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Amine-borane adducts and B-C-N materials for reversible hydrogen storage

Ammonia borane NH$_3$BH$_3$ (AB), a remarkable hydrogen storage material carrying 19.6 wt% of hydrogen, owns attractive properties. AB (in thermolytic conditions) has been understandably much investigated in the recent years leading to destabilization strategies in order to decrease the onset dehydrogenation temperature (<100°C). The “best” destabilization approach is the use of a scaffold for nanosizing AB. The nanoconfinement of this precursor shows incredible new pathway to dehydrogenation properties. With this knowledge, we showed that nanoparticles of ammonia borane (AB) can be successfully synthesized without any scaffold and this has opened new perspectives for elaborating new B-N-based materials. Such materials have besides been computationally designed, in the recent years, as the most attractive solutions for reversible H$_2$ storage at ambient conditions. However, there is no experimental evidence yet. The present ambitious project aims at confirming the potential as well as a breakthrough in the field of reversible H$_2$ storage.