

実験報告書様式(一般利用課題・成果公開利用)

(※本報告書は英語で記述してください。ただし、産業利用課題として採択されている方は日本語で記述していただいても結構です。)

 MLF Experimental Report	提出日 Date of Report 2013/02/27
課題番号 Project No. 2012B0172 実験課題名 Title of experiment Neutron diffraction tomography 実験責任者名 Name of principal investigator Shin-ichi Shamoto 所属 Affiliation Japan Atomic Energy Agency	装置責任者 Name of responsible person Toshiya Otomo (J-PARC, KEK) 装置名 Name of Instrument/(BL No.) NOVA (BL21) 実施日 Date of Experiment 2012/12/3-2012/12/8

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.
a copper block with a SUS430 plate Ammonite originating in China

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.
Original goniometer designed by our group was used for scanning materials. Scanning sequence command (x-axis, y-axis, θ and RX-axis) for tomography measurement worked successfully at NOVA. Slit window size was set by $3*3\text{ mm}^2$. Copper block was first scanned by 3 mm steps in x and y-axes, and 10 degree steps in θ -axis. Measuring time for one scan was found to become longer after many repetition of the sequence. We have to stop our sequence in the middle to reset the condition. Average measuring time for one position was about 1.5 minutes. In total, it took 4 days for one tomography scanning measurement in $3*3\text{ mm}^2$ resolution for $\phi 50*t20\text{ mm}^3$ material even at the highest intensity diffractometer NOVA. We also measured an Ammonite originating in China ($h80*w70*t15\text{ mm}^3$). It took one day for 2D scanning (not tomography). The ammonite is made mainly of Calcite, CaCO_3 . Figure 1 shows a diffraction image of one of the strongest diffraction peaks at $d=3.03\text{ \AA}$ for the ammonite. One may see radially distributed CaCO_3 high density parts. This high density part is limited only in the right hand side. This structure possibly relates to the type of ammonites.

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

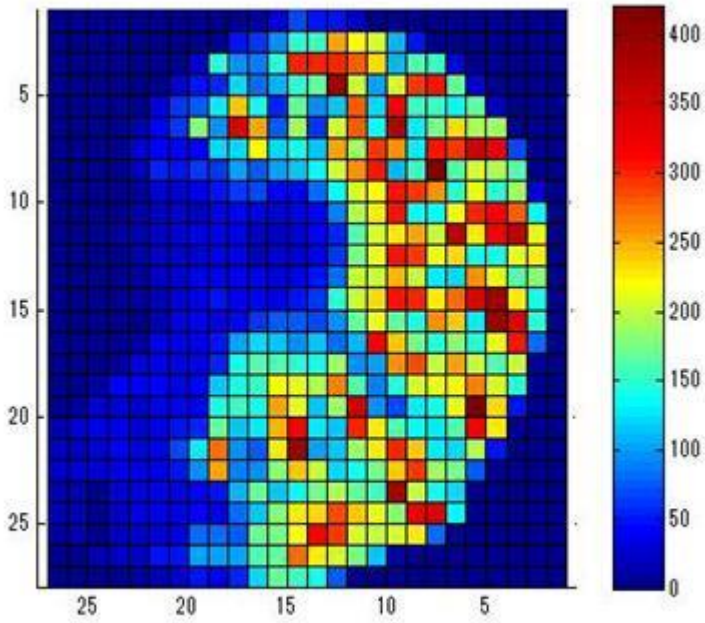


Fig. 1. Diffraction image of an ammonite. Color bar in the right-hand side shows the corresponding diffraction peak intensity at $d=3.03$ Å.

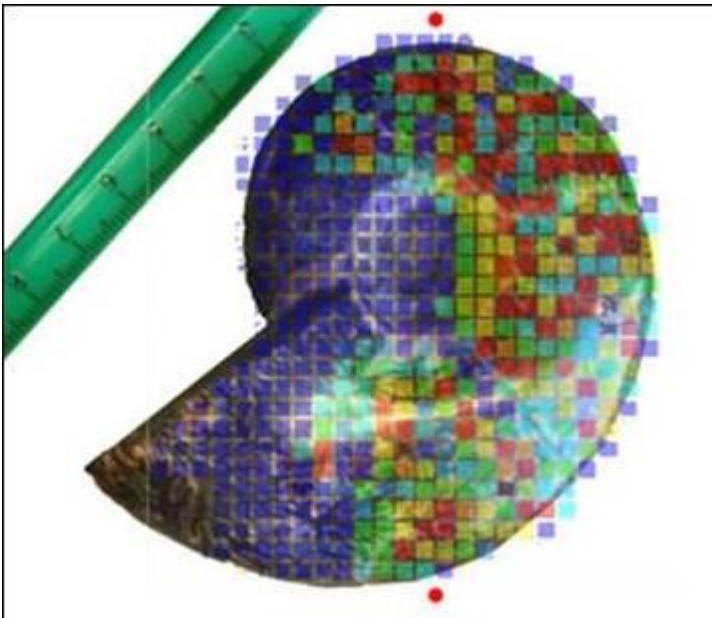


Fig. 2. Merged image of diffraction and photo images with mm scale ruler.