

## Poster Presentation

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### *In-situ hydrogen gas loading setup for synchrotron X-ray total scattering*

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Hydrogen has been considered as a promising alternative fuel for transportation, provided we can find a way to store a large amount of hydrogen in a compact way. The realization of such a storage system can be achieved by developing materials that can easily absorb, safely store, and rapidly release hydrogen repeatedly. However, there is currently no material to meet all the requirements for on board storage. Great efforts have been made to understand hydrogenation properties of currently available materials to look for a way to improve properties or to prepare new materials. However, investigating the structure of some of these materials is challenging since their hydrides are only available under hydrogen gas pressure. Furthermore, many novel materials with improved properties often show heavily disordered or nanoscale structural features which are difficult to characterize using conventional crystallographic technique alone (crystallographically challenged hydrogen storage materials). In order to investigate the structural change in crystallographically challenged hydrogen storage materials during hydrogenation or dehydrogenation processes we have developed in-situ hydrogen gas loading setup for synchrotron X-ray total scattering experiments at the Japan Atomic Energy Agency (JAEA) beamline of BL22XU [1] at SPring-8. Coupled to an area detector [1,2], this setup allows us to obtain the atomic pair distribution function (PDF) [3] of metal hydrides either in equilibrium or in non-equilibrium state with hydrogen. In this poster, we will introduce our in-situ setup and present some preliminary results on AB5-type intermetallic compounds and Pd nanoparticles.

[1] T. Watanuki et al., *Philos. Mag.* 87 (2007) 2905-2911, [2] P. J. Chupas et al., *Appl. Crystallogr.* 36 (2003) 1342-1347, [3] T. Egami and S. J. L. Billinge, *Underneath the Bragg Peaks: Structural Analysis of Complex Materials*: Pergamon Press Elsevier: Oxford, England, 2003.

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