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Extraction of rhenium from PWA 1484 superalloy scrap using electrogenerated chlorine leaching in acid solutions

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Recycling of used Ni-based superalloy scrap is important since it contains various valuable metals such as Ni, Co, Cr, W, Ta, Re, etc. Especially we focused on the extraction of the most expensive Re from PWA1484 superalloy scrap for developing a hydrometallurgical recycling process. The superalloy scrap was pretreated by Ni-Alintermetallic compound formation for easy combination. The extraction of Re was processed by two stage leaching; acid leaching for removing Ni, Al, Co, Cr was followed by electro generated chlorine leaching for Re dissolution. In the first stage, over 99 % of Ni, Al, Co, and Cr was leached in 60 minutes at 90oC in 4 mol L⁻¹ HCl solution, whereas only less than 3 % of Re was leached in the case of lower solid/liquid ratio than 40 g/L. Over 97 % of the remaining rhenium in the residue from the first stage was leached out in 50 minutes using the electro generated chlorine as an oxidant at 80oC in 4mol L⁻¹HCl solution. Most of tantalum was remained in the final residue. In sulfuric acid solutions, the dissolution of Re was suppressed less than 2% at higher solid/liquid ratio, while it was not in hydrochloric acid solutions. However, the leaching of Al, Co, Cr was reduced with increasing solid/liquid ratio in sulfuric acid solution.

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