ADS Research Activities in SungKyunKwan University

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Current status of nuclear power plants in Korea

- In operation (27,053 GWe)
  - 23 units: 19 PWRs, 4 PHWRs (CANDU)
- Under construction (5.6 GWe)
  - 4 PWRs
- Planning (5.6 GWe)
  - 4 PHWRs

Amount of nuclear waste (Unit: Tdis/yr)

ADS research in SKKU

- Partitioning
- Transmutation of LLFP’s
- Accelerator Driven Molten Salt Reactor
- Installation of 9 & 13 MeV Cyclotron
- Life Cycle Assessment of ADS
- Applications (nuclear data, detectors, medical, etc)

Actinide Partitioning

- Tetracyclo diglycolamidot (TODGA) is the most promising extractant for the separation of long lived minor actinides from High Level Waste and has been investigated extensively for Actinide Partitioning.[1]
- Effect of diluent and ion strength was investigated on the extraction behaviour of La(III), Eu(III) and Yb(III) with TODGA.[2]
- Mechanism of extraction of La(III)/Eu(III)/Yb(III) using DGA-chromatographic resin from nitric acid/perchloric acid was investigated thermodynamically.
- TODGA based EXC resin is capable of remediation of liquid waste eminating from nuclear fuel cycle facilities dealing with Pu in the presence of 0.01M perchloric acid.[3]

Thermal analysis for Be target design

- Thermal analysis of a multi-channel helium cooled device [3].


Life Cycle Assessment for ADS

- LCA is a useful tool to consider life cycle time scale from various points of view [4].
- Developed by United Nations Environmental Programme (UNEP).
- LCA for ADS:
  - One of the fundamental problems in nuclear power is the MA burning for waste reduction. Partitioning and transmutation both have to be correctly evaluated from the LCA.

Detectors and Sensors

- Solid State Nuclear Track Detector CR-39 as an online optical sensor
  - Optical response of CR-39 employing techniques such as AFM, absorbance and reflectance spectroscopy.
  - GEANT4 simulation of alpha particles in the detector is carried out.
- A novel nanometric DNA thin film as a sensor for alpha / beta radiations radiation


Thermal analysis of a multi-channel helium cooled device [3].