MLF Experimental Report

提出日 Date of report
2014/6/19

実験装置名／BL番号 Name of Instrument/BL
ANNRI/ BL04
実験装置責任者 Name of the person responsible for the instrument:
Hideo Harada
所属 Affiliation: JAEA

1. 研究成果概要 (a)装置グループ内の成果、(b)ユーザー課題実装時における特筆すべきサポート、(c)ユーザー課題の執行状況について、まとめてください。A4 サイズ用紙使用のこと。

Outline of your activities. Following results at your instrument should be reported in A4 size papers: (a) results of your instrument goup, (b) significant user support works, and (c) statistical summary of user experiments.

(a) We have conducted to investigate the methodology and feasibility of developing a novel neutron activation analysis. Standard samples were measured using two Cluster Ge detectors from the viewpoint of prompt gamma-ray activation analysis. We have measured the background, and obtained PGA, TOF, TOF-PGA, TOF-MPGA spectrum.

We have developed a measurement system of neutron transmission spectra, which is shown in Fig. 1. Using the rotary sample changer and automatic measurement system, we could obtain transmission spectra of the Tc-99 and Au-197 samples changing the samples at 7500 neutron pulses. This method is helpful for reducing systematic uncertainty. Fig. 2 shows obtained transmission spectra and some dips originating from the resonances are seen.

Data acquisition system for the NaI(Tl) spectrometer of ANNRI was upgraded. A new data acquisition method based on pulse width analysis has been developed for neutron capture cross section measurement using the ANNRI NaI(Tl) spectrometer. Pulse width analysis is faster than the traditional pulse height analysis. This method can extend high energy limit of measurement. Pulse width measurement for this method was achieved with a time digitizer, FAST ComTec MPA4T. Two major improvements were made in 2013 fiscal year. First, a simple discriminator module was added before the time digitizer, thereby successfully suppressing detection timing oscillation originating the time digitization process. Second, MPA4T is capable to make both the pulse width analysis and the traditional pulse height analysis of the input signal. This allows us to simplify the calibration procedure to obtain the conversion relation between the pulse width and γ-ray energy. The upgraded system was tested using the neutron beam of ANNRI. The results show that the system can acquire the data correctly and neutron capture measurement can be done in the high energy region.

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

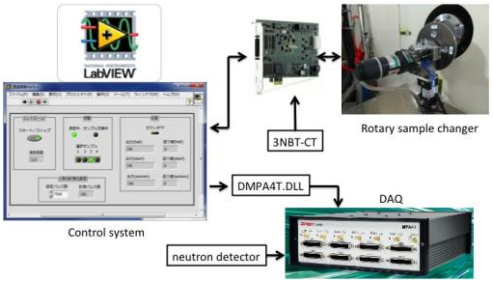

Fig. 1 Transmission measurement system

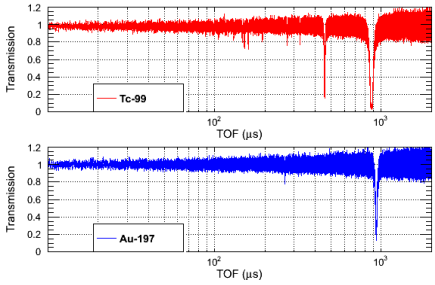

Fig.2 Transmission spectra of Tc-99 and Au-197

(b)

2013A0040, 2013A0043

The provision of advice, suggestions and useful information for sample preparation (size, weight, packing material etc.), the experimental setup (DSP mode, size of the collimators, measuring time etc.) and the spectrum (TOF, PGA).

2013B0235

Users installed and used their own detectors. Therefore, the members have supported their set-up.

2013B0189、2013B0124、2013B0040

The members have suggested sample conditions (size, weight, packing material etc.) and beam conditions (size of the collimators, measuring time etc.)

(c)

2013A0040, 2013A0043, 2013A0171, 2013A0192, 2013A0213, 2013A0217

No results were obtained because of the accident at the Hadron Experimental Facility.

必要に応じて、A4 サイズの用紙に続きを記入して下さい。

Please use A4-size papers for further reporting, if necessary.