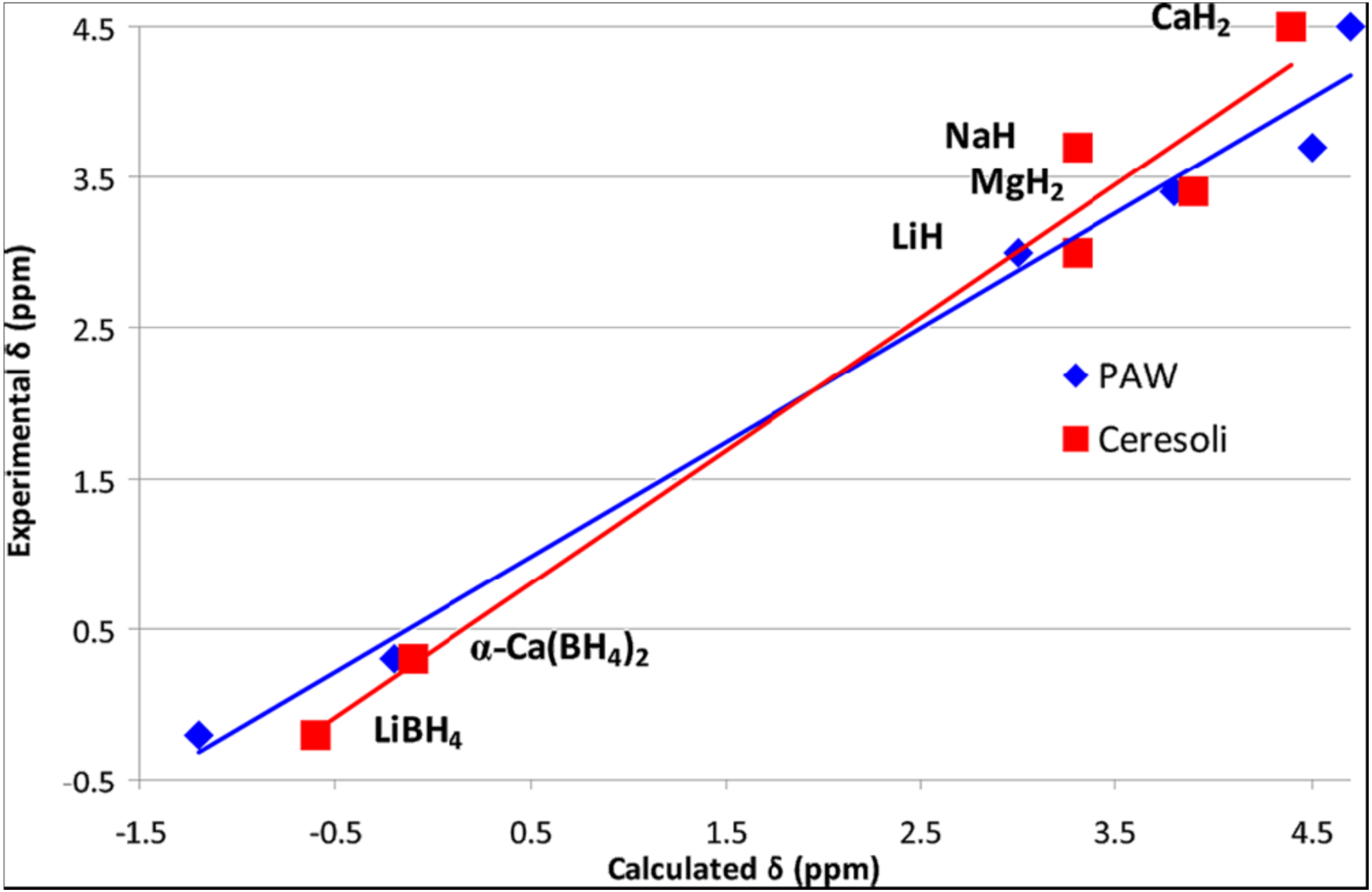
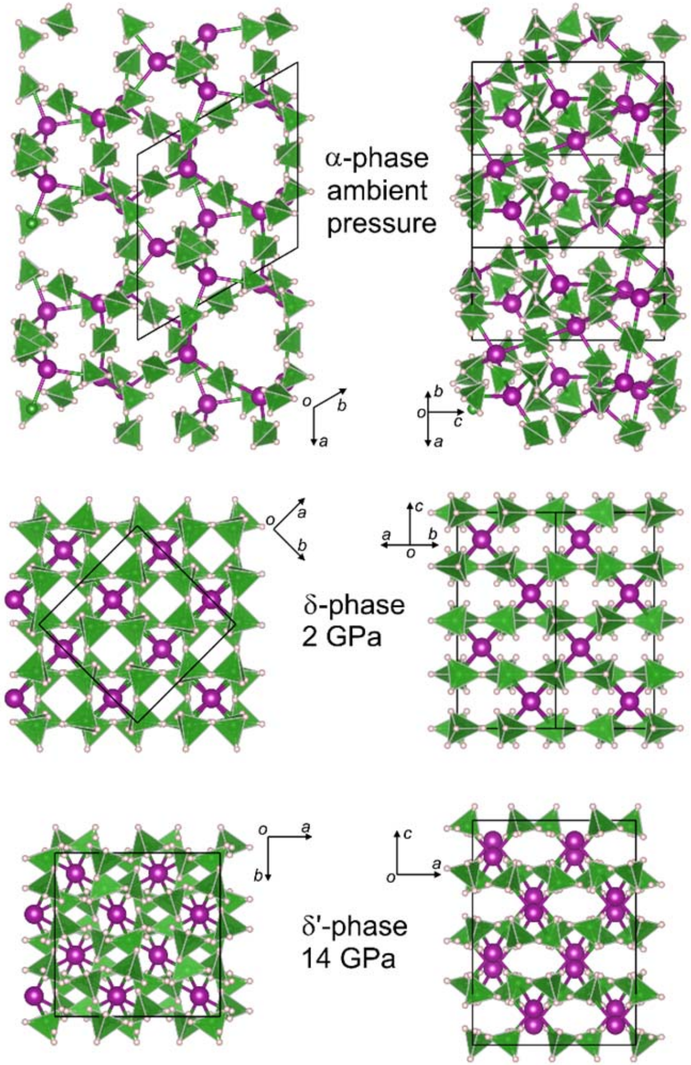
In line with this, diagrams or photographs illustrating and promoting the work of the project, as well as relevant contact details or list of partners can be provided without restriction.

