（ ※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。 ）

J-PARC **MLF Experimental Report**	提出日 Date of Report
課題番号 Project No. 2014A0073 実験課題名 Title of experiment: Identification of the peculiar forging methods of two Japanese swords through morphological micro-structural analysis by neutron tomography and energy selective neutron imaging 実験責任者名 Name of principal investigator: Grazzi Francesco 所属 Affiliation Consiglio Nazionale delle Ricerche, Istituto dei Sistemi Complessi (Italy)	装置責任者 Name of responsible person Oikawa／Shinohara 装置名 Name of Instrument/（BL No.） BL10 実施日 Date of Experiment 2014/11/04 − 2014/11/11

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.
Japanese blade knife 1, carbon steel（FeC） Japanese blade knife 2, carbon steel（FeC） Japanese blade tiny naginata 1, carbon steel（FeC） Japanese kozuka blade 1, carbon steel（FeC）

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.
The experiment was performed measuring a set of four samples. It was supposed to be performed also on two Japanese swords but there were delays in the custom delivery and they did not arrive in the scheduled time. In order to exploit the time, the four mentioned samples that are part of Japanese sword fittings were analyzed. The two large swords were measured during commissioning time on RADEN in March 2015. The four samples were measured by using the micro channel plate detector developed by Anton Tremsin and available on BL10 in collaboration with him and with Dr. Shinohara. The measurements were performed by analyzing the Bragg edge time of flight profile of the selected areas in the samples, measuring three points per sample (2 in the blade and 1 in the tang).

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

The results allowed to determine the spatial distribution of the different phases of steel: ferrite, martensite and retained austenite by analyzing the intensity of the Bragg edge profiles relative to the different phases. Microstructure and texture are related to the shape of the profiles and it was possible to derive semi-quantitative information about their distribution. Analysis was performed using the imageJ software. The data format is a set of images taken at different time of flight as shown in fig.1 for kozuka and knife blades measurements. The normalized data for the kozuka blade are shown in fig. 2 reporting the Bragg edge profile typical of BCC ferrite.
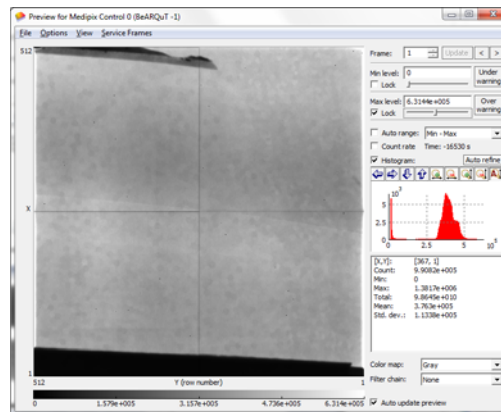

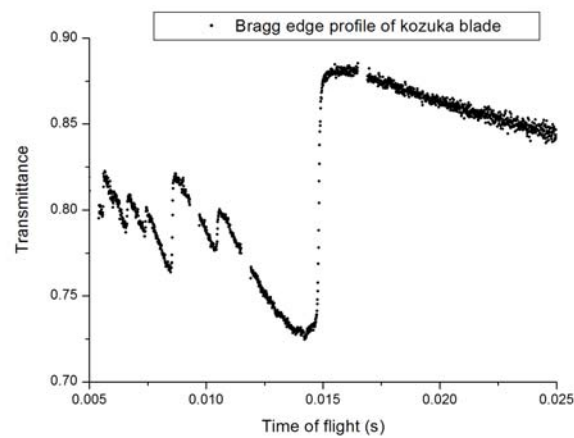Fig. 1 Picture of the acquisition software showing the data acquisition system and the obtained data.

Fig. 2 Bragg edge profile of the kozuka blade sample