Enhancement of the Hydrogen Storage Properties of Ammonia Borane in the Micro Nano Pores of Mesoporous Silicate

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DOE recently proposed a Grand Challenge for on-board hydrogen storage in response to the President's 2003 State of the Union address. This Grand Challenge will require the discovery and development of new hydrogen storage materials and catalysts for fuel cell-powered vehicles. New materials that store both high gravimetric (≥90 g H_2/kg) and high volumetric (≥82 g H_2/L) densities of hydrogen that can be delivered at temperatures between -20 and 85°C will be needed by the year 2015. The volumetric constraints eliminate pressurized hydrogen systems from consideration and guide us toward the development of solid storage materials. We have been investigating novel approaches to enhance the reactivity (release of hydrogen) and selectivity (minimize unwanted side reactions) of hydrogen storage materials for on-board applications. In this work we will show that the hydrogen storage properties of the ammonia borane are greatly enhanced by inclusion in a mesoporous scaffold. These enhanced benefits are due in large part to the micro-nano pore structure of the mesoporous materials used in this work.