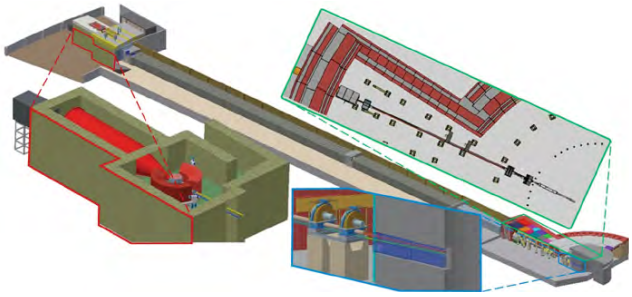

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Keywords: Neutron Diffraction, In-Operandi, In-Situ

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Temperature-dependent structure changes of complex aluminium hydrides with Rb and Cs as metal cations

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Complex aluminium hydrides are interesting materials with respect to the release and uptake of hydrogen. Since hydrogen is part of the crystal structure of the hydrides, such compounds can serve as solid hydrogen storage materials. The temperature dependent behaviour of most of the complex aluminium hydrides with alkali and earth alkaline metals has been studied intensively.[1] The crystal structures of complex aluminium hydrides are built from isolated $[AlH_4]^-$ tetrahedra which coordinate the metal cations. The decomposition of aluminium hydrides with alkali metals proceeds via the formation of intermediate hexahydride structures consisting of isolated $[AlH_6]^{2-}$ octahedra. This formation is associated with a first hydrogen release step before simple metal hydrides form after a second step. However, *in situ* X-ray diffraction experiments have shown that their decomposition route cannot easily be transferred to $CsAlH_4$ and $RbAlH_4$.[2] The transformations are more complex and do not proceed via the known hexahydride structures. *In situ* synchrotron measurements have been performed in order to study the processes and the phases formed during the dehydrogenation of both hydrides.

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