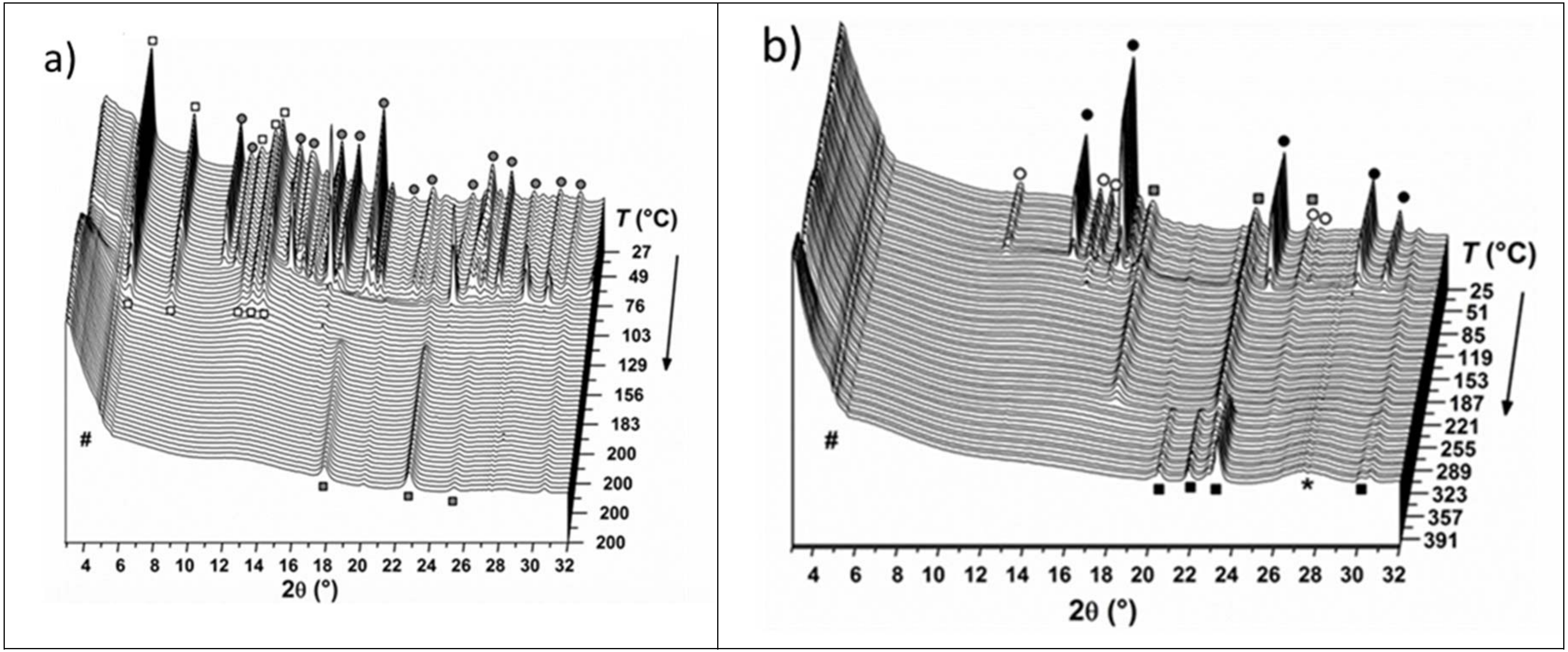
BOR 4 STORE



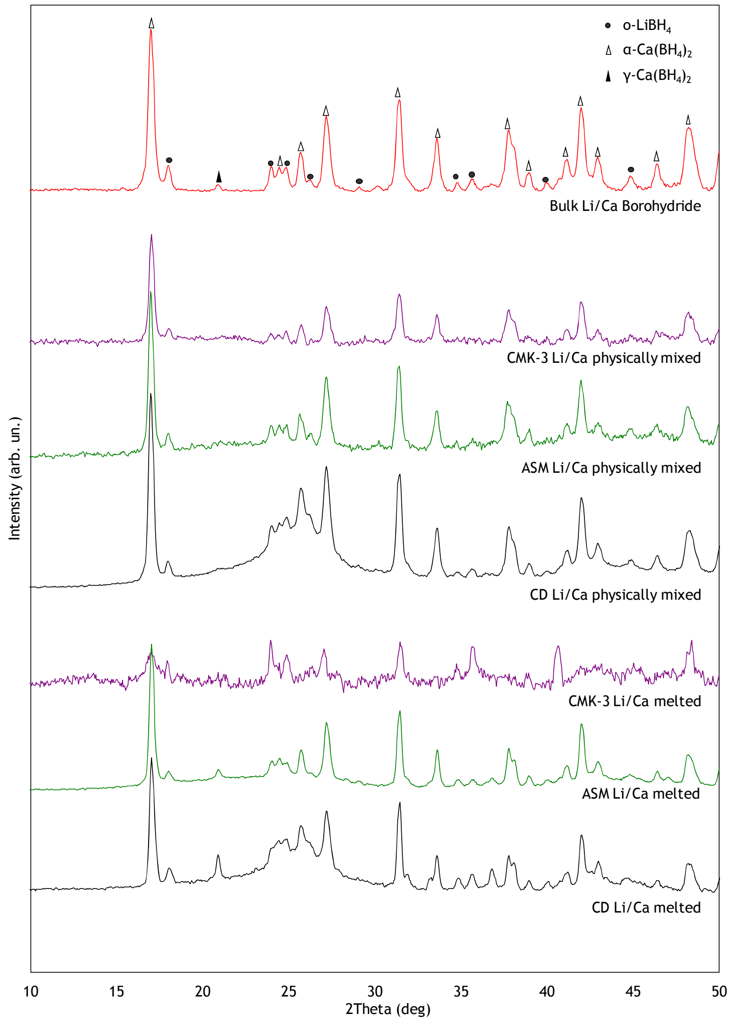
Modelling of boron hydride based hydrogen storage materials: experimental vs calculated 1H chemical shifts in NMR spectroscopy (TMS as reference).



