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Status and current activities for neutron-induced cross-section measurements in ANNRI·MLF·J-PARC

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For detailed technical designs and safety evaluations of innovative nuclear reactor systems, accurate cross-sections are required. Especially, in the field of nuclear systems such as the transmutation of radioactive waste and various innovative reactor systems, neutron-capture cross sections of minor actinides (MAs) and long-lived fission products (LLFPs) are quite important to estimate the production and the transmutation rates [1-3]. However, accurate measurements of these cross sections are very difficult due to high radioactivity of these samples.

The Accurate Neutron-Nucleus Reaction measuring Instrument (ANNRI) was constructed to overcome this problem through a collaboration between Hokkaido University, Tokyo Institute of Technology, and JAEA in 2008.

ANNRI is located on Beam Line No. 04 of the Materials and Life science experimental Facility (MLF) at the J-PARC. There are three detector systems in ANNRI [4]. At flight lengths of 21.5 and 28 meters, an array of Ge detectors and a NaI(Tl) spectrometer were installed. These two gamma-ray spectrometers are used to determine the capture cross-section.

For total cross-section measurements, Li-glass detectors were installed at a flight length of 28.5 m. Since 2008, measurements of neutron-induced cross-sections of the MAs and LLFPs with high-intensity pulsed neutrons have been conducted. Neutron capture and/or total cross sections of ^{244}Cm , ^{246}Cm , ^{241}Am , ^{243}Am , ^{237}Np , ^{99}Tc , ^{107}Pd , ^{129}I , and many stable isotopes were reported [5-9]. These results will make significant contributions to the field of developing innovative nuclear systems. A brief overview of ANNRI and its current activities are reported in this presentation.

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