

# Solid-state hydrogen storage and battery energy storage

What is solid-state hydrogen storage?

As discussed, hydrogen is a promising clean energy carrier with the ability to greatly contribute to addressing the world's energy and environmental challenges. Solid-state hydrogen storage is gaining popularity as a potential solution for safe, efficient, and compact hydrogen storage.

Are solid-state hydrogen storage materials economically feasible?

To be economically feasible, solid-state hydrogen storage materials must exhibit long-term stability and endurance. Comprehensive studies that analyze the deterioration processes of storage materials under real-world settings, including temperature fluctuations and cycling, are lacking in the literature. 6. Conclusions and future perspectives

Can solid-state hydrogen storage materials be experimentally synthesized?

It is evident that there are relatively few solid-state hydrogen storage materials that can be experimentally synthesized, and the vast majority of research efforts are still in the theoretical phase. Fig. 15. (a) Potential hydrogen storage materials.

What are the different types of solid-state hydrogen storage materials?

Nowadays under investigation are metal-organic frameworks (MOFs), metal-doped metal organic frameworks, covalent organic frameworks (COFs), clathrates, nanostructured carbon materials, metal-doped carbon nanotubes, and complex chemical hydrides as solid-state hydrogen storage materials.

Are solid-state hydrogen storage materials high-performance?

However, solid-state hydrogen storage materials are characterized by a wide variety of types, significant performance variability, and complex experimental preparation processes. Developing high-performance solid-state hydrogen storage materials remains a challenging task.

Can low-dimensional materials be used in solid-state hydrogen storage?

Moreover, there is limited research on the application of low-dimensional materials such as clusters and two-dimensional materials [216,217] in solid-state hydrogen storage field.

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