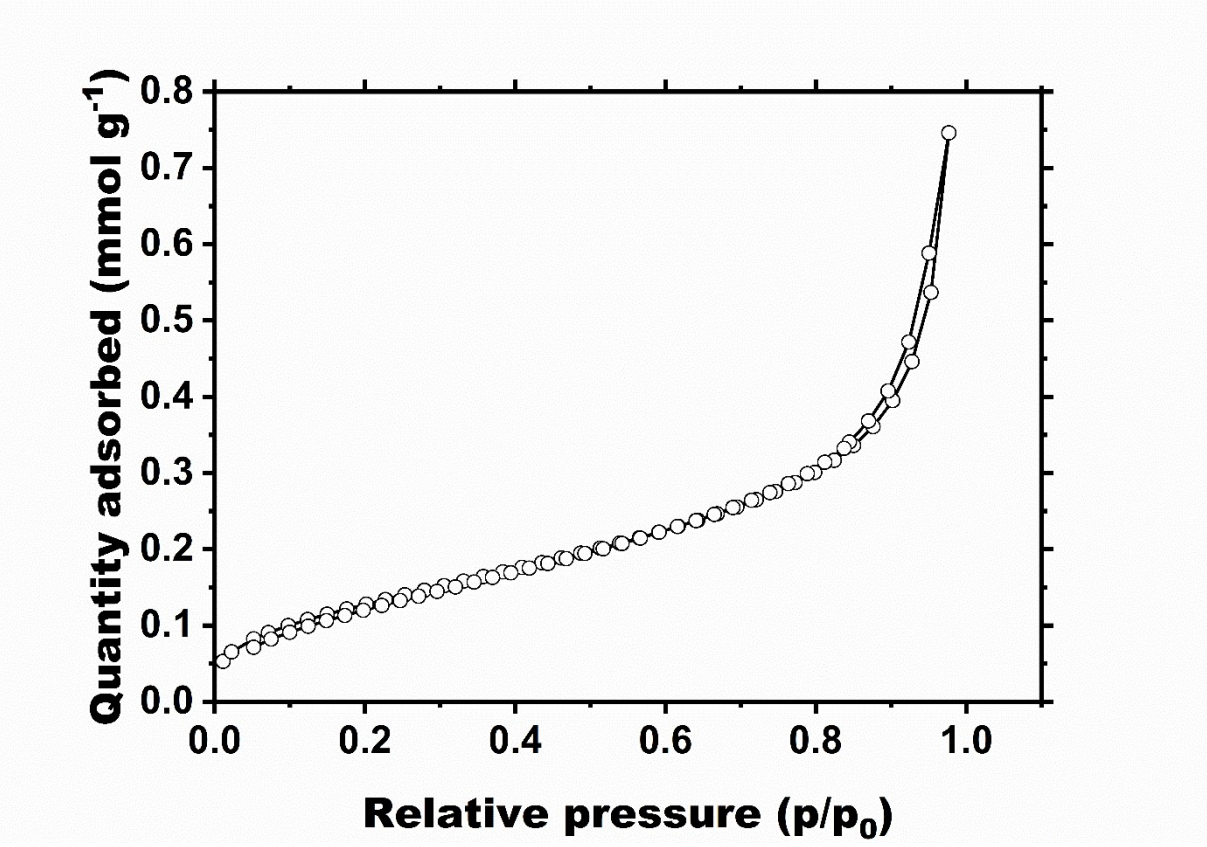

Figure S3. The nitrogen adsorption/desorption isotherm for the Cellulose-TAEA sample

