Contribution ID: **861** Type: **Poster**

Deep Eutectic Solvents: Promising Media for advanced hydrometallurgical processes for actinides separation

Monday, 14 May 2018 18:30 (15 minutes)

Deep eutectic solvents (DESs) have emerged as an interesting type of neoteric solvents and have shown their usefulness as environmentally benign sustainable alternative to the conventional organic solvents *1.* DESs are eutectic mixtures of Lewis and Brönsted acids and bases, which can contain a variety of anionic and cationic species *2.* The use of DESs in chemical synthesis and chemical processes stems from their characteristics of green and inexpensive solvents, biodegradable, catalytic activity in some cases. Their simple preparation and the quantitative yields render DESs attractive for academic and industrial research *1.* In particular, DESs have extensive applications in the extraction and separation of a wide range of analytes.
In this communication we reports on the use of some newly synthesized DESs as innovative alternative to the recently proposed imidazolium based ionic liquids (ILs) for processing nuclear waste *3.* To this purpose, new DESs choline acetate-based products, designed in accordance with the CHON rule, were synthesized and fully characterized (HR-MAS NMR, FT-IR and DSC). The new DESs were checked as co-solvents in liquid-liquid extraction tests simulating hydrometallurgical processes for the recovery of minor actinides from the Plutonium and URanium EXtraction (PUREX) raffinate. In particular, Selective ActiNide EXtraction (SANEX) based processes were considered as reference. Therefore, some preliminary liquid-liquid extractions were performed at controlled temperature (25℃) by exploring i) a small library of DESs, ii) different DESs concentrations in the aqueous phase, and iii) different extraction strategies. 241Am(III) and 152Eu(III) were used as representatives of minor actinide and lanthanide families, present in the aqueous feed to be decontaminated. The DES affinity towards actinides and lanthanides and their extraction capability were checked with respect to TODGA, as reference ligand to co-extract Am(III) and Eu(III), and CyMe4-BTBP, as reference ligand to selectively extract Am(III), dissolved in the organic phase.
Results, advantages and drawbacks of the use of DESs in advanced partitioning processes are summarized in the present communication.

Ref:
1. Xiaoxia Li, Kyung Ho Row, J. Sep. Sci, (2016), 39, 3505-3520
2. E.L. Smith, A.P. Abbott and K.S. Ryder, Chem. Rev. 114 (2014) 11060-11082.
3. A.Berthod, M.J. Ruiz-Ángel, S. Carda-Broch, Journal of Chromatography A, https://doi.org/10.1016/j.chroma.2017.09.044

Primary authors: Ms COLOMBO DUGONI, Greta (Politecnico di Milano); Dr FERRO, Monica (Politecnico di Milano); Mr PANZERI, Walter (Politecnico di Milano); Prof. SACCHETTI, Alessandro (Politecnico di Milano); Dr MACERATA, Elena (Department of Energy, Politecnico di Milano, Piazza L. da Vinci 32, I-20133 Milano, Italy); MOSSINI, Eros (Politecnico di Milano); Prof. MARIANI, Mario (Politecnico di Milano); Prof. MELE, Andrea (Politecnico di Milano)

Presenter: Ms COLOMBO DUGONI, Greta (Politecnico di Milano)

Session Classification: Poster SEP

Track Classification: Separation Methods, Speciation