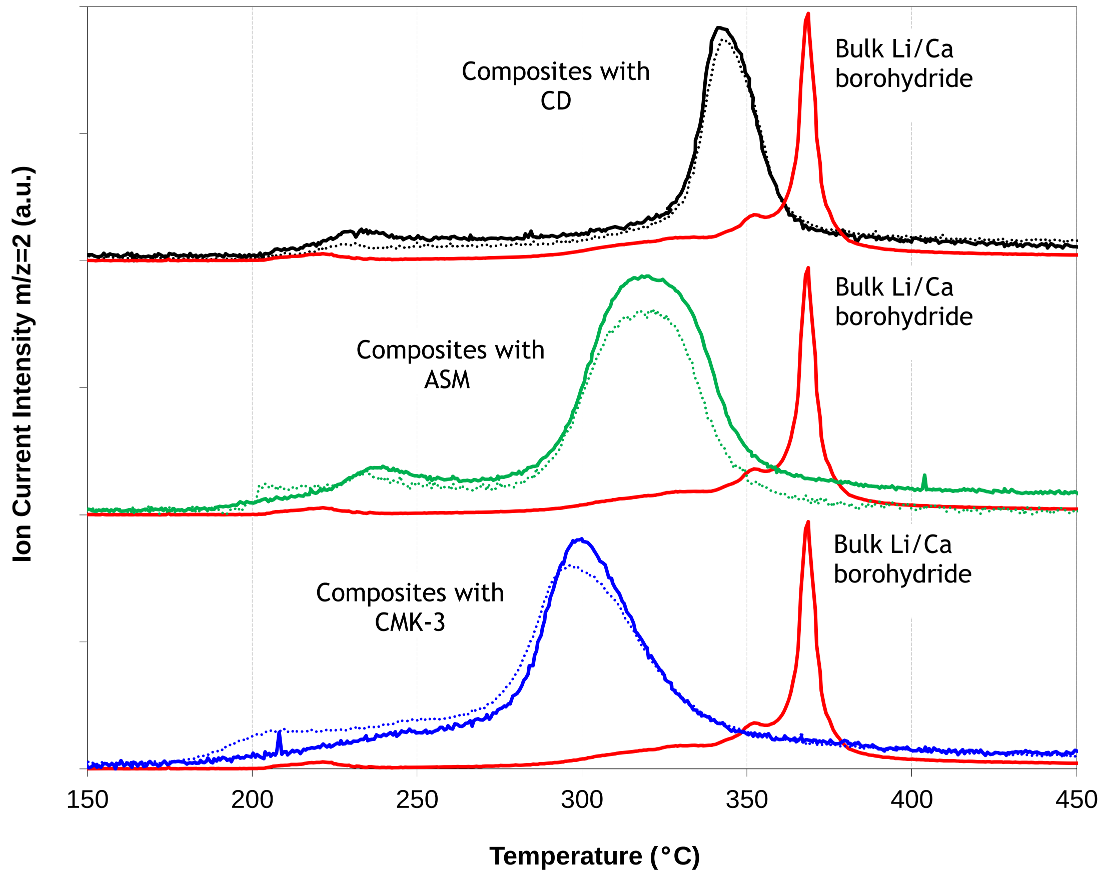
Crystal structures of α-$Mn(BH_4)_2$, high pressure δ-$Mn(BH_4)_2$ and higher pressure δ'-$Mn(BH_4)_2$, illustrating the increasing density of the material as function of pressure.



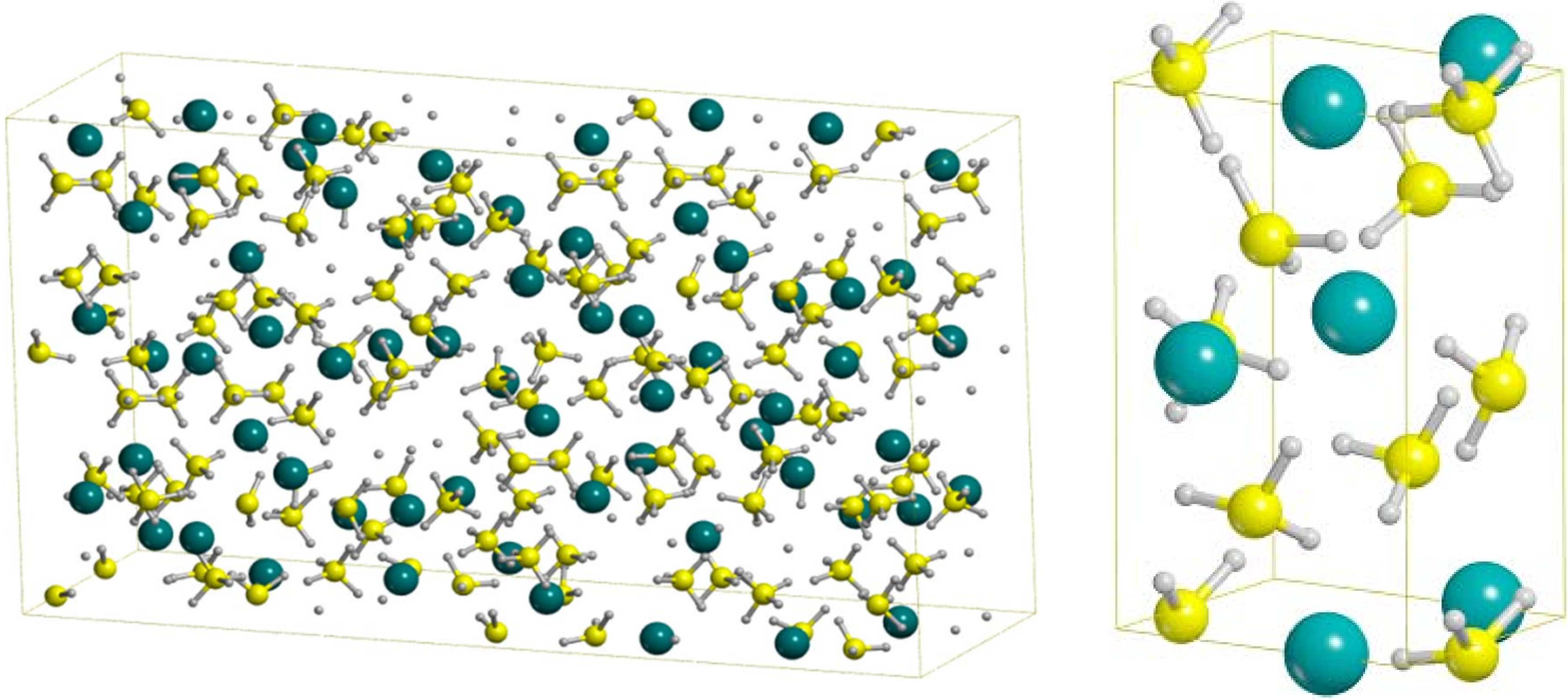
In situ *SR-PXD measurements of $Mg(C_4H_9)_2$ infiltrated carbon aerogel scaffold X6 mixed with $0.725LiBH_4$–$0.275KBH_4$*
(a) *Melt infiltration, i.e. heating from* RT *to 200 °C* ($\Delta T/\Delta t$ = *10 °C/min) and kept isothermal at 200 °C for 15 min in* p*(H_2) = 50 bar.*
(b) *Hydrogen desorption, i.e. heating from* RT *to 400 °C* ($\Delta T/\Delta t$ = *5 °C/min),* p*(H_2) = 10^{-2} mbar (λ = 0.9919 Å).*
*Symbols: # Aerogel X6, □ $Mg(C_4H_9)_2$, ■ MgH_2, ■ Mg, ● $LiK(BH_4)_2$, ○ $LiBH_4$, ● KBH_4, * MgO.*



