

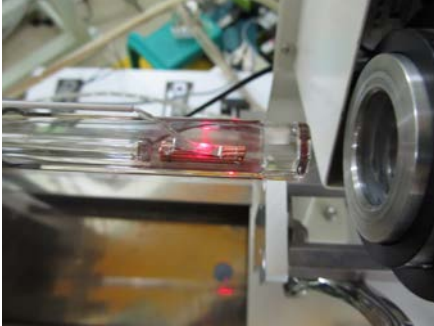


(※本報告書は英語で記述してください。ただし、産業利用課題として採択されている方は日本語で記述していただいても結構です。)

 MLF Experimental Report	提出日 Date of Report June 28, 2011
課題番号 Project No. 2010B0027 実験課題名 Title of experiment Strain behavior of RHQ-Nb ₃ Al superconducting wire in thermal process up to 800 °C 実験責任者名 Name of principal investigator Tatsushi NAKAMOTO 所属 Affiliation KEK	装置責任者 Name of responsible person Stefanus HARJO 装置名 Name of Instrument/(BL No.) TAKUMI/BL-19 実施日 Date of Experiment Feb. 7 – 9, 2011

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.

<p>1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.</p> <p>Samples:</p> <p>A RHQ-Nb₃Al superconducting wire (K3): φ1 mm, 50 mm long, heat-reacted at 800 °C for 10 hours in advance. Composite of Nb₃Al, Cu, Ta, Nb.</p> <p>RHQ-Nb₃Al superconducting wires (K1, K3): φ1 mm, 50 mm long, Not heat-reacted. Composite of Nb₃Al, Cu, Ta, Nb.</p>
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<p>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。)</p> <p>Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.</p> <p>Stain behavior of Nb₃Al in the thermal process from room temperature to 800 °C, which is the heat reaction temperature to generate A15 crystal structure for the RHQ- Nb₃Al superconducting wire, were investigated. The samples were set in a vacuum furnace and inclined at 45 degree with respect to incident neutron beam so that</p> <div style="display: flex; justify-content: space-around;">   </div> <p>Fig. 1. Pictures of a sample preparation for RHQ-Nb₃Al wire in the furnace at TAKUMI/BL-19.</p>
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2. 実験方法及び結果(つづき) Experimental method and results (continued)

Two different types of RHQ-Nb₃Al wires (K1, K3) were examined without pre-heat treatment while another K3 wire was heat-reacted in advance. Neutron diffraction measurements for the heat-reacted K3 RHQ-Nb₃Al wire were performed for 30 minutes at every 100 °C step up to 800 °C and typical diffraction peaks of in axial and transversal directions are shown in Fig. 2. As one can see, [321] peak shifts of Nb₃Al due to thermal expansion in the composite wire were clearly observed in both directions. For non-heat reacted samples, on-the-fly measurements during heating up and at 800 °C for 10 hours were carried out and we confirmed that generation and growth of Nb₃Al crystal started at temperature around 750 °C. Detailed analysis has been underway.

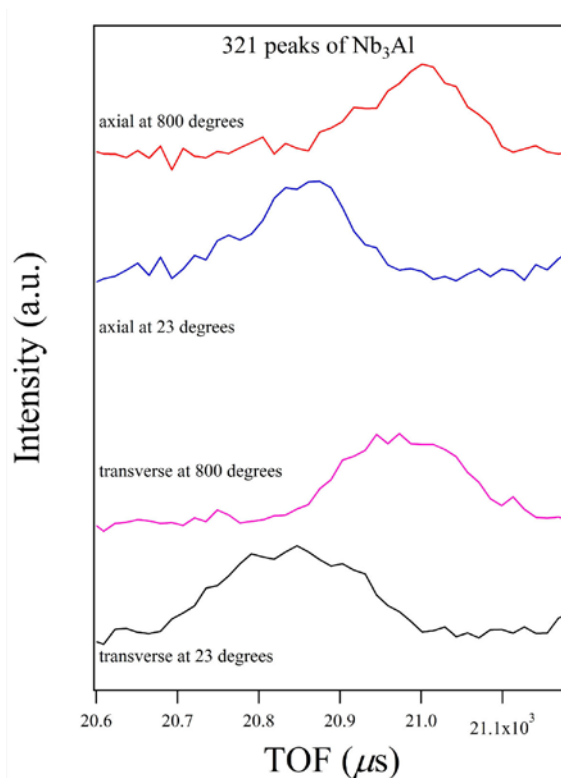


Fig. 2. Diffraction peak of