Materials Science & Engineering and Metallurgical Engineering Graduate Seminar

Wednesday, February 13 2019, 4:10-5:00PM, FASB 295

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Study of Lithium Oxide Entrainment in Reduced Uranium Particles Formed from Electrolytic Reduction of UO_2 in Molten Lithium Chloride-Lithium Oxide Salt

Pyroprocessing is an innovative process designed to reprocess spent nuclear fuel. In order to make it cost competitive advancements must be made in the process to increase its efficiency. This work aimed to increase the efficiency of a part of pyroprocessing by mitigating the amount of Li_2O transferred from the oxide reduction step to the electrorefining step. It did so by studying the effects that various process variables had on Li_2O entrainment in the cathode basket. The process variables studied were: particle size in the range of 106 to 1000 µm, applying current in intermittent cycles, stirring the salt, and reducing the uranium oxide chemically as opposed to electrolytically.

Titration was used to measure Li_2O entrainment in the cathode product, which was validated. Rotating the basket at a high rate of speed and a temperature of 650°C was effective at removing the majority of the salt in the cathode basket, allowing direct titration of the cathode product. The TGA was found to be effective for measuring the reduction extent, and was validated using pure uranium.

Adam Burak has always been intrigued by metallurgy, studying it even for his bachelor's degree. His interest in electrometallurgy began when he was an undergraduate, but his first job out of school focused on programming instead. After a couple years working in industry Adam returned to pursue his interest in electrochemistry and metallurgy. Almost five years have passed with research, classes, writing, and numerous conferences. Adam hopes to graduate and get a job, still doing research, whether at a university, a national lab, or in industry.