Hydrogen Fuel Generation by Thermal Decomposition of Ammonia Borane-Nano Silica Powder Composite

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Hydrogen known as a clean energy source does not emit any harmful gases with the oxidation reaction, and therefore has been attracted much attention as a promising next-generation energy. Ammonia borane (NHBH, AB), an alternative hydrogen fuel energy source for proton-exchange membrane fuel cells (PEMFC), contains 19.6 wt% hydrogen and up to 13 wt% of H yield by thermal decomposition of AB in the presence of boric acid has been reported. Low hydrogen evolution rate and high activation energy of the direct thermal decomposition of AB demand a catalyst or additives to bring down the working temperature with enhanced rate of hydrogen generation. In this study, we employed a composite of AB and Nano Silica (SiO) powder to increase evolution rate and to lower the working temperature. Results showed that the dehydrogenation reaction of the AB and Nano Silica powder composite occurs at a temperature less than 100 °C and around 117.87 mL of hydrogen was generated from 0.09 AB and 0.06 g Nano Silica powder.