Supplementary Information

Performances and mechanistic investigations of triphosphine trioxide / ionic liquid system for rare earth extraction

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Fig. SI-1 Extraction kinetic of Ln. $[HNO_3]$ = 6 M

Fig. SI-2 Effect of temperature on the extraction in $[EBPip][NTf_2]$. Initial aqueous phase: $[HNO_3]$ 6 M.
Ln D_{Ln} = f(1/RTx10^3) : Nd (y = 12.22x + 1.22); Eu (y = 11.67x + 0.73) ; La (12.65x + 1.04) ; Yb (y=-9.42x + 0.79)

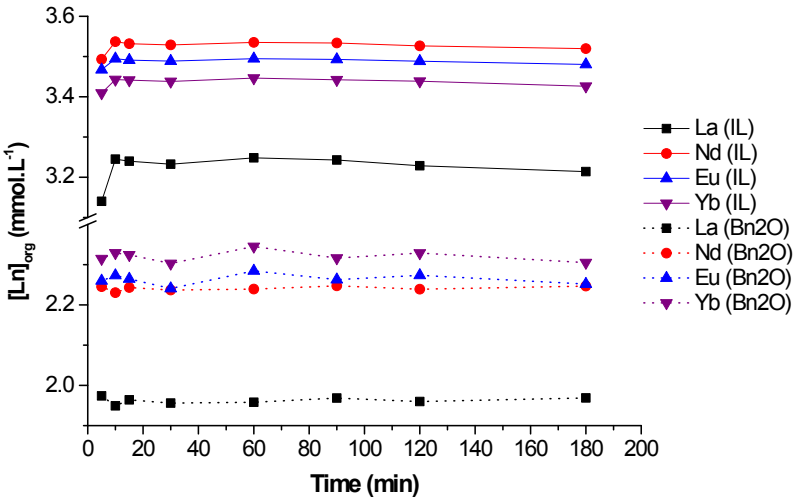
Fig. SI-3 Nitric acid extraction following the solvent used: a) after pre-equilibrium step and b) after metal extraction

Fig. SI-4 Theoretical (dot line) and experimental extraction in IL of La vs number of ligands

Fig. SI-5 a) variation of the ligand concentration vs Eu extracted in organic phase [TPO]-(IL) =f ([Eu]org): y = 2.94 + 0.3, R^2 = 0.998; [TPO]-(Bn_2O) =f ([Eu]org): y = 8.58x + 4.3, R^2 = 0.997; b) Theoretical (dot line) and experimental extraction in IL of Eu vs number of ligands

Fig. SI-6 variation of the ligand concentration vs Yb extracted in organic phase. [TPO]-(IL) =f ([Eu]org): y = 2.86 + 0.15, R^2 = 0.982; [TPO]-(Bn_2O) =f ([Eu]org): y = 8.8x + 0.38, R^2 = 0.996

Fig. SI-7 a) Comparison of water extraction with different ILs vs $[HNO_3]$; b) Extrapolation of the nitric acid extracted in organic phase vs $[HNO_3]$



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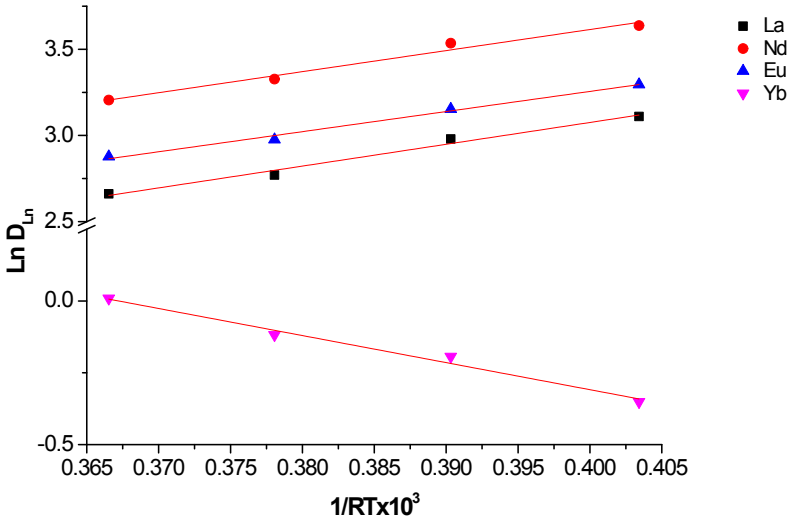

