

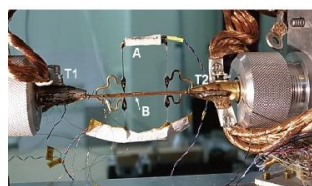
 <b>MLF Experimental Report</b>	提出日 Date of Report May 27, 2014
課題番号 Project No. 2013B0098 実験課題名 Title of experiment <b>International Benchmarking Test on ITER Nb<sub>3</sub>Sn Strand                  = Principal Contribution to Clarify Exact Local Strain =</b> 実験責任者名 Name of principal investigator Kozo Osamura 所属 Affiliation Research Institute for Applied Sciences	装置責任者 Name of responsible person Kazuya Aizawa 装置名 Name of Instrument/(BL No.) TAKUMI / BL 19 実施日 Date of Experiment Feb. 26 – March 5, 2014

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.
ITER Nb <sub>3</sub> Sn strand with diameter of 0.828mm, which is delivered as the common sample for the international benchmarking test. The twisted strand includes 11,077 Nb <sub>3</sub> Sn filaments. The single bundle includes 19 Nb <sub>3</sub> Sn filaments. The whole strand consists of 577 bundles.

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.
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Two kinds of sample holder were used in order to measure strain state exerted on Nb<sub>3</sub>Sn filaments. As shown in Fig. 1(a), the sample consisting of three strands was pulled step by step by the load frame. At every constant load, the diffraction measurement was carried out. The sample cell shown in Fig. 1(b) was attached directly to the cold head and used for the diffraction measurement at various temperatures.



(a)



(b)

Fig. 1 Sample holders

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

### 1. Diffraction experiments at low temperature

In order to measure the local strain exerted on  $\text{Nb}_3\text{Sn}$  component as a function of applied strain, the measurements were carried out two times at about 15 K. The results are shown in Fig. 2(a). Even though both results shall be consistent with each other, the 1<sup>st</sup> result gave poor the applied strain dependence and the 2<sup>nd</sup> one showed inappropriate strain dependence especially at the low applied strain region. The major reason was attributed to the applied load control, because the load cell was placed outside the low temperature chamber and could not control precisely such low load that should be applied to the sample.

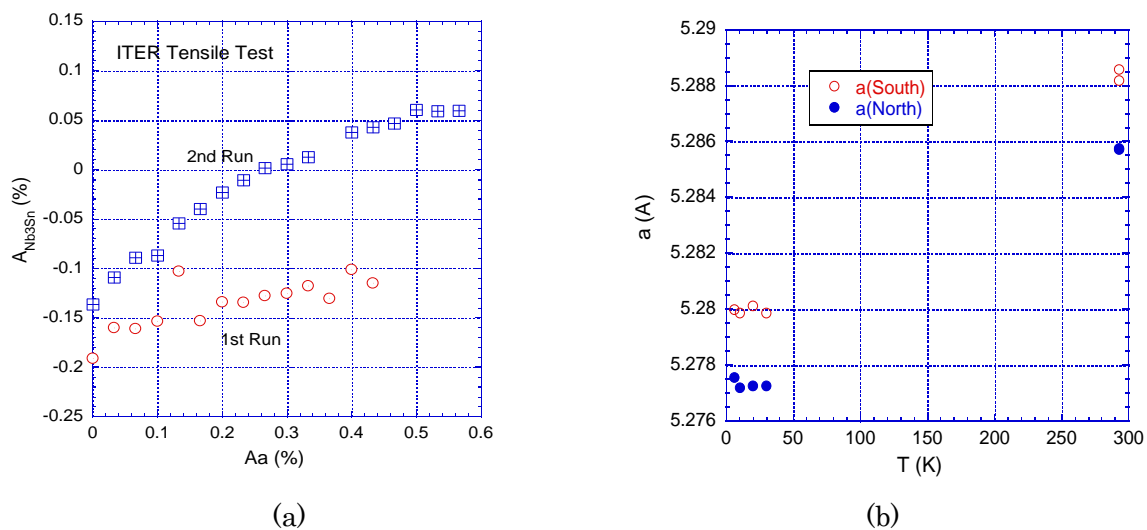


Fig. 2 Experimental results, where (a) at 15 K and (b) during heating.

### 2. Strain measurement during heating

By using the sample holder shown in Fig. 1(b), the temperature dependence of lattice constant was tried to be measured from low temperature to room one. As shown in Fig.2(b), however, a quite limited data was succeeded to be measured. The reason was attributed to the programming error for temperature control.