MLF Experimental Report	提出日 Date of Report 2016/Aug/29
課題番号 Project No. 2014B0124 実験課題名 Title of experiment Measurement of energy and angular correlation of gamma rays from the thermal neutron capture of enriched Gd-155 and Gd-157 Targets 実験責任者名 Name of principal investigator Makoto Sakuda 所属 Affiliation Okayama University	装置責任者 Name of responsible person Toh Yosuke 装置名 Name of Instrument/(BL No.) ANNRI (BL04) 実施日 Date of Experiment 2016/Dec/10-16

試料、実験方法、利用の結果得られた主なデータ、考察、結論等を、記述して下さい。(適宜、図表添付のこと)
Please report your samples, experimental method and results, discussion and conclusions. Please add figures and tables for better explanation.

1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.

1) Enriched Gd(^{157}Gd, ^{157}Gd) in Gd_2O_3 powder (10mg).
2) NaCl powder (10mg).
3) Radioactive sources (^{60}Co, ^{22}Na, ^{137}Cs, ^{152}Eu)

2. 実験方法及び結果 (実験がうまくいかなかった場合、その理由を記述してください。)
Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.

We conducted an experiment to measure the gamma-rays from Gd(n,gamma) reaction using ANNRI spectrometer at BL04 beamline. We also took calibration data using beam (Cl(n,gamma)) and radioactive sources. The data-taking were very smooth and successfully finished.

The schedule of the experiment is the following:

10th Dec. 2014, 17:00 – 19:00(11th) : Radioactive sources(^{60}Co, ^{22}Na, ^{137}Cs, ^{152}Eu)
11th Dec. 2014, 19:00 – 14:00(12th) : Enriched Gd(^{157}Gd)
12th Dec. 2014, 14:00 – 18:30 : Sodium chloride(NaCl)
12th Dec. 2014, 18:30 – 11:00(13th) : Enriched Gd(^{155}Gd)
13th Dec. 2014, 11:00 – 11:00(14th) : Enriched Gd(^{157}Gd)
14th Dec. 2014, 11:00 – 11:00(15th) : Enriched Gd(^{155}Gd)
15th Dec. 2014, 11:00 – 17:00 : Blank(Empty target)
15th Dec. 2014, 17:00 – 18:00 : Radioactive source(^{60}Co)
15th Dec. 2014, 18:00 – 9:00(16th) : Enriched Gd(^{157}Gd)
16th Dec. 2014, 9:00 – 10:00 : Radioactive source(^{60}Co)

After the experiment, we withdrew our samples from the beamline.

2. 実験方法及び結果（つづき） Experimental method and results (continued)

The data-taking time and the amount of data for each sample are the following:

1) Enriched Gadolinium (^{157}Gd) : total 40 hours, 3.4×10^9 events
2) Enriched Gadolinium (^{155}Gd) : total 38 hours, 3.1×10^9 events
3) Sodium chloride (NaCl) : total 4hours, 1.3×10^8 events
4) Radiation sources (^{60}Co, ^{22}Na, ^{137}Cs, ^{152}Eu) : total 24 hours, 1.2×10^7 events
5) Blank (Empty target) : total 6 hours, 1.3×10^7 events

The beam intensity and the event rate were checked every two hours and the data-taking went very smoothly.

The data were taken back to Okayama. All the target samples and radioactive sources were returned to JAEA. The analysis is going on and the preliminary results were presented at the workshops and JPS meetings.

Presentations:

1) M.Sakuda（招待講演(国際会議)）, K.Hagiwara（ポスター発表）, Y.Yamada, P.Das, I.Ou, T.Mori, Y.Koshio (Okayama), T.Yano (Kobe), A.Kimura, H.Harada, N.Iwamoto, S.Nakamura (JAEA) , Gamma production from thermal neutron capture on natural gadolinium, ^{155}Gd and ^{157}Gd, Presented at The 13th International Symposium on Origin of Matter and Evolution of Galaxies Jun.24-27,2015,Beijing

2) 萩原開人、山田芳幸、王岩、P.Das、小汐由介、作田誠 （岡大）、矢野孝臣(神戸大)、木村敦、原田秀郎、岩本信之、中村詔司 (JAEA)、ガドリニウムの熱中性子捕獲反応から放出されるγ線データ解析とシミュレーションとの比較、日本物理学会春年会、東北学院大学、2016 年 3 月 19 日

3) 萩原開人、山田芳幸、王岩、P.Das、小汐由介、作田誠 （岡大）、矢野孝臣(神戸大)、木村敦、原田秀郎、岩本信之、中村詔司 (JAEA)、ガドリニウムの熱中性子捕獲反応から放出されるγ線データ解析とシミュレーションとの比較、日本物理学会秋年会、宮崎大学、2016 年 9 月 22 日