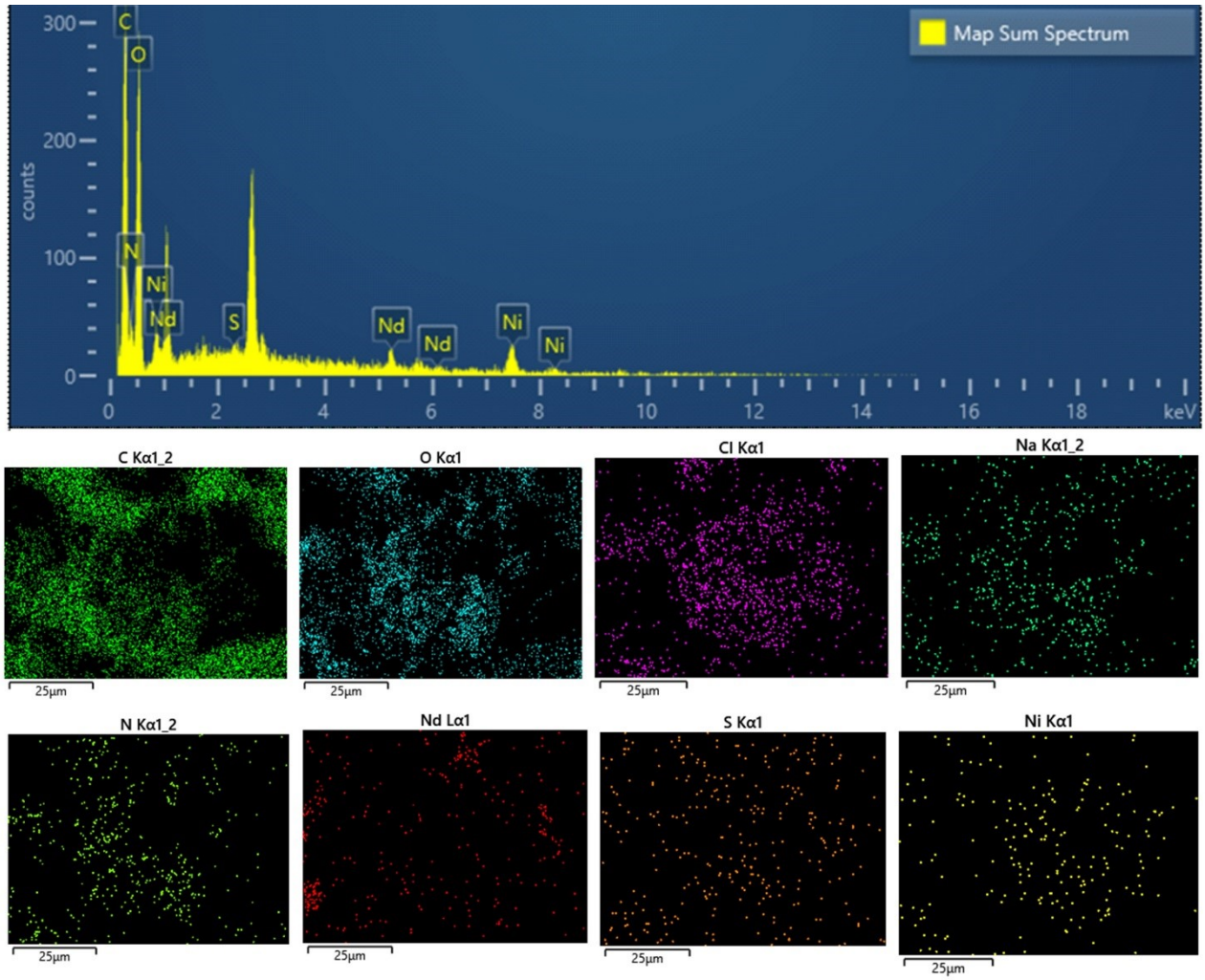

Figure S4. EDS map sum spectrum of cellulose-TAEA in the present of a equimolar mixture of Nickel(II) and Neodynium (III). (ca. 2at% Ni, 0.5at% Nd)

