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High-pressure neurton diffraction study on metal hydrides at total scattering diffractometer NOVA in J-PARC

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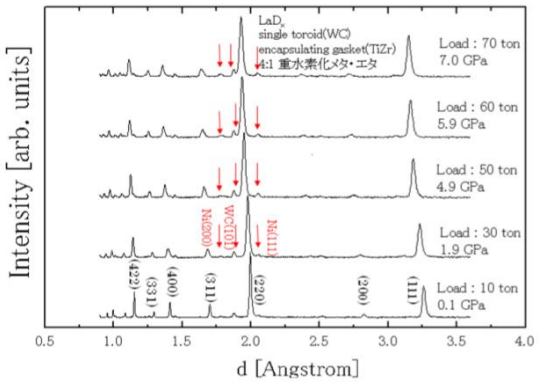
Now, high-pressure structural changes in rare-earth hydrides La(H/D)2 is being investigated by neutron diffraction under the program of Advanced Fundamental Research on Hydrogen storage materials(Hydro-star). The preceding investigation by synchrotron diffraction revealed that the rare-earth hydrides (LaX2) commonly shows spontaneous dissociation into two phases with different hydrogen contents under pressure. In this transformation, metal sub lattice keeps the macroscopic crystallinity, suggesting that hydrogen diffuses in metal sublattice. To investigate the hydrogen behavior in high hydrogen-density states is indispensable for generating new functional materials. The aforementioned behavior is speculated only from the lattice parameter of the metal sublattice due to the insensitivity of x-ray to hydrogen. To confirm the behavior, it is indispensable to investigate by diffraction using neutron, which is sensitive to hydrogen. Therefore, we developed the device to realize high-pressure neutron diffraction. For the prescription, we coupled a compact but heavy load applicable Paris-Edinburgh cell with total scattering diffratometer NOVA, which has world-quickest data-acquisition performance. Through the various developments, we succeeded in obtaining the high quality data sufficient to apply Rietveld analysis at the highest pressure in Japan. The details will be introduced in this talk.



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