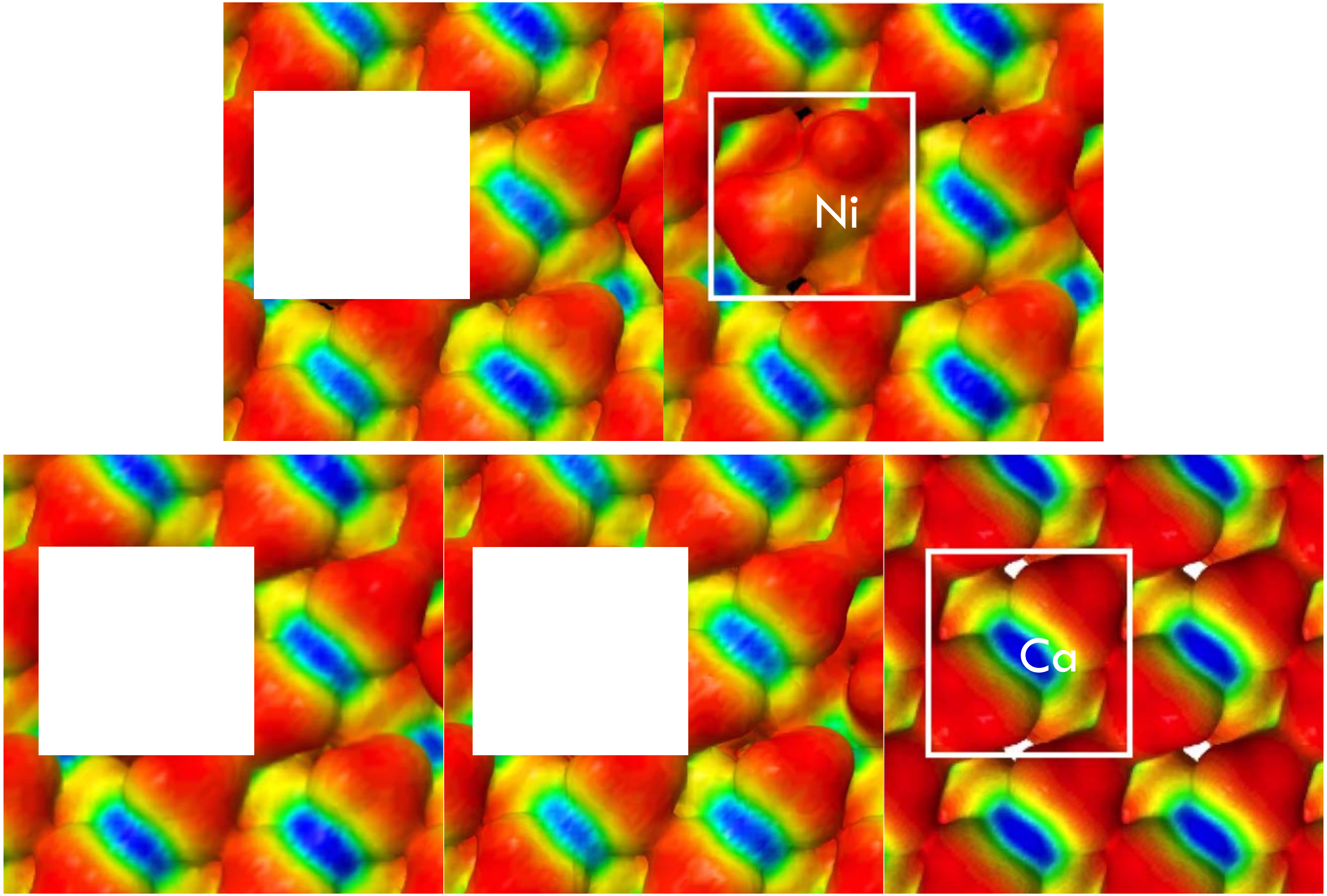
Powder X-ray diffraction patterns of bulk Li/Ca and Li/Ca carbon composites (60% Li/Ca mixture loading)



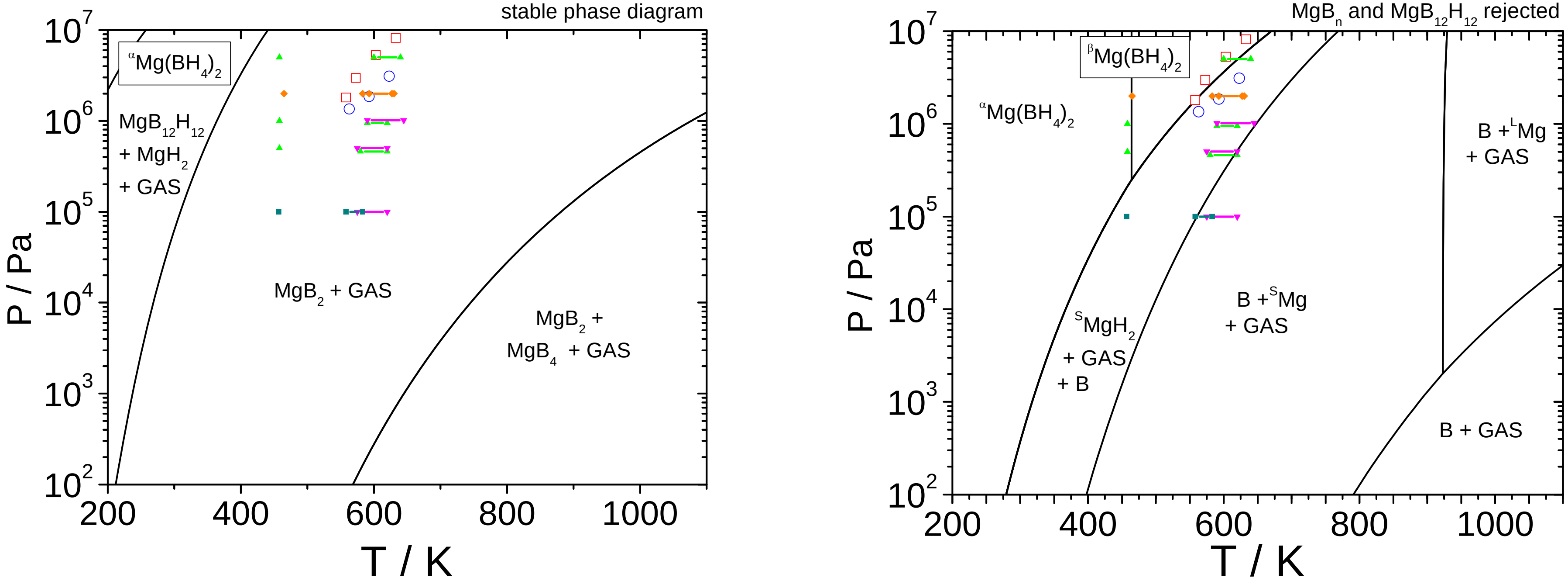
TPD-MS profiles. Dotted lines: physically mixed samples. Continuous lines: melted composites (60% Li/Ca mixture loading).



