

Deep Eutectic Solvents for Critical Metal Refining and Recycling Assistant Professor Takafumi Hanada



Content:

The solvent extraction method, which is one of the rare metal separation techniques, is a practical process that allows for rapid and high-purity separation and recovery of target metals. However, concerns about environmental pollution arise from the use of inorganic acids and organic solvents in the leaching and extraction stages.

In recent years, deep eutectic solvents (DESs) have gained attention as alternative solvents to inorganic acids and organic solvents. DES is a mixture that becomes a liquid simply by combining hydrogen bond donor and acceptor compounds. It was first reported in 2003 as a new solvent of the 21st century (Abbott *et al., Chem. Commun.*). DES is known as an environmentally friendly solvent due to its low volatility and low toxicity. However, most existing DESs are hydrophilic, making it difficult to apply them to separation techniques such as solvent extraction.

Therefore, this study focuses on hydrophobic DES, which are immiscible with water, with the aim of applying them to the solvent extraction process for rare metals. Furthermore, by utilizing the unique intermolecular interactions between the hydrogen bond donor and acceptor compounds that constitute DES, the study aims to develop advanced rare metal separation systems.

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