

What is ammonia borane (AB)?

Here, catalysts facilitate the release of H<sub>2</sub> gas from chemicals when combined with H<sub>2</sub>O solution, and ammonia borane (AB) is notable for its high hydrogen content (19.6 wt%), high stability in air and water, and non-toxicity [6, 7, 8, 9, 10, 11].

Is ammonia borane a hydrogen carrier?

Energy Environ. Sci. 10,2563-2569 (2017). Demirci, U. B. Ammonia borane: an extensively studied, though not yet implemented, hydrogen carrier. Energies 13,3017 (2020).

Which nanocatalyst provides a million turnovers in hydrogen release from ammonia borane?

Catal. Today 183,10-16 (2012). Akbayrak, S., Tonbul, Y., & Zkar, S. Magnetically separable Rh<sub>0</sub>/Co<sub>3</sub>O<sub>4</sub> nanocatalyst provides over a million turnovers in hydrogen release from ammonia borane. ACS Sustain. Chem. Eng. 8,4216-4224 (2020).

Can a foam fuel cell be used as a power supply?

As shown in Supplementary Movie 2 and Movie 3, the foam can be used to produce a high H<sub>2</sub> flow (180 mL H<sub>2</sub>/min) in the commercial fuel cell, which can successfully power the driven model car for long durations (total of at least 5 h). A stable output of 7.8 V and 1.6 A is obtained (12 W), which is usable as a power supply for various applications.

Ammonia as an Alternative Energy Storage Medium for Hydrogen Fuel Cells: Scientific and Technical Review for Near-Term Stationary Power Demonstration Projects, Final Report

An advanced ammonia borane (AB)-based H<sub>2</sub> power-pack is designed to continually drive an unmanned aerial vehicle (UAV) for 57 min using a 200-W e polymer electrolyte membrane fuel cell (PEMFC). In a flight test with the UAV platform integrated with the developed power-pack, pure hydrogen with an average flow rate of 3.8 L(H<sub>2</sub>) min<sup>-1</sup> is generated by autothermal H<sub>2</sub> ...

Ammonia borane (AB) is emerging as a promising solid hydrogen carrier, particularly for power generation in portable devices that employ proton-exchange membrane fuel cells. A preparative-scale synthesis of AB from sodium borohydride and ammonium salts in high yields (>=95%) and very high purity (>=98%) has been described. The first systematic study of a ...

Ammonia Borane Based Nanocomposites as Solid-State Hydrogen Stores for Portable Power Applications ... Remaining traces of ammonia could be completely eradicated from the fuel supply via the use of an external NiCl<sub>2</sub> filter, which, if necessary, could also decrease the concentration of other unwanted by-products such as diborane. ...

This article introduces an on-demand microfluidic hydrogen generator that can be integrated with a micro-proton exchange membrane (PEM) fuel cell. The catalytic reaction, reactant circulation, gas/liquid separation, and autonomous control functionalities are all integrated into a single microfluidic device. It generates hydrated hydrogen gas from an ...

practical ammonia borane regeneration cycle. o Supply selected borate esters to project collaborators at the Pacific Northwest National Laboratory (PNNL). o Assess U.S. and global borate resources and reserves available for large-scale implementation of ammonia borane as a transportation fuel.

Other ammonia-based materials such as hydrazine, ammonia borane, metal ammine salts are also carbon-free at the end users. The use of ammonia as energy vector has several advantages [15] such as low cost and ease of storage. ... Miniature NH<sub>3</sub> cracker based on microfibrinous entrapped Ni-CeO<sub>2</sub>/Al<sub>2</sub>O<sub>3</sub> catalyst monolith for portable fuel cell ...

Ammonia borane (AB) based nanocomposites have been investigated with the aim of developing a promising solid-state hydrogen store that complies with the requirements of a modular polymer ...

An advanced ammonia borane (AB)-based H<sub>2</sub> power-pack is designed to continually drive an unmanned aerial vehicle (UAV) for 57 min using a 200-We polymer ...

The use of an ammonia-fed solid oxide fuel cell (SOFC) is the most efficient method of generating power. In terms of CO<sub>2</sub> emission, ammonia is a good indirect hydrogen storage material because it does not contain carbon and therefore will not release CO<sub>2</sub> when used as fuel in a fuel cell or gas turbine. Using ammonia like hydrogen directly in a fuel-cell system ...

Portable ammonia-borane-based H<sub>2</sub> power-pack for unmanned aerial vehicles. Journal of Power Sources 2014-05 | Journal article DOI: 10.1016/j.jpowsour.2013.11.112 ... Development of a continuous hydrogen generator fueled by ammonia borane for portable fuel cell applications. Journal of Power Sources

Development of a continuous hydrogen generator fueled by ammonia borane for portable fuel cell applications

The obtained high energy densities indicate that the direct ammonia borane fuel cell holds potential applications for portable devices. ... An alkaline fuel cell power supply using ammonia borane as fuel was investigated with a power density of 315 mW/cm<sup>2</sup> achieved at ambient pressure and near ambient temperature [140].

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The HCD can catalyze the ammonia borane hydrolysis to release hydrogen at room temperature without additional illumination. Additionally, due to the heat supply of the photothermal layer and the presence of

LiCl to supply moisture and prevent freezing, it is suitable for working at cold environments without liquid water.

Ammonia-borane,  $\text{NH}_3\text{BH}_3$ , dissolves in water to form a stable solution, to which the addition of a catalytic amount of suitable metal catalysts leads to hydrogen release with an  $\text{H}_2$  to  $\text{NH}_3\text{BH}_3$  ratio up to 3.0, corresponding to 8.9 wt.% of the starting materials  $\text{NH}_3\text{BH}_3$  and  $\text{H}_2\text{O}$ . This article presents a brief overview of the hydrogen generation system based on the ...

Organic acids are found to accelerate the hydrolysis of ammonia borane and sodium borohydride with relative indifference towards the purity of water being used. This is ...

An advanced ammonia borane (AB)-based  $\text{H}_2$  power-pack is designed to continually drive an unmanned aerial vehicle (UAV) for 57 min using a 200-W e polymer electrolyte membrane fuel ...

An advanced ammonia borane (AB)-based  $\text{H}_2$  power-pack is designed to continually drive an unmanned aerial vehicle (UAV) for 57 min using a 200-We polymer electrolyte membrane fuel cell (PEMFC).

Fuel cell current, power, and voltage output when using ammonia borane hydrolysis to power a PEMFC. Hydrogen was generated using approximately 35 mL of 8 M ammonia borane solution and

Pure hydrogen generation under mild conditions in a controllable way is important for portable devices. Recently, we have found that an aq. ammonia-borane ( $\text{NH}_3\text{BH}_3$ ) solution is a potential hydrogen source with noble metal catalysts. For practical use, the development of a low-cost, efficient and safe system is desired. In this study, we found that solid acids such as ...

However, the hydrogen supply including hydrogen transport and storage has been a bottleneck to the application of PEMFC as portable power sources. PEM fuel cells require stable and high-capacity hydrogen generator at ambient condition [18]. Recently, ammonia borane ( $\text{NH}_3\text{-BH}_3$ , AB for short) with high hydrogen storage density and high stability ...

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