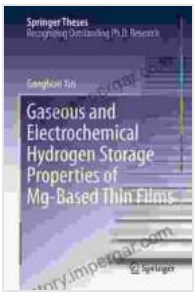
Gaseous And Electrochemical Hydrogen Storage Properties Of Mg Based Thin Films

The search for viable and efficient hydrogen storage materials is critical for the advancement of hydrogen economy and the transition to sustainable energy sources. Hydrogen, as an energy carrier, holds immense potential due to its high gravimetric energy density and zero-emission nature. However, its storage remains a significant challenge due to its low volumetric density.



Gaseous and Electrochemical Hydrogen Storage Properties of Mg-Based Thin Films (Springer Theses)

by Philip Ball

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Thin Film Hydrogen Storage

Thin film materials have emerged as promising candidates for hydrogen storage due to their high surface-to-volume ratio, accessible active sites, and potential for tailored properties. Among various materials, magnesium (Mg) has attracted significant attention for its lightweight, abundance, and high hydrogen storage capacity.

Gaseous Hydrogen Storage

Mg-based thin films have exhibited remarkable gaseous hydrogen storage properties. The films are typically synthesized via physical or chemical vapor deposition techniques, allowing precise control over their composition and microstructure. The hydrogen uptake kinetics and capacity are influenced by factors such as film thickness, crystal structure, and the presence of dopants or catalysts.

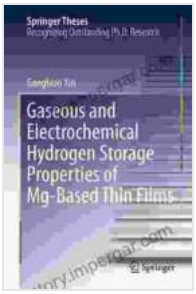
Electrochemical Hydrogen Storage

In addition to gaseous storage, Mg-based thin films also demonstrate electrochemical hydrogen storage capabilities. When immersed in an electrolyte, the films undergo electrochemical reactions to absorb and desorb hydrogen. This process involves the formation and decomposition of magnesium hydride (MgH2),a hydrogen-rich compound.

Applications and Advancement

The unique properties of Mg-based thin films make them suitable for various applications, including portable hydrogen storage devices, fuel cells, and sensors. Ongoing research focuses on improving the hydrogen storage capacity, cycling stability, and reversibility of the films. Doping, alloying, and surface modifications are employed to enhance their performance and tailor their properties for specific applications.

Mg-based thin films hold great promise for advancing the field of hydrogen storage. Their high surface area and engineered properties enable efficient and reversible hydrogen absorption and desorption. As research continues to refine these materials, they are expected to play a significant role in the development of practical hydrogen-based energy systems.



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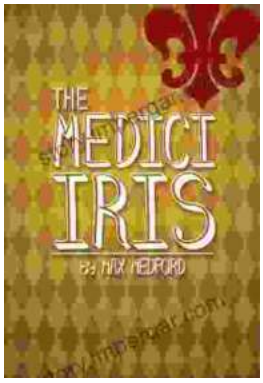

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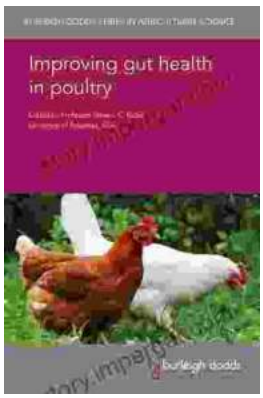

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