Electrolysis of rich Titanium Slag in Molten CaCl_2 with a Liquid Zn Cathode

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A unique utilizing method for rich titanium slag with liquid Zn cathode in molten CaCl_2 has been proposed. In order to establish this process, the electrochemical behavior of TiO_2 was investigated. Cyclic voltammetry results showed that the reduction of TiO_2 on Zn electrode at 1123 K was occurred at potential range from -0.77 V to -1.73 V vs. Ag/AgCl. After potentiostatic electrolysis at -1.5 V, reduction and enrichment of Ti in Zn matrix was confirmed by EDS, XPS and XRD. The content of titanium reached 26.3 at% in the rich region. The electrolysis of rich titanium slag with Zn electrode was carried out. Metal Ti can be observed in Zn matrix after electrolysis only after a pre-melting process was carried out. The content of Ti in the enriched area was increased from 5.5 at% to 25.4 at% when the pre-melting time increased from 1 hour to 3 hours.

Keywords: Molten Salt Electrolysis, Rich Titanium Slag, Zn electrode, Pre-melting

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