Selective recovery of valuable metals from e-waste using ionic liquids

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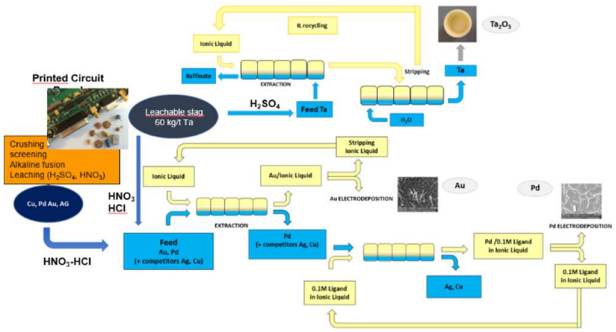
Liquid-liquid extraction is one of the most powerful techniques for separating and purifying compounds. Despite its efficiency, this method has some drawbacks, in particular the use of organic diluents, which are environmentally questionable. They are often toxic, flammable and contribute to the emission of VOCs into the atmosphere. Alternative processes that limit the use of volatiles must be considered, and one of the most promising is the use of ionic liquids due to their very low vapour pressure and non-flammability, thus limiting atmospheric pollution and increasing worker safety.
An environmentally friendly process based on ionic liquids (ILs)[1] or functionalised task-specific ionic liquids (TSILs)[2] has been proposed for the extraction and stripping of Ta from sulphuric acid medium[3] or other valuable metals such as Au and Pd from aqua regia leachate[4], which can be obtained from the dissolution of bottom ash and by-products of industrial activities, as well as from secondary sources such as waste electrical and electronic equipment (WEEE). The study of key parameters of the IL-based process was investigated, including the effect of metal concentration, acid concentration, equilibration time, temperature, IL partitioning...
The IL phase is selective for the valuable metals with respect to all other cations considered in the simulated solution of an e-waste leachable slag, with the possibility of recyclability of the IL phase allowing to propose a global flowsheet for the recovery of valuable metals from e-waste.



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4. Patent FR3106597 (A1) / WO2021148758 (A1)

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