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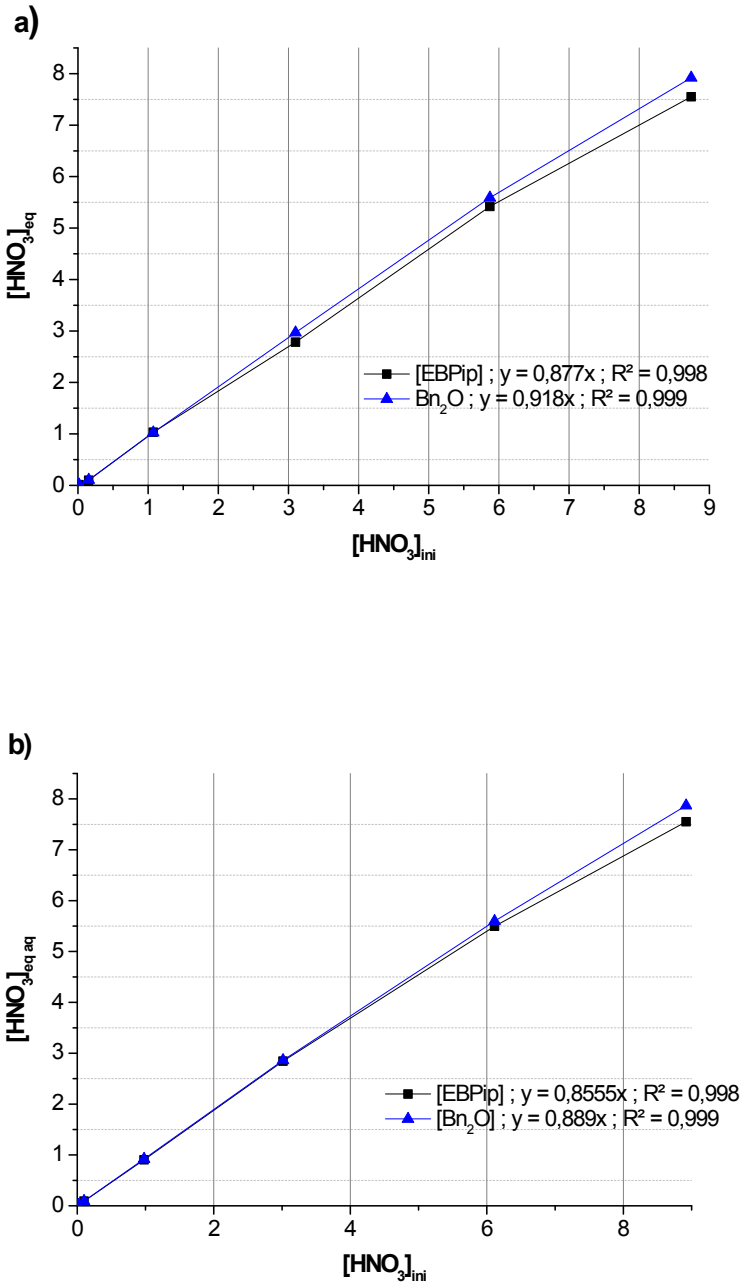

