

A Plan of Materials Irradiation Facility at J-PARC for Development of ADS and High-power Accelerator Facilities

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Development of beam window (BW) materials is one of crucial issues in development of accelerator driven nuclear transmutation systems (ADS). The BW is exposed to high energy protons and spallation neutrons, and also to corrosive lead-bismuth eutectic (LBE) alloy at high temperature of about 500 °C. Recently, not only high-power accelerators but also high-power targets are the rate-limiting factor for increasing the power of accelerator facilities in terms of radiation damage and heat removal. To study radiation damage on BW and target materials for high-power accelerator facilities including ADS, we are planning a materials irradiation facility by utilizing the proton beam of 400 MeV and 250 kW provided by the J-PARC's Linac. The target is flowing LBE alloy which is a candidate target and coolant material of ADS. When a steel sample is irradiated in the target for one year, the sample receives radiation damage of about 10 dpa at maximum which is equivalent to the yearly radiation damage of ADS's BW. In the current facility concept, the facility is equipped with a hot-laboratory for efficient post-irradiation examination. The facility will be outlined in this presentation.