IDENTIFICATION OF NEW MG-B-N-H COMPOUNDS IN THE $Mg(BH_4)_2$-$Mg(NH_2)_2$ PHASES DIAGRAM

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In a similar manner as the exploration of the $LiBH_4$-$LiNH_2$ phases diagram revealing the existence of different Li-B-N-H phases able to release large amounts of hydrogen at moderated temperatures (>10 wt.% at 250°C for the $Li_3BN_2H_8$ composition), we have managed a similar study on the $Mg(BH_4)_2$-$Mg(NH_2)_2$ system. The only compound reported so far in the literature was $MgBH_4NH_2$, for which a notable Mg^{2+} ionic conductivity was measured ($1x10^{-6}$ S/cm at 150°C), whereas Mg^{2+} conductivity in the solid state is usually very limited due to the strong polarising nature of the Mg^{2+} cation.

Our work was targeting a systematic exploration of the $Mg(BH_4)_2$-$Mg(NH_2)_2$ phases diagram. Three new compounds have been identified, labelled α, β and γ, respectively. The β phase with $Mg_3B_2N_4H_{16}$ composition is able to desorb 9.6 wt.% of hydrogen between 200 and 250°C, without significant NH_3 contamination. A new γ phase with $Mg_3B_4N_2H_{20}$ stoichiometry, thermally stable up to 250°C, shows a Mg^{2+} ionic conductivity of $4.1x10^{-5}$ S/cm at 100°C, making this compound one of the solid materials with the highest Mg^{2+} conductivity. During the talk, the possible use of these solid Mg^{2+} ionic conductors as solid electrolyte for Mg-ion batteries will be discussed.

References

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	Dr Raphaël JANOT (CNRS researcher since 2005) is a specialist in energy storage materials. His recent research activities were focused on various types of carbon used as anode materials in metal-ion batteries, and on complex hydrides for reversible hydrogen storage. He is the author of more than 60 peer-reviewed articles, 6 patents, 3 book chapters and has been an invited speaker to 12 international conferences.