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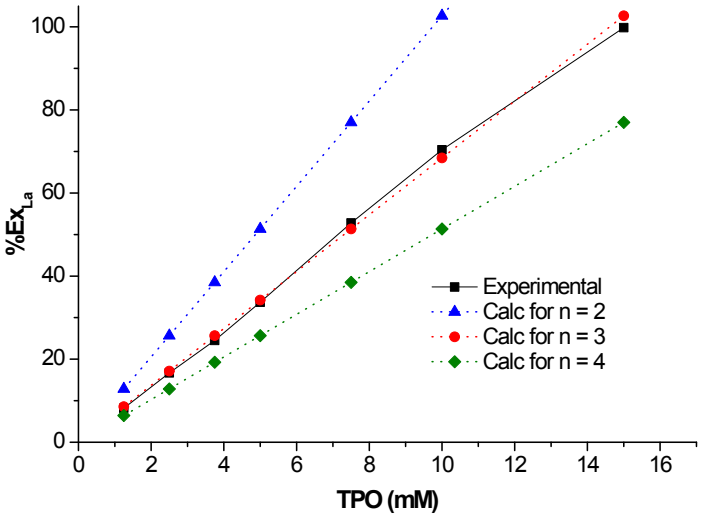
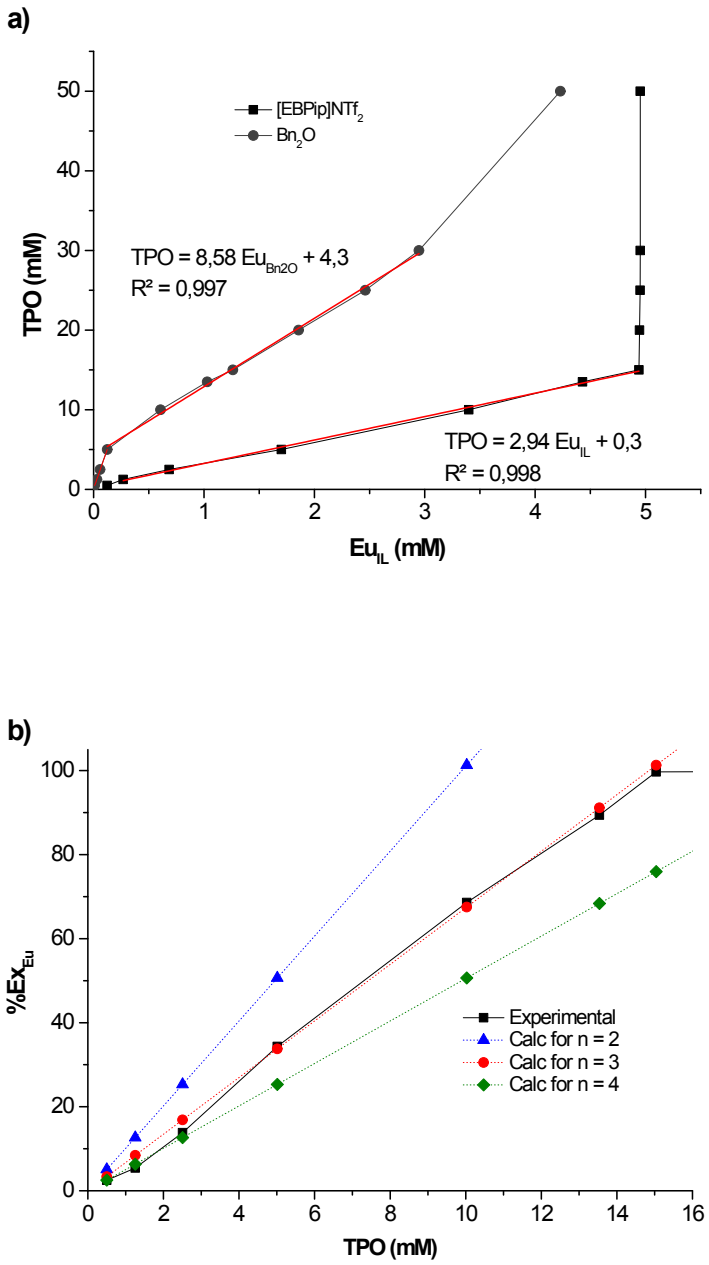


Fig. SI-4 Theoretical (dot line) and experimental extraction in IL of La vs number of ligands



