

 MLF Experimental Report	提出日 Date of Report 2009/5/22
課題番号 Project No. : 2008A0043 実験課題名 Title of experiment: Research and development of energy selective neutron imaging technique 実験責任者名 Name of principal investigator: Masahito Matsubayashi 所属 Affiliation: Japan Atomic Energy Agency	装置責任者 Name of responsible person Fujio MAEKAWA 装置名 Name of Instrument/(BL No.) BL-10 (NOBORU) 実施日 Date of Experiment 2008/12/23 ~ 2009/2/25

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) LBE(lead bismuth eutectic), plastic deformed iron
- 2) Thin metal plate: Co, Ta, Au, In, Cd
- 3) Welded iron plate
- 4) Thin metal plate: Ta, Au, In, Cd

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.

1) LBE(lead bismuth eutectic), plastic deformed iron

We carried neutron transmission measurements for the samples (lead bismuth eutectic, LBE, and plastic deformed iron) with ⁶Li-glass scintillator pixel type 2-dimensional position sensitive detector. In the measurements the TOF spectra were taken at each pixel and analyzed them with the view point of Bragg-edge. Finally we obtained the 2-dimensional distributions of gamma phase in the matrix of LBE, and texture and strain distributions concerning to the plastic deformation for deformed iron.

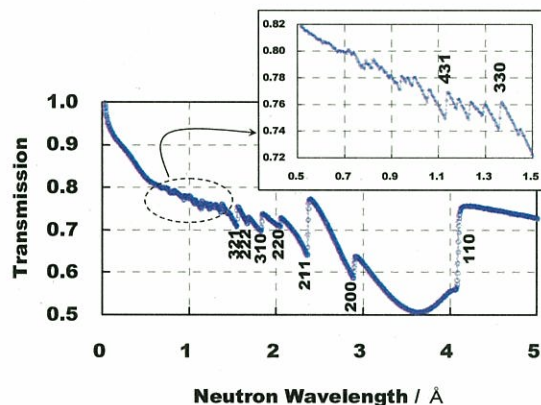


Fig.1 Transmission spectrum of plastic deformed iron.

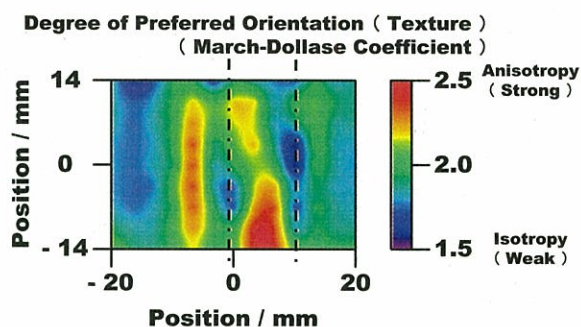


Fig.2. Texture mapping for plastic deformed iron. Dotted broken lines show sample bending lines.

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

2) Thin metal plate: Co, Ta, Au, In, Cd

Temporally resolved neutron intensity profile was captured by the high-frame-rate neutron imaging system.

Neutron transmission images of thin metal plates were captured by the high-frame-rate neutron imaging system.

As the result, resonance neutron absorption dependent images inherent in each element.

3) Welded iron plate

Neutron transmission images of welded iron plate were captured by the high-frame-rate neutron imaging system.

4) Thin metal plate: Ta, Au, In, Cd

Similar measurements as those of 2) were performed with a 2-dimensional position sensitive photomultiplier tube (RPMT) detector attached with a Li-6 glass scintillator. As shown in Fig. 3, neutron transmission images at a certain TOF intervals indicate only a specific element. This experiment demonstrated a principle of the material selective neutron imaging technique with using pulsed neutrons and 2-dimensional TOF detectors.

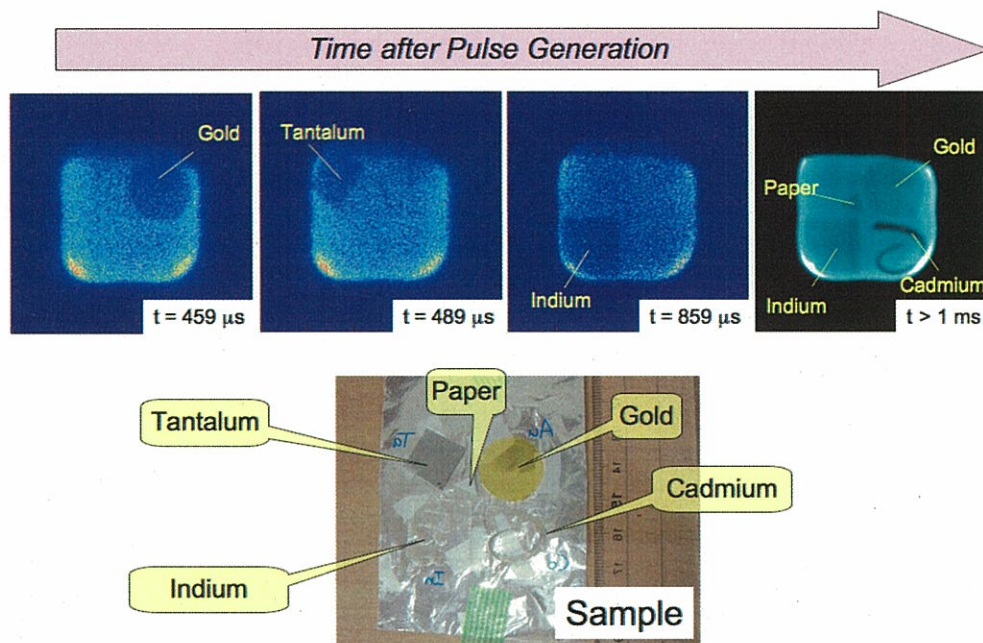


Fig. 3 Neutron transmission images at several TOF intervals taken by the RPMT detector with the Li-6 scintillator.