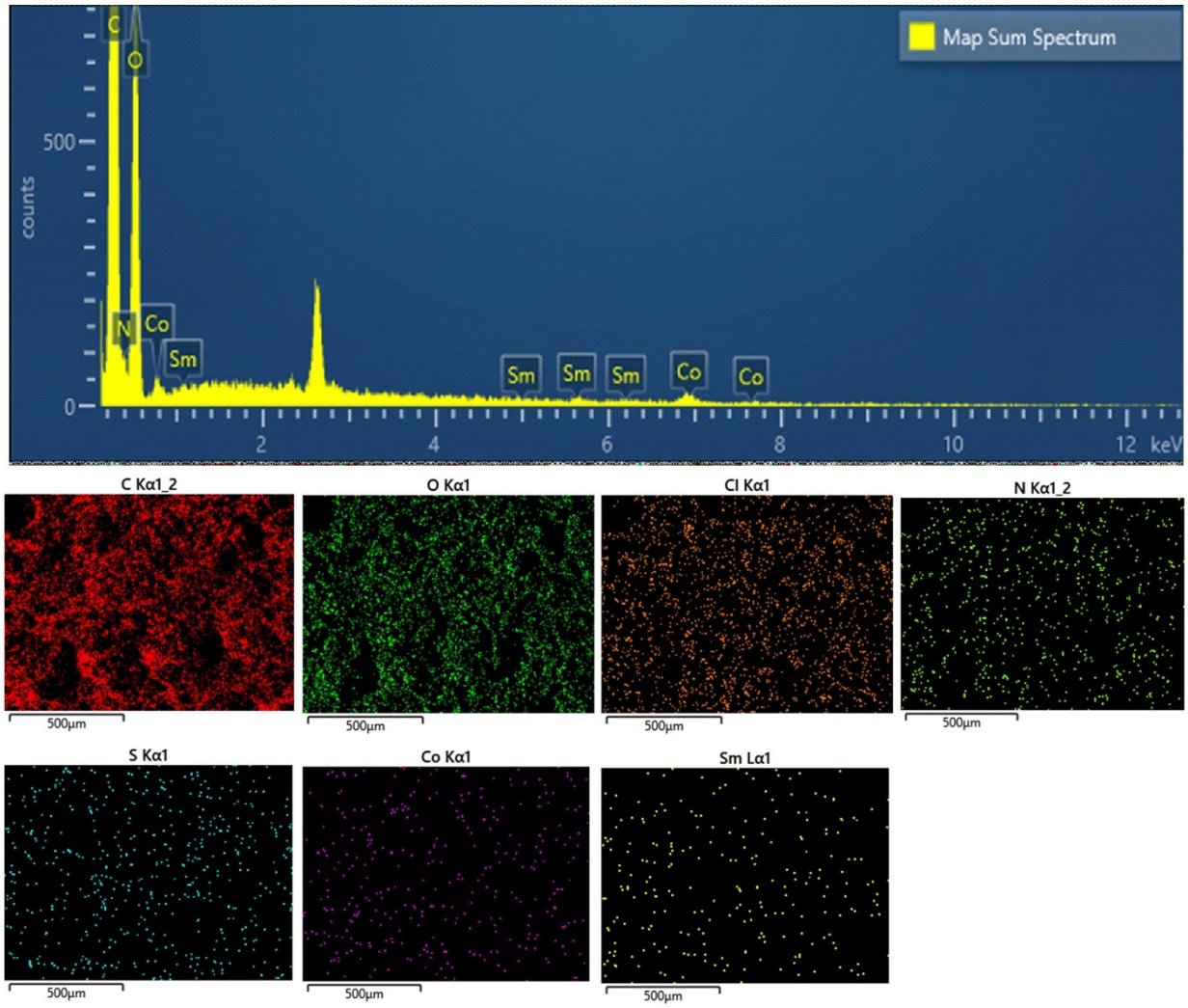

Figure S5. EDS map sum spectrum of cellulose-TAEA in the present of a equimolar mixture of Cobalt(II) and Samarium (III). (ca. 0.3 at% Co, 0.07at% Sm)

