

 MLF Experimental Report	提出日 Date of Report 2014/9/21
課題番号 Project No. 2012B0246 実験課題名 Title of experiment Structures of Pd/Pt nano-alloys and their mixing transitions derived by hydrogen absorption/desorption processes 実験責任者名 Name of principal investigator Osamu Yamamuro 所属 Affiliation University of Tokyo	装置責任者 Name of responsible person Toshiya Otomo 装置名 Name of Instrument/(BL No.) NOVA (BL-21) 実施日 Date of Experiment 2013/01/28 – 2013/01/30

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> <ul style="list-style-type: none"> •Bulk and nano-particles of Pd (Bulk: 500 mg, Nano: 118 mg) •Bulk and nano-particles of Pt (Bulk: 500 mg, Nano: 161 mg) •Nano-particles of Pd_{0.8}Pt_{0.2} (166 mg)
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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。) Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.</p> <p>In the proposing experiments using NOVA, we aim to elucidate the following aspects: (1) the structural difference between nano-particles and bulk samples, (2) the interface structure of core-shell phase of Pd/Pt nano-alloy, (3) the positions of hydrogen atoms in the Pd nano-particles and Pd/Pt nano-alloy, (4) the structural change during the mixing transition. We have performed the neutron powder diffraction measurements for Pd, Pt, Pd/Pt alloys with the particle size of 6–8 nm. These samples were contained in a pressure cell made of quartz. The measurements of the bulk samples were also made to obtain reference data. Figure 1 shows the diffraction pattern from bulk (top) and nano-particles of Pd (bottom). As shown in Fig. 1, the diffraction peaks of Pd nano-particles were not observed because their intensity were much smaller than those of the quartz cell and the protecting polymer (PVP). Therefore, we stopped the experiment at this stage. To obtain sufficient data, it is necessary to (1) increase the quantity of samples, (2) reduce the contents of PVP, (3) develop a plated V cell (probably with Cu) to protect from hydrogen embrittlement. We planed to make additional experiment using remaining beamtime, but it was canceled due to the J-PARC accident.</p>

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

Fig. 1 Neutron powder diffraction patterns of bulk and nano-particles of Pd.