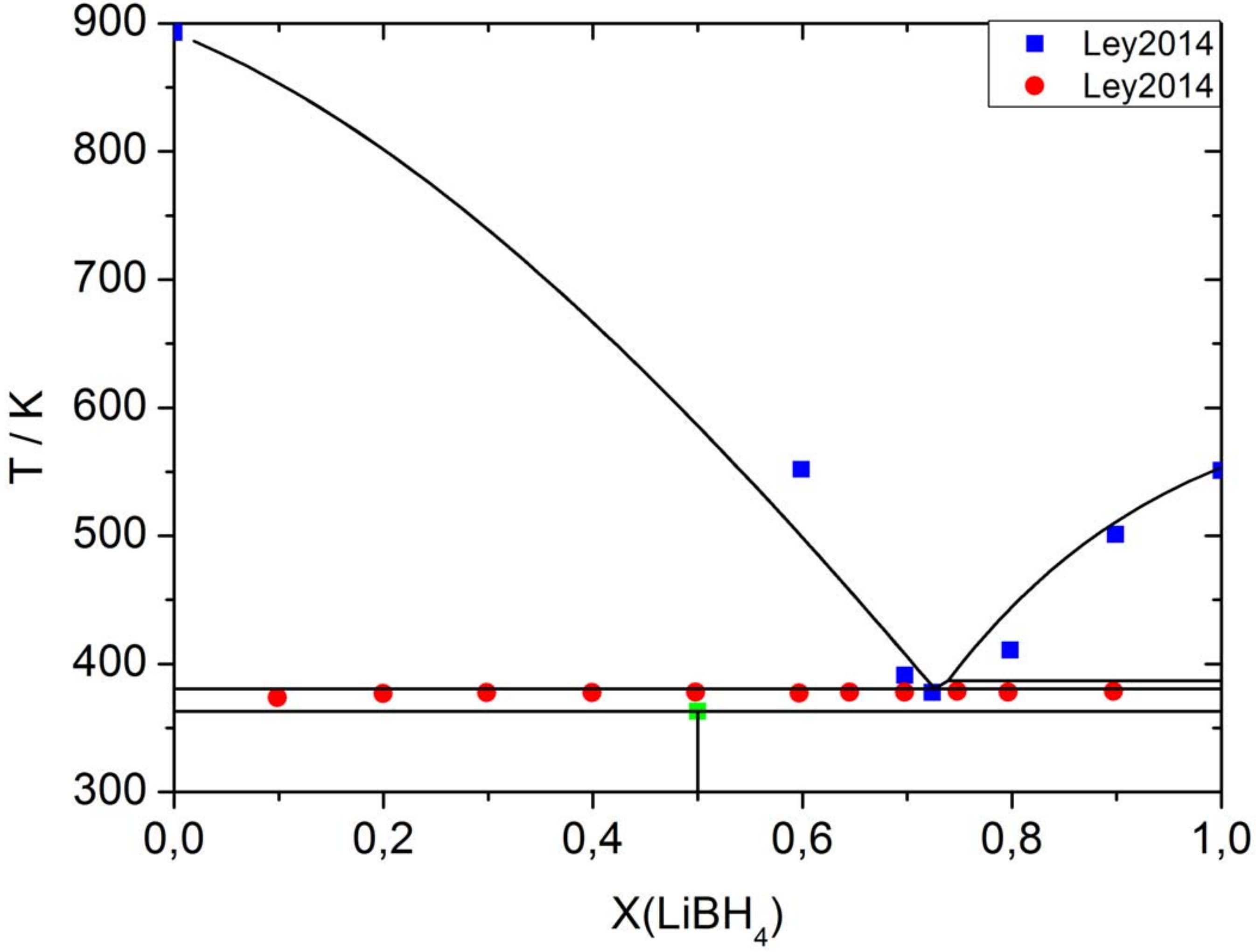
Unit cells of the high temperature Fddd $Mg(BH_4)_2$ polymorph (left) and of the Pmc2_1 model system (right). Boron in yellow, calcium in green and hydrogen in white



