Sydney Holdampf, Mark R. Deinert

Colorado School of Mines

ANS Global/Top Fuel 2019

Electrophoretic Separations of Lanthanum and Gadolinium for Used Nuclear Fuel Reprocessing

Minor actinides are largely the cause of the long-lived radioactivity and heat associated with used nuclear fuel. Reprocessing methods such as PUREX and UREX have been used for decades to separate uranium, or uranium and plutonium, but fail to partition the lanthanide fission products and minor actinides. TALSPEAK, Trivalent Actinide Lanthanide Separation by Phosphorus-reagent Extraction from Aqueous Komplexes, is one approach to achieving this and takes advantage of the competition between an extractant in the organic phase and complexing agents in the aqueous phase. However, it is still unable to partition all trivalent actinides from the lanthanides. Electrophoretic separation is another approach and could be used with the standard nitric acid solutions used to dissolve fuels instead of using many different agents during the separation process. The actinides and lanthanides would be driven by an electric potential causing differing drift velocities based on the ions' sizes and masses. Here, we show that this approach can be used to drive Gd and La at different velocities through a porous medium of agarose.