Electrochemical Reduction of Uranium from Porous 17 kg-Uranium Oxide Pellets by Selection of Optimal Cathode/Anode Surface Area Ratio

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An electrochemical reduction of metal oxide forms to their metallic forms has been evaluated as a simple, cost-effective and environmentally friendly process for the production of various metals. In this study, influence of cathode/anode surface area ratio on electrochemical reduction behavior of uranium oxide in a molten LiCl-Li2O electrolyte was investigated. In a bench-scale test, cathode/anode surface area ratio in the vicinity of 2.6 was shown to the most efficient to achieve high current density and to produce metallic uranium from uranium oxide when mass of LiCl-Li2O electrolyte in an electrolysis cell is large enough. We set up a 17 kg-uranium oxide electrolysis cell to have the cathode/anode surface area ratio of 2.6 and successfully performed electrochemical reduction of uranium oxide to metallic uranium.