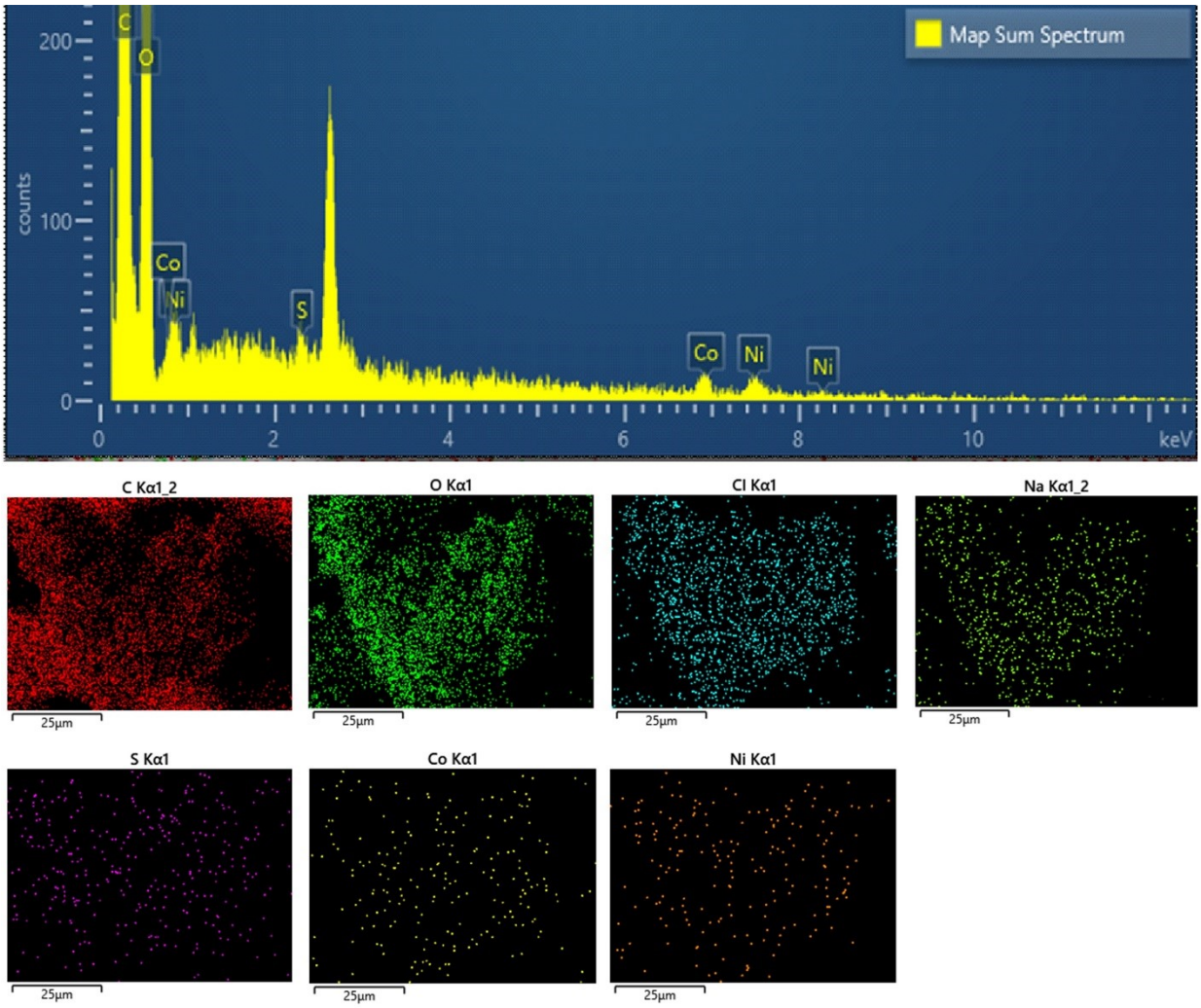

Figure S6. EDS map sum spectrum of cellulose-TAEA in the present of a equimolar mixture of Cobalt(II) and Nickel (II). (0.44 at% Co, 0.43 at% Ni).

