 <b>MLF Experimental Report</b>	提出日 Date of report
<p>実験課題番号 Project No. 2014P0701</p> <p>実験課題名 Title of experiment Research on nuclear astrophysics, nuclear data, and trace-element analysis using pulsed neutrons</p> <p>実験責任者名 Name of principal investigator Atsushi Kimura</p> <p>所属 Affiliation Japan Atomic Energy Agency</p>	<p>装置責任者 Name of responsible person Yosuke Toh</p> <p>装置名 Name of Instrument/(BL No.) BL04</p> <p>利用期間 Dates of experiments 2014/4/1~2015/4/10</p>

1. 研究成果概要(試料の名称、組成、物理的・化学的性状を明記するとともに、実験方法、利用の結果得られた主なデータ、考察、結論、図表等を記述してください。)

Outline of experimental results (experimental method and results should be reported including sample information such as composition, physical and/or chemical characteristics.

The ANNRI installed at BL04 of J-PARC/MLF was applied for researches of nuclear astrophysics, nuclear data, and trace-element analysis. In this report, representative results in this project are presented. In 2014 JFY, due to the fire accidents, some experiments were carried over into 2015 JFY.

In the nuclear astrophysics study, a Cd-112 sample was measured and transmission gamma rays to isomer state of  $11/2^-$  are observed. Neutron capture cross section of Nd-142 was measured. The first six resonances of Nd-142 reported in a previous work were not observed. The experimental results and cross-search of resonance energies in nuclear data libraries suggested that resonances of the impurity nuclide Pr-141 have been mistakenly assigned as Nd-142 in the previous experiment.

In the activation analytical study, Pd-Ag alloys were measured with the Ge spectrometer. The resonance peaks of Pd and Ag elements were clearly observed in TOF spectrum. The linearity of the calibration curve exhibits excellent linearity over a wide range of a sample weight by applying the correction for neutron and gamma rays self-shielding effects, etc.

In the nuclear data study, for minor actinide and long lived fission products, measurements of the neutron capture cross sections of Pd-107, Tc-99 and Am-241 were carried out. For stable isotopes, the neutron-capture cross sections of Sn-120, 122, 124 were measured in the energy range from 10 meV to 2 keV with an array of germanium detectors in ANNRI. The preliminary result of the neutron-capture cross section was obtained by normalizing the relative cross sections to the data in JENDL 4.0

1. 研究成果概要(つづき) Outline of experimental results (continued).

As examples of neutron-capture cross-section measurements, the measurement Sn-120 is presented. The measurement was performed with an array of Ge spectrometer in ANNRI. The pulsed neutron beam was collimated to a 7mm at the sample position. Tin-120 sample was isotopically enriched metallic tin with a diameter of 5 mm. The weight of the sample was 68.7 mg. The isotopic enrichment for the sample was 98.8mole%. The sample was chemically contaminated with 60, 400, 500 and 600 ppm of Sb, Al, Fe and Si on the certification sheet. The total measuring time was about 63 hours for the Sn-120 sample

The obtained neutron-capture cross section for Sn-120 is shown in Fig. 1 together with values of JENDL-4.0 for  $T = 300$  K (broadened with the resolution function) and those of the other impurities. The 67.32- and 150-eV resonances were not observed although they were listed on ENDF/B VII.1.

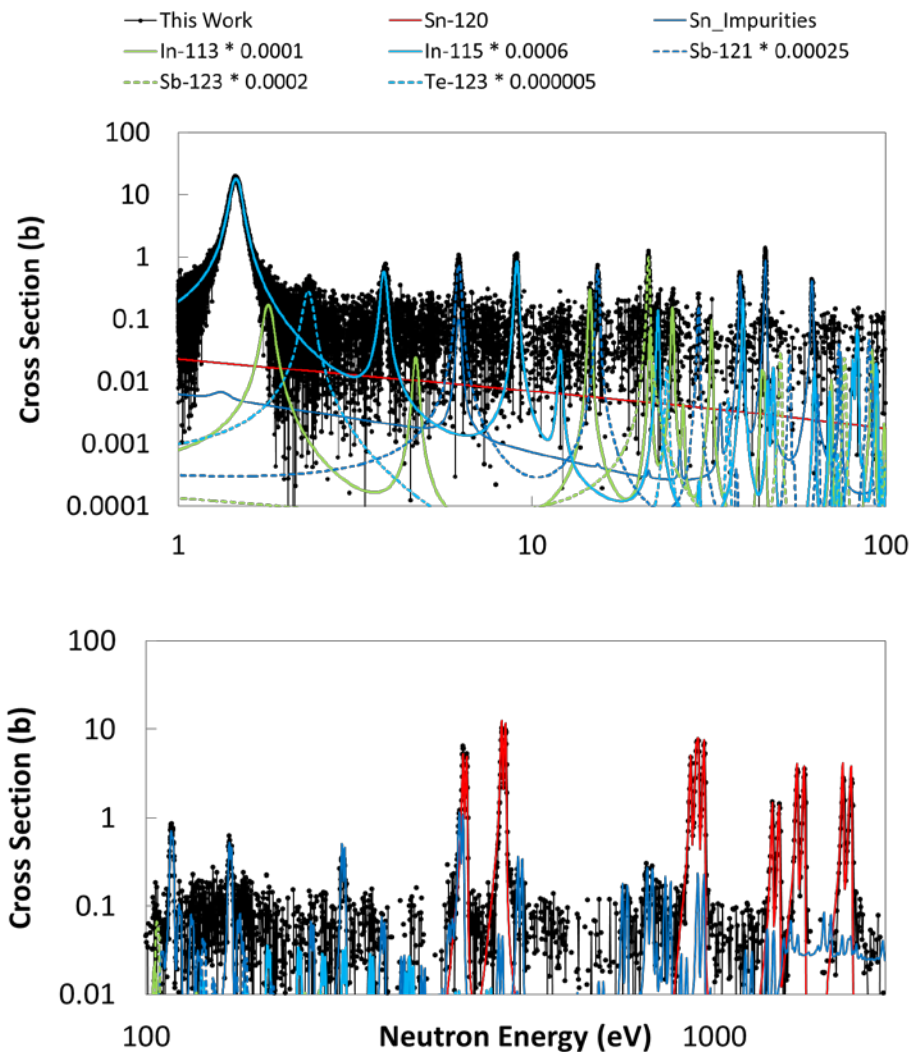


Fig.1 Preliminary results of the neutron-capture cross-sections for  $^{120}\text{Sn}$  together with values of JENDL-4.0 for  $T = 300$  K (broadened with the resolution function) and those of the other impurities.

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