

# Hydrogen energy storage triggers new logic

What motivates reversible hydrogen storage materials?

For example, compensating for intermittent renewable energy generation is an often-cited motivation for developing reversible hydrogen storage materials, but research has typically focused on cross-cutting needs rather than specific use cases (for example, robust catalysts to enable reversible hydrogen release from LOHCs).

Can a hydrogen storage system be used as a back-up power supply?

Future research should target developing MOFs with 15 g kg<sup>-1</sup> of recoverable hydrogen adsorbed (excess uptake) and could be manufactured for under US\$10 kg<sup>-1</sup> to make the on-site storage system a leading option for back-up power applications. Resilient power supply has become increasingly important in today's energy infrastructure.

What are hydrogen-based strategies for high-density energy storage?

Hydrogen-based strategies for high-density energy storage 127,128,129 include compressed gas, cryogenic liquid (black circles) 130, hydrogen chemically bound as a hydride 63,131,132,133,134,135,136 (purple triangles) or as an LOHC 32 (orange squares) or hydrogen physisorbed within a porous adsorbent 24 (light-blue pentagons).

What is hydrogen energy storage?

Hydrogen is a versatile energy storage medium with significant potential for integration into the modernized grid. Advanced materials for hydrogen energy storage technologies including adsorbents, metal hydrides, and chemical carriers play a key role in bringing hydrogen to its full potential.

Are hydrogen storage technologies sustainable?

The outcomes showed that with the advancements in hydrogen storage technologies and their sustainability implications, policymakers, researchers, and industry stakeholders can make informed decisions to accelerate the transition towards a hydrogen-based energy future that is clean, sustainable, and resilient.

How can a metal-organic framework improve hydrogen storage?

MOF composite materials, mixed materials, and doping with various metal compounds can improve hydrogen storage. The development of metal-organic frameworks (MOFs) capable of efficiently storing hydrogen at room temperature is highly desirable for energy-storage purposes.

Keywords - Hydrogen production and storage, Renewable energy, Power management, Fuzzy logic control energy carrier. The fuel cell will be used as power source to convert the chemical energy from hydrogen into electrical ...

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NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC. Hydrogen Energy ...

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6 ???&#0183; Impact of Hydrogen on Material Properties. Hydrogen, despite being the smallest and lightest atom, has a significant impact on materials by infiltrating them and altering their properties, such as superconductivity and metal ...

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