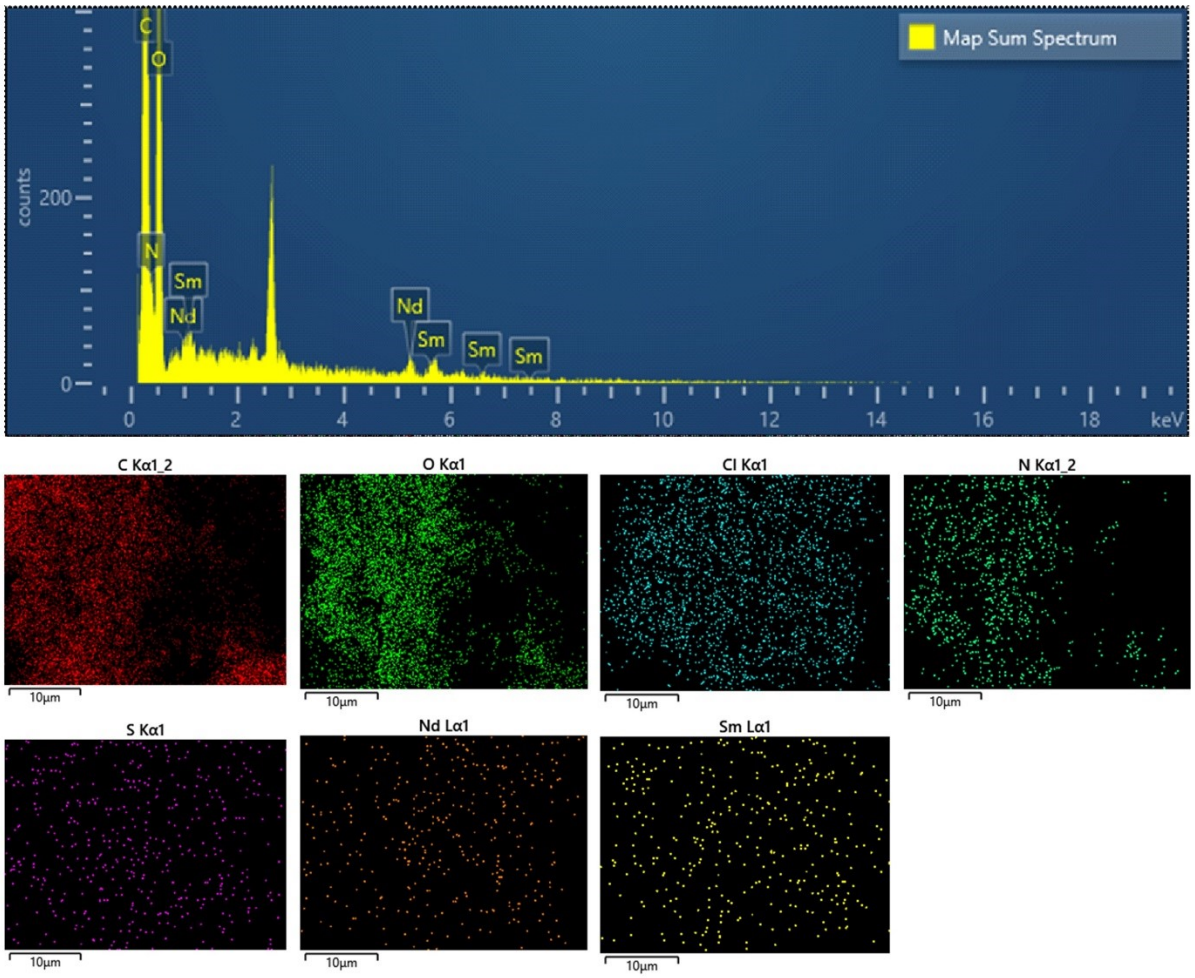

Figure S7. EDS map sum spectrum of cellulose-TAEA in the present of a equimolar mixture of Neodynium(III) and Samarium (III). (0.23 at% Nd, 0.19at% Sm).

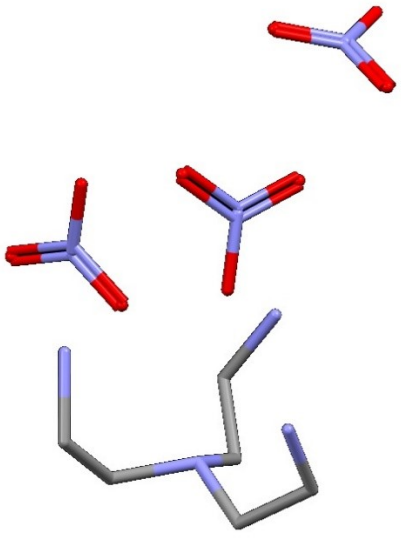

Figure S8. Molecular structure of $[N(C_2H_4NH_3)_3](NO_3)_3$, compound (**2**), generated by CCDC Mercury program using the data of ref. 52.

