Zirconium Behaviour during Electrorefining of Actinide-Zirconium Alloy in Molten LiCl-KCl on Aluminium Cathodes

Abstract:
A pyrochemical electrorefining process for the recovery of actinides from metallic nuclear fuel based on actinide-zirconium alloys (An-Zr) in a molten salt is being investigated. In this process actinides are group-selectively recovered on solid aluminium cathodes as AnAl alloys using a LiCl-KCl eutectic melt at a temperature of 450°C. In the present study the electrochemical behaviour of zirconium during electrorefining was investigated. The maximum amount of actinides that can be oxidised without anodic co-dissolution of zirconium was determined at a selected constant cathodic current density. The experiment consisted of three steps to assess the different stages of the electrorefining process, each of which employing a fresh aluminium cathode. The results indicate that almost a complete dissolution of the actinides without co-dissolution of zirconium is possible under the applied experimental conditions.

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