

### Diffusion of AM, AEM and Oxygen Ions via Metal Oxide Powders in a Molten Salt

박병홍\*, 박성빈, 서중석, 박성원  
한국원자력연구소  
(bhpark@kaeri.re.kr\*)

The advanced spent fuel conditioning process (ACP) has been developed in KAERI to manage spent fuels (SFs) safely and efficiently. An electrolytic reduction of spent fuels is the main unit process of ACP, in which oxides of uranium, plutonium and minor actinides lose their oxygen component and are reduced to the corresponding metals. Meanwhile, the oxides of alkali and alkaline-earth metals (AM, AEM) dissolve into a molten salt phase in an electric cell. During an electrolytic reduction, alkali, alkaline-earth metal, and oxygen ions diffuse through a porous magnesia filter containing metal oxide powders. The selective separation of AM and AEM is experimentally performed and their diffusivities are determined by using the cylindrical magnesia membrane. The diffusivities of the metal ions are in the order of Ba, Cs, and Sr. However, the diffusion behavior of the oxygen ion is somewhat different from those of the metal ions since it interacts with the molten salt. The Fick's second law is solved to obtain an infinite series solution for a cylindrical shape.