

Electrochemical reduction of SIMFUEL for pyroprocessing

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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. The electrochemical process of using spent oxide fuel from nuclear power plants and reducing it to a metallic form is particularly promising, firstly in terms of the way spent oxide fuel from a fast neutron reactor can be recycled to a metallic form and, secondly, in the way the accumulation of spent fuel can be reduced. SIMFUEL (simulated high burn-up nuclear fuel) consists mainly of UO<sub>2</sub>, but Sr, Y, Zr, Mo, Ru, Rh, Pd, Ba, La, Ce and Nd are added in different amounts depending on which burn-up process is being mimicked. Chemically, SIMFUEL is similar to real spent fuel, but it does not contain radioactive isotopes. In this work, SIMFUEL was prepared and electrochemically reduced in a LiCl-1 wt.% Li<sub>2</sub>O melt. A steel basket containing the particles and a platinum plate were used as a cathode and an anode, respectively.