Mechanochemistry of (Bi)Metallic Amidoboranes – Synthesis, Characterisation and Perspective

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Mechanochemistry is a very useful liquidless technique for synthesis of (bi)metallic amidoboranes [1-3]. Successful syntheses are obtained in solid state reactions of ammonia borane (borazane, NH_3BH_3) with alkali metal hydrides (NaH, LiH) and alkaline earth metal hydrides (CaH_2 and MgH_2), by using the PMMA and stainless steel (Fig. 1) milling jars. On such a way we synthesized two monometallic ($NaNH_2BH_3$, $LiNH_2BH_3$) and four bimetallic amidoboranes ($Na_2Mg(NH_2BH_3)_4$, $Li_2Mg(NH_2BH_3)_4$, $Na_2Ca(NH_2BH_3)_4$, $Li_2Ca(NH_2BH_3)_4$. Although all compounds show high gravimetric H_2 storage capacity and low H_2 desorption temperatures, their main problem still stays unsolved – rehydrogenation. Having that in mind there is one fundamental question – are (bi)metallic amidoboranes prominent materials for solid state hydrogen storage?

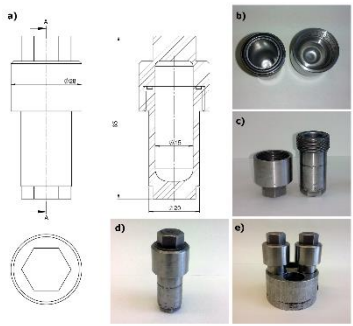

Figure 1. Stainless steel milling jar: a) technical drawing; b) interior of the jar; c) opened jar; d) closed jar; e) two jars prepared for mounting on the mill.

[1] N. Biliškov et al. *Eur. J. Chem.* **23** (2017) 16274.
[2] I. Milanović et al. *ACS Sustain. Chem. Eng.* **9** (2021) 2089.