Magnesium Borohydride $Mg(BH_4)_2$ for hydrogen storage: present and perspective

Hai-Wen Li

International Research Center for Hydrogen Energy, International Institute for Carbon-Neutron Energy Research, Kyushu University

Hydrogen has been extensively regarded as a clean energy carrier. The energy density of hydrogen per unit volume at ambient temperature and pressure is as low as 1/3000 of gasoline, which makes hydrogen a big challenge to store, particularly within the size and weight constraints of a vehicle. Therefore, development of hydrogen storage technologies is a key issue for realizing the sustainable hydrogen economy.

Hydrogen storage materials show compact, energy efficient and safe method of hydrogen storage and transport, compared to pressurized or liquid hydrogen (see Fig. 1). For onboard hydrogen storage application in fuel cell vehicle (FCV), materials are required to possess all the capabilities of high hydrogen densities (≥ 6 mass%), mild working temperature (< 423 K), and adequate reaction rate for refueling.

Magnesium borohydrides $Mg(BH_4)_2$, having a high gravimetric hydrogen density of 14.9 mass% and a theoretically predicted working temperature at around R.T., has been attracting increasing interest as one of the potential candidates for hydrogen storage materials. In this talk, we will discuss the recent progress, with a focus on the fundamental dehydrogenation and rehydrogenation properties and on providing guidance for material design in term of tailoring thermodynamics and promoting kinetics for hydrogen storage.

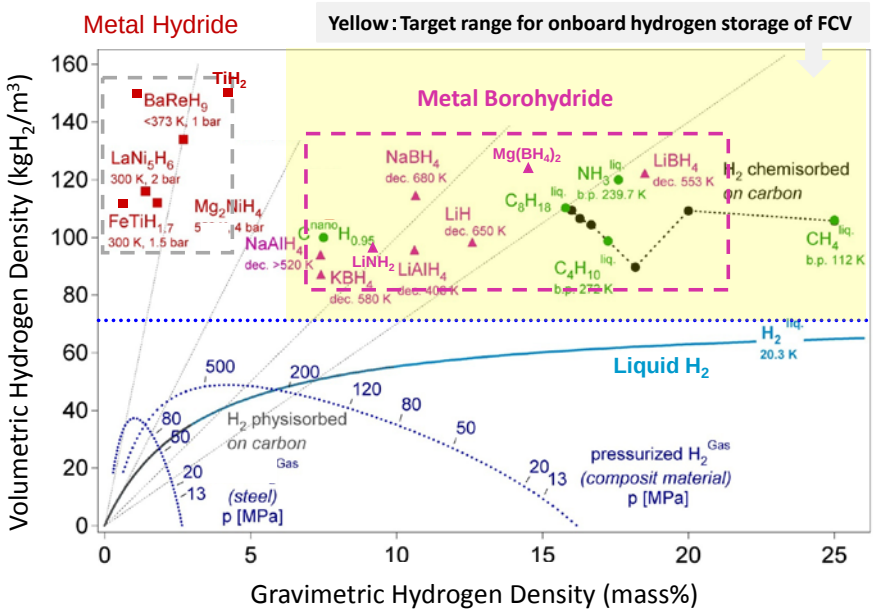

Fig. 1 Comparison of hydrogen density among various storage technologies