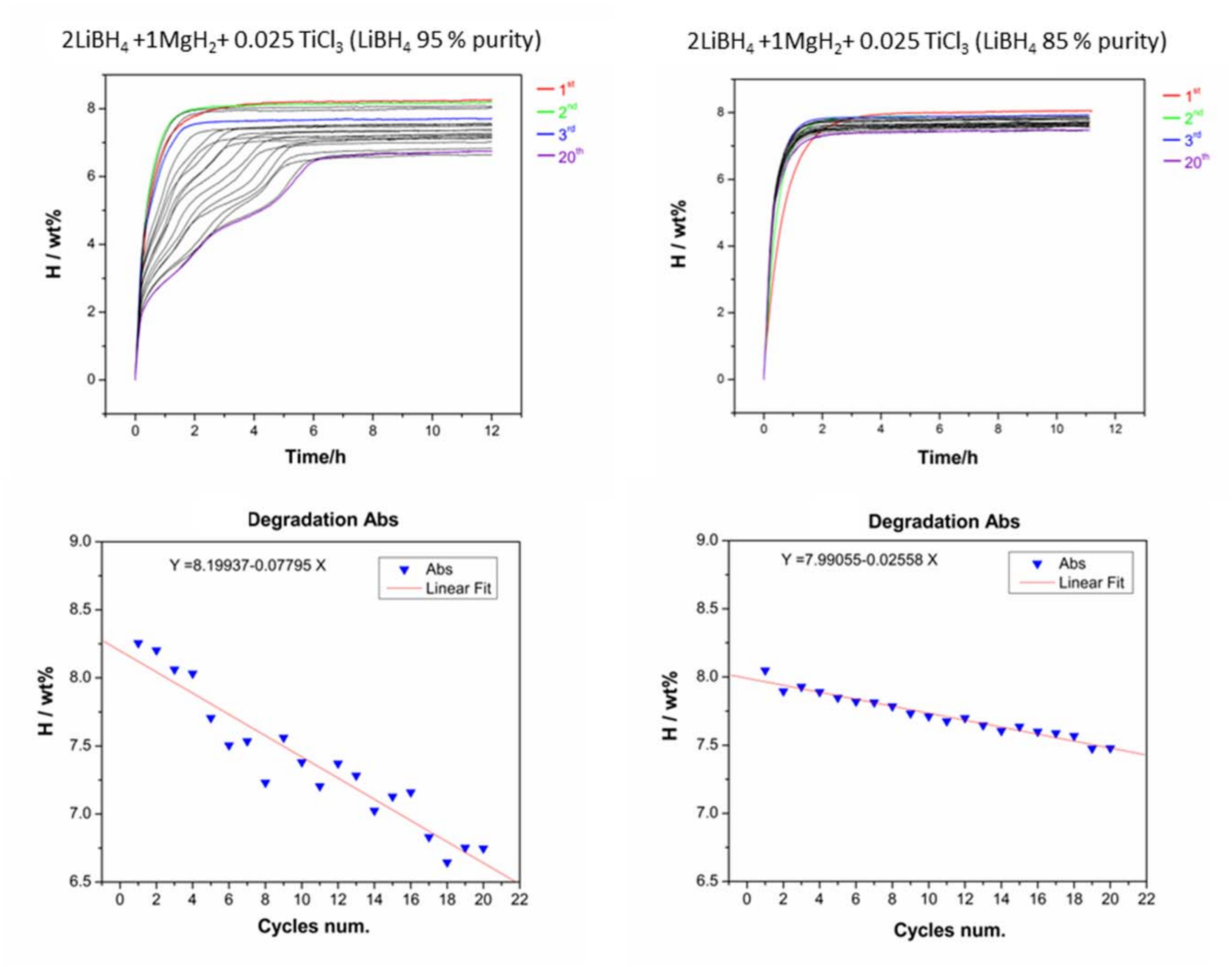
Top view of electrostatic potential (min: -0.029 a.u. (red); max: +0.246 a.u. (blue)) mapped on top of the charge density isosurface (i.e. 0.003 a.u.) for all the optimized structure. The region of interest is highlighted by the white box.



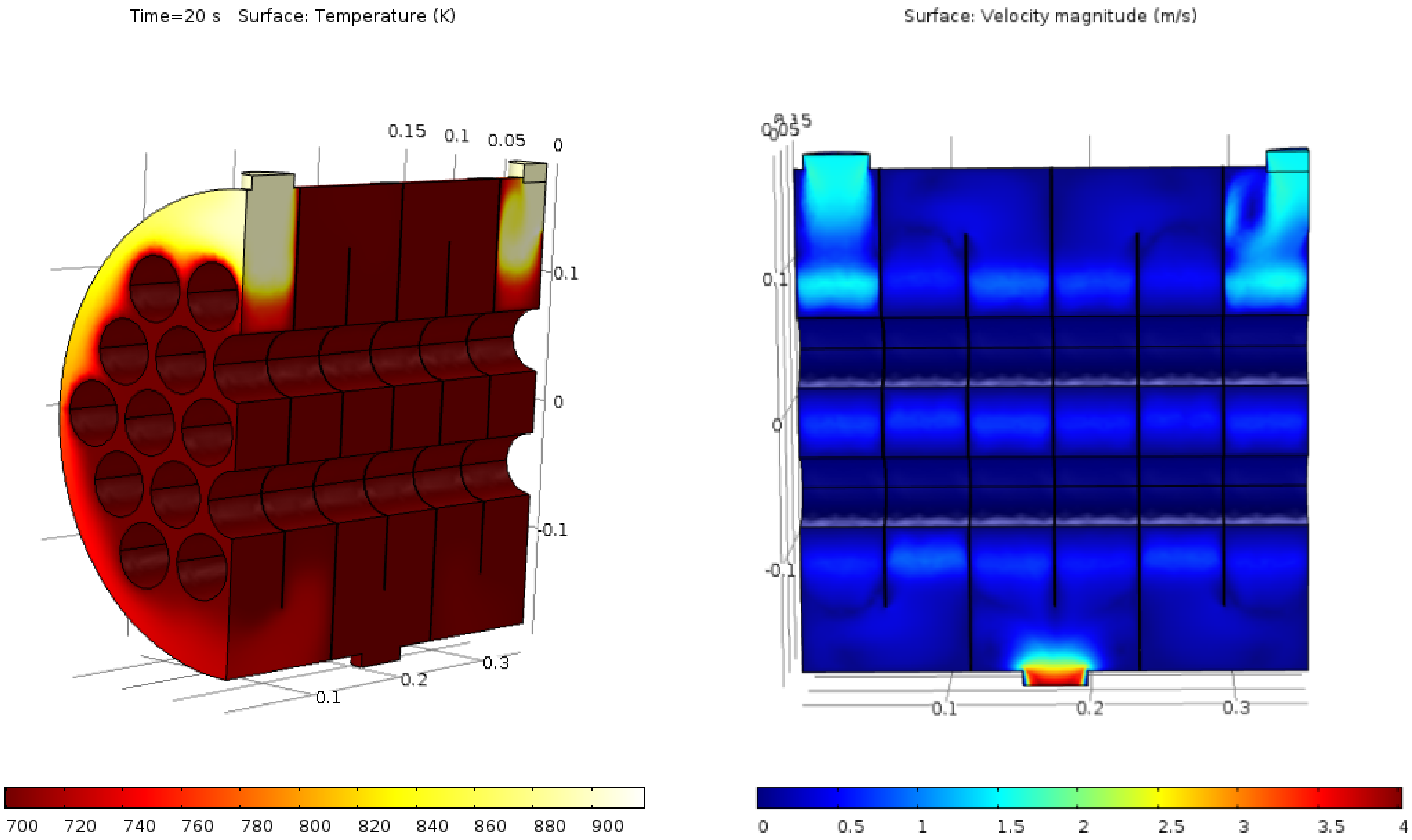
Calculated phase diagrams for $Mg(BH_4)_2$ composition. Stable phase diagram obtained considering all phases is shown on the left. Metastable phase diagram obtained rejecting $MgB_{12}H_{12}$ and magnesium borides is shown on the right. PCI and DSC data from literature are reported for comparison.



