Development of High Efficiency Electrochemical Reduction Process for Nuclear Recycling

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Electrochemical reduction process has been used as a technique for electrochemically producing metal from metal oxides by using a molten salt as an electrolyte. Since the electrochemical reduction process was innovated for the reduction of TiO2 to Ti metal, it has been expanded to the reduction of the various metal oxides such as SiO2, Ta2O5, Fe2O3, SnO2, Tb4O7, Nb2O5, Cr2O3 and CeO2. Also, it was applied to produce diverse metal alloys from the mixed oxides such as Nb?Si and ZrCr2. The electrochemical reduction process has been also applied to reduce nuclear spent oxide fuel, which is aim to recover uranium and transuranic elements from the metallic fuel obtained through the electrochemical reduction process; theses integrated processes are called pyroprocessing. In this presentation, various approach and methods for increasing the efficiency of electrochemical reduction process will be discussed.