

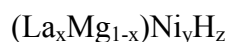


	Experiment title: Local and average structures of in metal hydrides and hydrogen absorbing compounds.	Experiment number: 01-01-697
Beamline: BM01B	Date of experiment: from: 19-July-06 to: 26-July-06	Date of report: 26-Sept-06 <i>Received:</i>
Shifts: 21	Local contact(s): Hermann EMERICH and Wouter VAN BEEK	

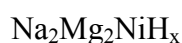
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For two samples of nominal compositions $\text{La}_{0.774}\text{Mg}_{0.258}\text{Ni}_{3.268}$, $\text{La}_{0.774}\text{Mg}_{0.258}\text{Ni}_{3.268}\text{H}_x$ synchrotron high resolution powder diffraction patterns were collected. Based on recorded data, the crystal structure of the intermetallic compound and the metal atoms substructure of hydrides were refined.



High-resolution powder pattern with very good intensities statistics was collected. Sample is not single phase due to the way of synthesis, but contain new phase. The intensities of new phase were successfully indexed in monoclinic cell with lattice parameters $a = 10.0651$, $b = 11.4503$, $c = 5.4301$ Å, $\beta = 122.813$ deg and $V = 525.9$ Å³. Data will be used for the solving of metal atoms substructure.



High-resolution powder pattern with very good intensities statistics was collected. Data were used for indexing and solving the structure of new phase in the $\text{LaMg}_2\text{Pd-D}_2$ system. It is intermediate phase with approximate composition $\text{LaMg}_2\text{PdD}_3$ (sp. gr. $Cmcm$, $a = 4.7528$, $b = 10.6439$, $c = 7.9747$ Å) having the same metal atoms substructure as initial intermetallic compound LaMg_2Pd .

Hydrides of the *bcc* alloys

A sample from the system Ti-Cr-Mo-C-H containing new hydrides phase was measured. Presently several indexing solutions with high figures of merits were obtained, but some lines in the pattern are still unexplained. Thus we decided to prepare more samples of different compositions to elucidate what lines belong to the new phase. Another sample tested was cycled *bcc* alloy; low background let us to confirm that no segregation of C14 Laves phase takes place.

Laves phase hydrides (deuterides) - $(Y_xTb_{1-x})Fe_2(D,H)_{4.2}$

High resolution powder patterns up to high Q-values of four samples, hydride and deuteride of yttrium and mixed yttrium-terbium compounds, were measured at two temperatures each: above and below the magnetic phase transition which occurs between 84 and 181.5 K. For one sample ($YFe_2D_{4.2}$) also a rapid temperature scan between 42 and 275 K was obtained. The aim was to detect a subtle structural phase transition connected to the magnetic phase transition, and to study the isotopic effect (H,D) and the effect of the rare earth substitution on the magnetic phase transition.

The data were planned to be measured at low temperatures using the new cryostat at the BM1B, but it was changed by the contact person to the cryostreamer for the temperatures above 90 K. It caused technical problems for some samples (creation of the ice on the capillaries), due to the large diameter of the capillaries prepared originally for the cryostat. One sample was lost during the data collection. It was agreed with the contact person that the lost beamtime will be compensated in the next scheduling period. The data are currently analysed with the Rietveld method.