Short Communication

Uranium Dissolution Behavior in LiCl-KCl Molten Salts

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Uranium (U) dissolution behavior at an anode during electrorefining was investigated by employing the potentiodynamic polarization method, galvanostatic potential transient technique, AC impedance spectroscopy, and potentiostatic current transient technique. For this purpose, a U pellet of diameter 8 mm and length 10 mm was used as the working electrode. From the quantitative analyses of the polarization curve and potential transient curves, the kinetic parameters governing the U dissolution reaction, such as the exchange current density and diffusivity of U ions in the LiCl-KCl fused salt, were determined. From the impedance spectra and anodic current transient curves obtained at various applied potentials, it was confirmed that the interfacial charge transfer for U dissolution is kinetically coupled with diffusion through the electrolyte. In addition, we found that AC impedance spectroscopy was more useful compared to the potentiostatic current transient technique in the presence of a large uncompensated ohmic potential drop.

Keywords: Pyroprocessing, Electrorefining, Uranium dissolution, Dissolution mechanism, Kinetic parameter

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