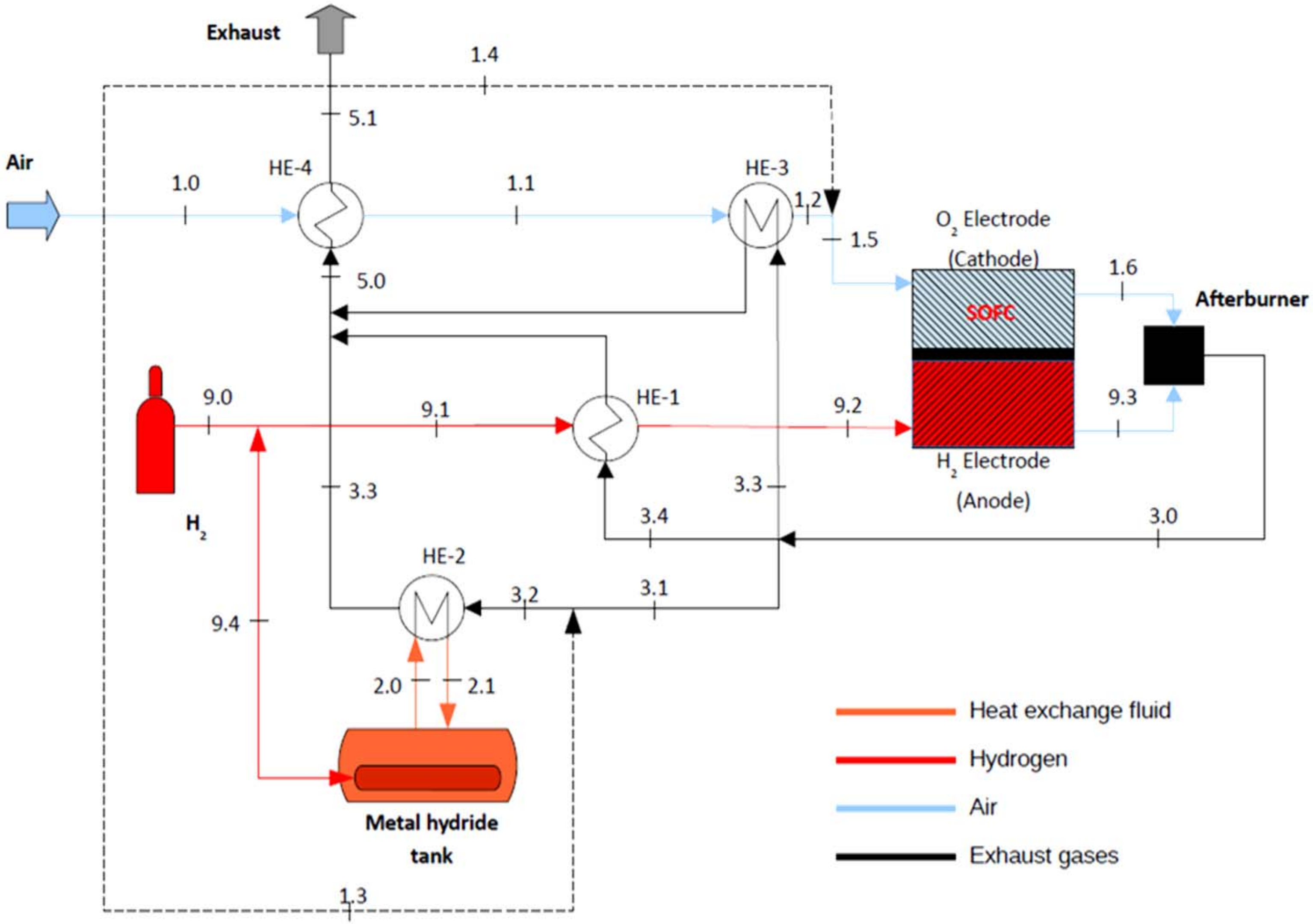
Calculated phase diagram for KBH_4 -$LiBH_4$ system for P_{H2}=1bar (lines). Experimental point obtained from the literature and from AU experiments (points).



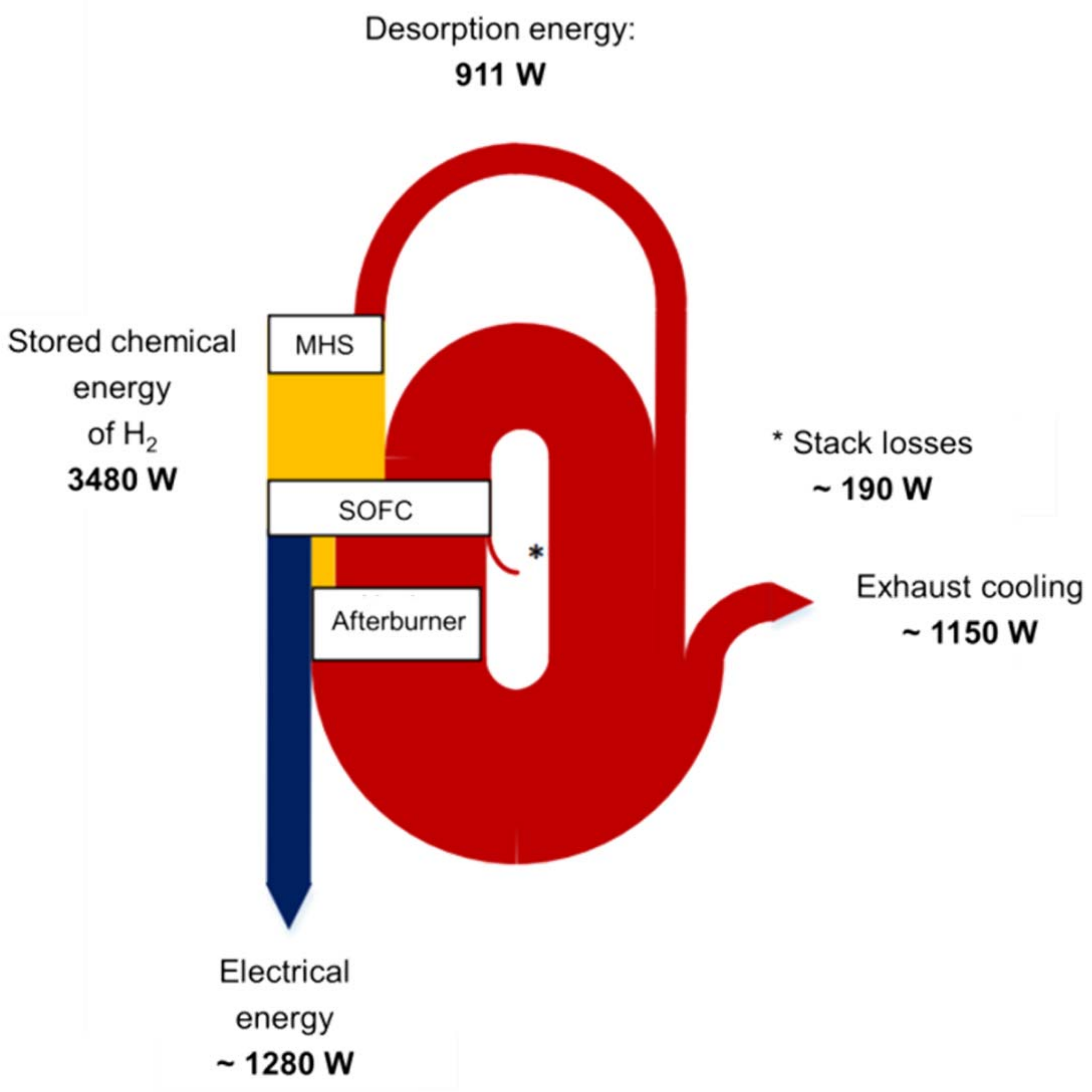
Absorption cycles 2LiBH$_4$ +1MgH$_2$+ 0.025 TiCl$_3$ with LiBH$_4$ 85 % purity (right side) and with LiBH$_4$ 95 % purity (left side)