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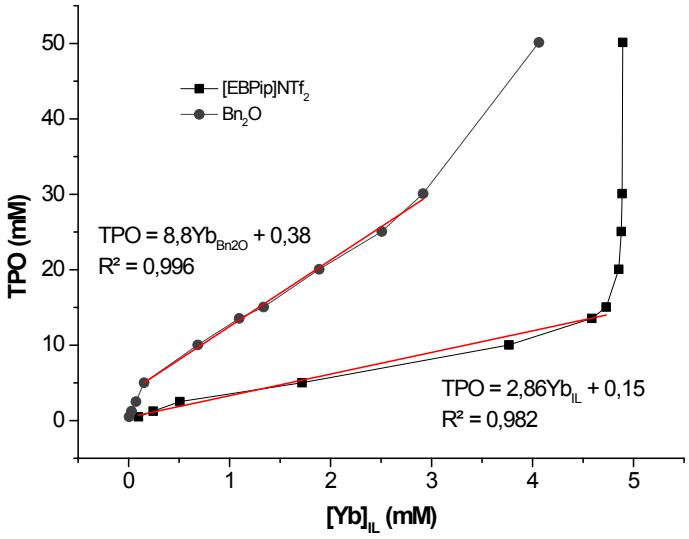
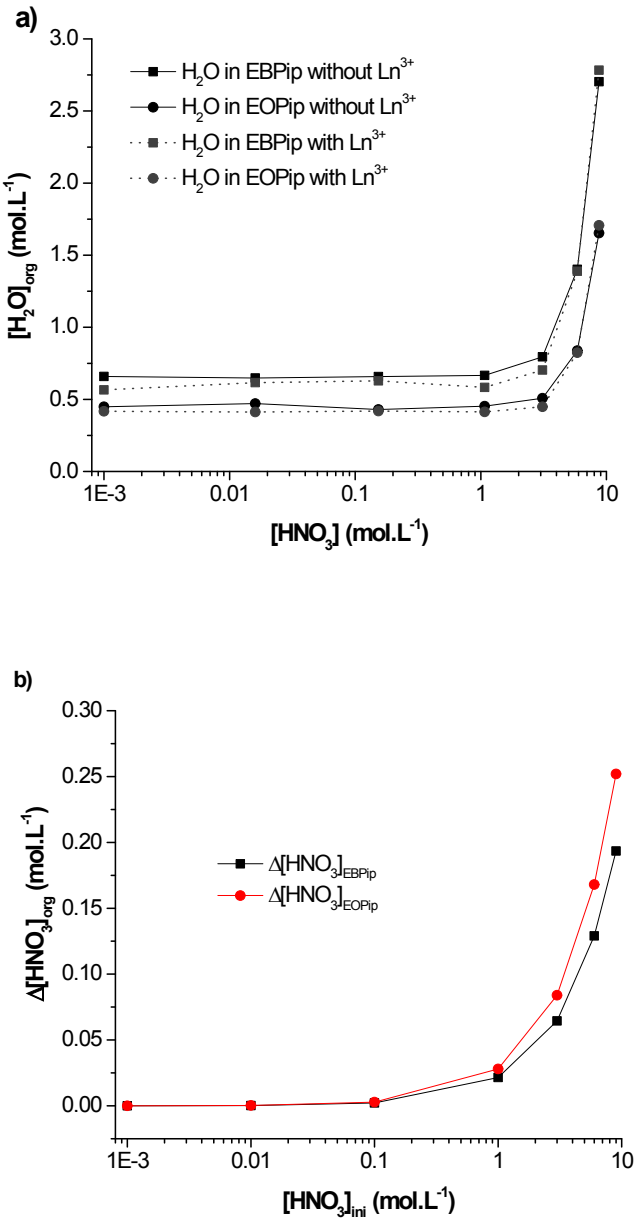


Fig. SI-6 variation of the ligand concentration vs Yb extracted in organic phase. [TPO]-(IL) =f ($[Eu]_{org}$): y = 2.86 + 0.15, R^2 = 0.982; [TPO]-(Bn_2O) =f ($[Eu]_{org}$): y = 8.8x + 0.38, R^2 = 0.996.



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