（ ※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。 ）

CROSS TOKAI **Experimental Report** J-PARC	承認日 Date of Approval 2017/12/12 承認者 Approver Takenao Shinohara 提出日 Date of Report 2017.12.11
課題番号 Project No. 2016A0267 実験課題名 Title of experiment Nondestructive study of traditional Japanese forged iron artifacts using pulsed neutron imaging for evaluating crystallographic texture and microstructure and investigating their manufacturing techniques 実験責任者名 Name of principal investigator Manako Tanaka 所属 Affiliation Showa Women's University (The state of the experiment: Tokyo University of theArts)	装置責任者 Name of responsible person Takenao Shinohara 装置名 Name of Instrument/（BL No.） BL22 実施日 Date of Experiment 06/19/2016 9:00～06/22/2016 9:00

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) Japanese matchlock gun, Fe, solid
(2) Fragment of Japanese matchlock gun, Fe, solid
(3) Fragment of Japanese sword, Fe, solid
(4) Fragment of Japanese sword, Fe, solid
(5) Fragment of Japanese sword, Fe, solid

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.

【Experimental method】

We proposed to carry out the pulsed neutron transmission and neutron tomography experiment at 2016A, but our proposal was regarded as a reserved proposal and our beam time was reduced. So, we decided to carry out just the neutron tomography experiment at J-PARC/MLF BL22. CCD camera was used and fragment of Japanese matchlock gun and fragment of Japanese swords samples were analyzed by neutron CT. Through our previous pulsed neutron transmission experiment, it's getting clear that we can get different kind of images by narrowing down the neutron wavelength. From the area before 110 edge of αFe, we could get the image emphasizing the crystal structure information, whereas from the area after 110 edge, we could get the image emphasizing the impurity. So, in this experiment, we decided to narrow down the wavelength using chopper. First we set the wavelength

between 2.8 Å and 4.2 Å (Fig.1 A), and then, we changed the wavelength to after 0.5 Å (Fig.1 B).

【Results】

Because of the beam trouble, we couldn't carry on the experiment after 9 P.M, 06/20/2016. We only could get two neutron CT data. Fig.2 shows neutron CT image of fragment of Japanese matchlock gun and that of Japanese sword between 2.8 Å and 4.2 Å. Fig.3 shows neutron CT image of fragment of Japanese matchlock gun and that of Japanese sword after 0.5 Å. Though we narrowed down the wavelength using chopper, there is no big differences between Fig.2 and Fig.3. We checked the image by taking a difference between Fig,2 and Fig.3 (Fig.4). Now we are still in the middle of checking the data, but there are some possibilities that the samples had moved during neutron CT experiment, and the gap image was caused by a differences of the intensity.

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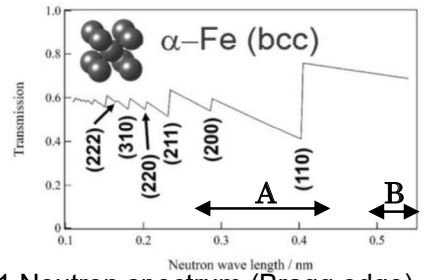

Fig.1 Neutron spectrum (Bragg edge) of αFe.

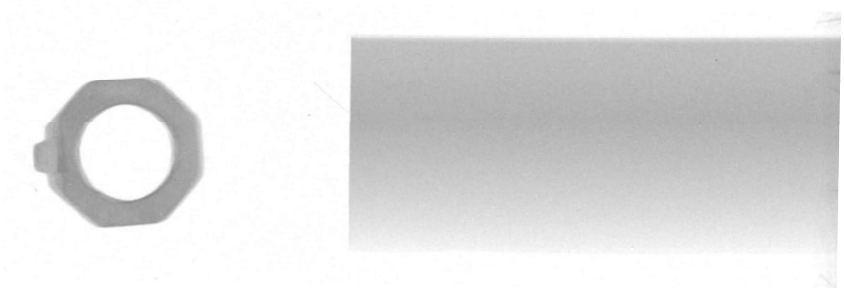

Fig.2 Neutron CT image of fragment of Japanese matchlock gun and that of Japanese sword between 2.8 Å and 4.2 Å.

Fig.3 Neutron CT image of fragment of Japanese matchlock gun and that of Japanese sword after 0.5 Å.

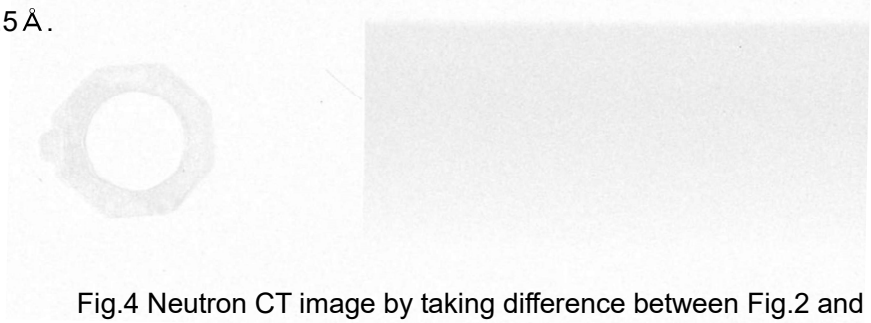

Fig.4 Neutron CT image by taking difference between Fig.2 and Fig.3.