Temperature (left) and velocity magnitude (right) profiles within the helium heat exchanger designed by Helmholtz-Zetrum Geesthacht.

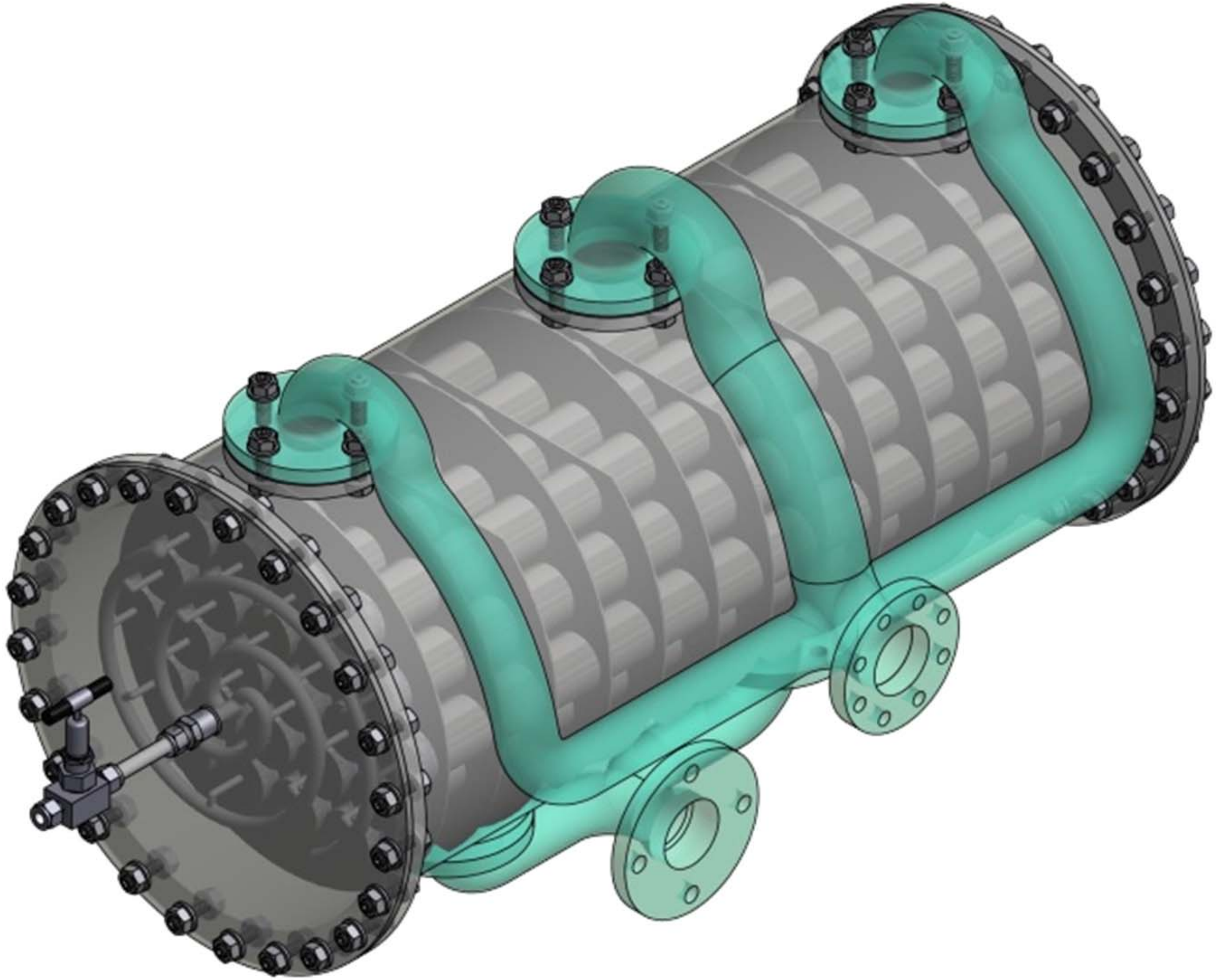


SOFC – MHT integration scheme (HE: heat exchanger)



Sankey diagram of the heat flows inside the integrated SOFC – metal hydride store (MHS) for the worst case scenario with MgH_2 (ΔH ~ 75 kJ/(mol H_2), shown in Figure 43. The whole system can operated without extra electrical heating of the MHS. For the Li-RHC (ΔH ~ 50 kJ/(mol H_2) instead of MgH_2, a smaller heat flow than 911 W, i.e. ca. 600 W, is required for hydrogen release.
The simulation considered just the stationary case of continuous operation. Possible heat losses in the heat transfer system and of the MHS were neglected.

BOR4STORE single module tank (ZOZ name B4S-SM). Left and write heat shieldings for hydrogen supply and take-out line (left) as well as thermocouple lines (right). Image on heat shielding box shows cooling spiral in hydrogen line and flange of proper tank module



Multimodule tank design draft from HZG. Pressurised single tank modules (designed for 650°C and 100 bar) with welded ends. Outer hull contains heat transfer medium only and is designed for 650°C and 0.5 bar overpressure, closed by flanged ends for easy mounting of the single modules. Vertical plates guide the heat transfer medium around single tank modules.