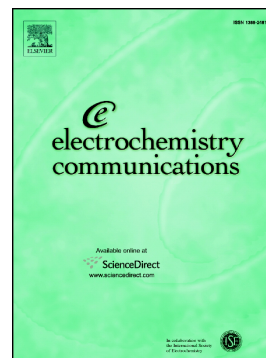


Accepted Manuscript

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PII: S1388-2481(18)30255-8
DOI: doi:[10.1016/j.elecom.2018.10.001](https://doi.org/10.1016/j.elecom.2018.10.001)
Reference: ELECOM 6305

To appear in: *Electrochemistry Communications*

Received date: 12 September 2018

Revised date: 1 October 2018

Accepted date: 1 October 2018

Please cite this article as: Prashant Bagri, Huimin Luo, Ilja Popovs, Bishnu P. Thapaliya, Jeremy Dehaut, Sheng Dai , Trimethyl Phosphate Based Neutral Ligand Room Temperature Ionic Liquids for Electrochemical Separation of Rare Earth Elements. *Elecom* (2018), doi:[10.1016/j.elecom.2018.10.001](https://doi.org/10.1016/j.elecom.2018.10.001)

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Trimethyl Phosphate Based Neutral Ligand Room Temperature Ionic Liquids for Electrochemical Separation of Rare Earth Elements

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Abstract

In this communication, a new class of task-specific ionic liquids (ILs) with cationic rare earth elements (REEs) is reported. These novel ILs have a wide electrochemical window of about 6 V, enabling direct electrodeposition of REE metals at room temperature. The ILs were prepared by dissolving bis(trifluoromethane)sulfonimide (NTf₂⁻) based rare earth salts (Ln(NTf₂)₃) (Ln:Lanthanide) in trimethyl phosphate (TMP) neutral ligand. Specifically, four REEs (Nd, Dy, Gd, and Pr) have been investigated in TMP based IL systems. All four metals were successfully deposited at room temperature. This demonstrates the applicability of the IL systems for electrodeposition of a wide range of REEs, which opens a new avenue of research for the quest to supplant high temperature molten salt systems for rare earth deposition.

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