

Development of LCC electrowinning process for group actinide recovery at KAERI

김가영\*, 김시형, 김택진, 안도희, 심준보, 백승우  
한국원자력연구원  
(gkim@kaeri.re.kr\*)

Used nuclear fuel is considered as waste to be disposed of in permanent repositories, but the long period of safety management makes it difficult to be accepted as a sustainable solution for long-term use of nuclear power. Pyrochemical processes, which utilize electrochemical reactions in high-temperature molten salts, have been a promising method for the recovery and recycling of a group actinide. In Korea, an integrated pyroprocessing system has been developed to process the used oxide fuel discharged from a pressurized water reactor (PWR) and to provide metallic fuel containing transuranic elements (TRUs) to a future sodium-cooled fast reactor (SFR). Since actinides are recovered using liquid cadmium cathode in electrowinning process, pyroprocessing enhances the proliferation resistance significantly. In the electrowinning process, U & TRUs in molten LiCl-KCl are co-deposited onto LCC, while  $\text{Cl}_2(\text{g})$  is evolved on an inert carbon anode surface. Since the dendritic U deposits act as a solid cathode, resulting in hindrance of the co-deposition of U/TRU, several designs of the LCC assembly were developed.