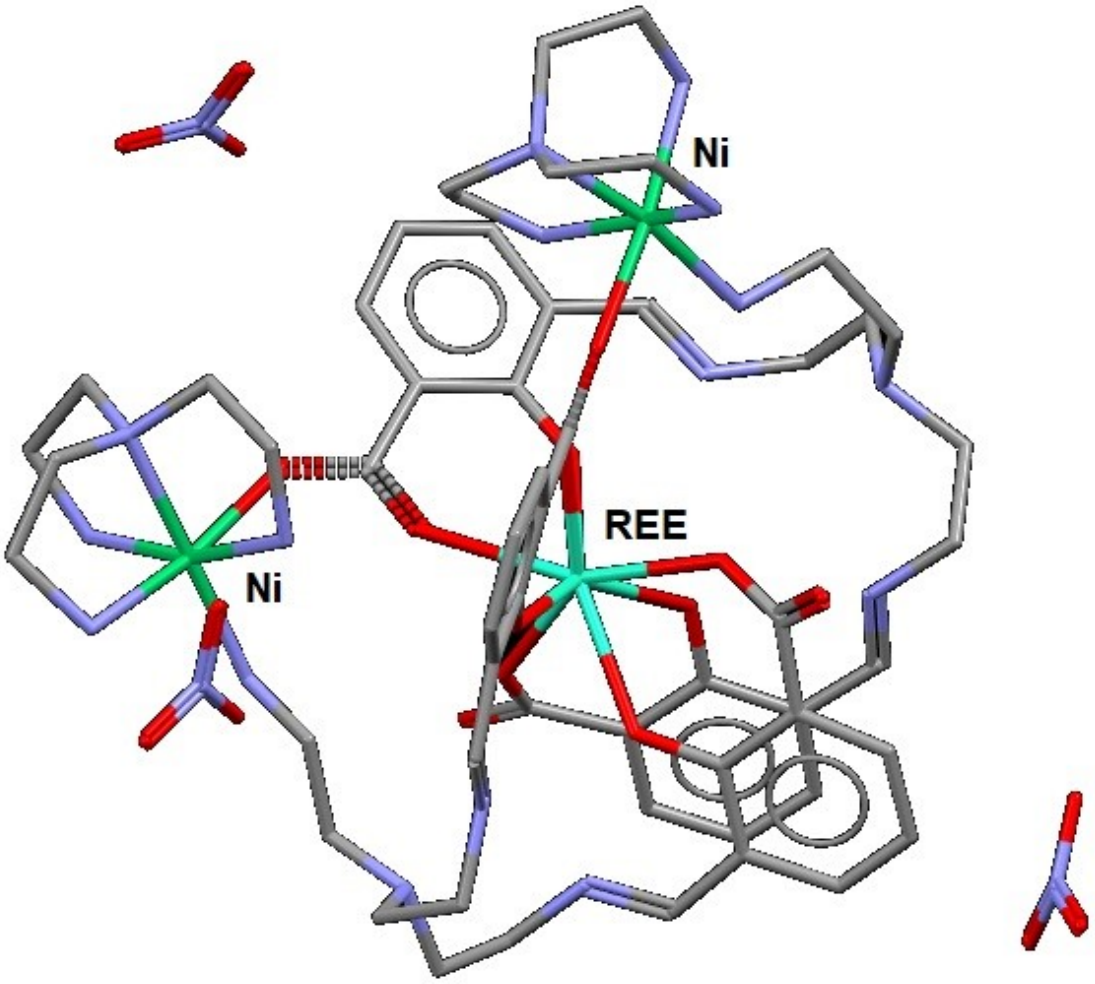

Figure S9. Molecular structure of REE{Ni(TAEA](H2L)}$(NO_3)_3$, generated by CCDC Mercury program using the data of ref. 53.

Table TS1. pH-dependent desorption of Co, Ni, Sm, Nd from Tris(2-aminoethyl)amine modified-cellulose

	Co	**Ni**	**Sm**	**Nd**
pH 0	42%	69%	51%	52%
pH 1	34%	63%	49%	54%
pH 2	29%	59%	29%	47%
pH 3	20%	29%	14%	12%
pH 4	4%	7%	15%	4%
pH 5	0%	0%	0%	0%

Table TS2. Unit cell determination of the $[N(C_2H_4NH_3)_3](NO_3)_3$ compound (**2**).

FILEID SAINT V8.40B 4.00 09/28/22 12:28:09 SmTAEA_220928

SITEID BrukerAXS SLU

TITLE Integration of SmTAEA_220928

SMAP 1 0 0 0 0 0 0 0

CHEM C6H12N7O9

CELL 8.7590 12.0758 14.5403 90.0000 90.7867 90.0000 1537.803

CELLSD 0.0010 0.0013 0.0017 0.0000 0.0024 0.0000 0.504

ORT1 1.8510969e-002 5.0215017e-002 -5.3385638e-002

ORT2 -4.7877077e-002 6.2643699e-002 3.4123499e-002

ORT3 1.0199036e-001 2.0292787e-002 2.6765097e-002

ZEROS 0.0000000 -0.0346542 0.0247405 -0.6903 0.5199 0.1307

SOURCE MO 0.71076 0.70930 0.71359 2.00000 50.00 20.00

LIMITS 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00

MORPH PLATE

ADPAR 385.3068 256.2824 4.9330 512 768

ADCOR 0.0257 0.0059 0.0067 -0.2582 0.5173 0.0329

BRAVAIS Monoclinic(b-unique) P

MOSAIC 0.44 1.78

SAINTD 0 0.0000 0.0000 0 0 0.00000

SAINOV 4672 3249 25.3408 0.901206 0 0 0

SAINOV 4672 3249 25.3408 0.901206 1 0 0

SAINOV 4672 3249 25.3408 0.901206 1 1 1

SAINGL 1647 2.8732 25.4107 0 0 0

SAINGL 1647 2.8732 25.4107 1 0 0

SAINGL 1647 2.8732 25.4107 1 1 1

SAINMC 0 0 0 0.0000 0.0000 1 1 1