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Disproportionation reaction of LaH₂ at high pressure and low temperature AKIHIKO MACHIDA, TETSU WATANUKI, DAICHI KAWANA¹, KATSUTOSHI AOKI², Quantum Beam Science Directorate, Japan Atomic Energy Agency, Japan — We have found that fcc-LaH₂ decomposes into two phases, which have different hydrogen compositions, a H-poor and H-rich phases, at 11 GPa at room temperature through synchrotron radiation x-ray diffraction (SR-XRD) measurements.³ The decomposition proceeds spontaneously by pressurization, being interpreted in terms of a disproportionation reaction. Recent neutron diffraction measurements on LaD₂ confirmed the formation of a NaCl-type LaD as the D-poor phase.⁴ The disproportionation accompanies the transfer of H atoms from the tetrahedral to octahedral interstitial sites in the fcc metal lattice. The diffusivity of the H atoms in the metal lattice would be suppressed at low temperature. We hence investigated the pressure-induced disproportionation of LaH₂ at low temperature by SR-XRD measurements at BL22XU, SPring-8, and found the disproportionation occurred at 13.5 GPa even at 200 K. The volume fraction of the H-poor phase relative to the H-rich one at 200 K was larger than that of the H-poor phase at room temperature. The H-transfer by the disproportionation will be discussed in terms of temperature effect.

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