

## **R&D STRATEGY FOR PARTITIONING & TRANSMUTATION UNDER OMEGA PROGRAMME AND NEUTRON SCIENCE PROJECT OF JAERI**

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### **Abstract**

JAERI developed the double-strata fuel cycle concept and JAERI's OMEGA activities have been devoted for developing technologies which are needed to realise this concept. In this concept, partitioning is based on aqueous separation of high level liquid waste from the reprocessing plant and a dedicated system with a very hard neutron spectrum is used for transmutation of minor actinides. Accelerator-driven subcritical system(ADS) and Actinide Burner Reactor(ABR) are designed. The system design of these systems is based on nitride fuel. Technology of nitride fuel fabrication and dry reprocessing of spent nitride fuel are under development. For 1000MWth-ADS plant, a proton accelerator of about 1GeV, 40mA will be needed for subcritical core of  $k_{\text{eff}}$  of 0.95 for the support factor of 12 to 14. To develop an accelerator hybrid system, an intense proton accelerator is needed for various experiments and also to demonstrate the high power accelerator technology. JAERI started the development of a super-conducting proton linac. In the course of developing of an accelerator for transmutation experiments, we recognised that neutron scattering community desires to have very high intensity neutron beam, two order of magnitude stronger than that of existing ones. Also, JAERI has been one of major neutron suppliers for basic science community in Japan with its research reactor JRR-3M, and is asked to continue to be so in the 21<sup>st</sup> century.

Neutron scattering has achieved some notable successes in recent years, such as unravelling the crystal structures of high-temperature superconductors, and is now exciting a lot of interest among biologists for probing large organic molecules. A limiting factor for neutron scattering research is the intensity of the neutron beams. High intensity of neutron beams allows researchers to carry out experiments that would otherwise be impossible.

Under these circumstances, JAERI has launched the Neutron Science Project. The objective of the project is to construct a 5MW spallation neutron source which consists of a high intensity proton accelerator with proton energy of 1.5 GeV, proton beam current 5.3mA (8 MW), a 5MW mercury spallation target and research facility complex for basic science such as neutron scattering and for nuclear technology. The R&D on accelerator-driven transmutation is performed under both the Neutron Science Project and the OMEGA programme.

The paper discusses the strategy for developing ADS and the recent R&D achievements of P&T under the Neutron Science Project and the OMEGA programme.