

# Can tungsten store hydrogen

Do tungsten platelets retain hydrogen?

Experimental

<div class="df\_qntext">Do tungsten surfaces absorb hydrogen?

In light of these concerns, it is necessary to understand the thermodynamics and kinetics of hydrogen absorption into tungsten surfaces and the subsequent behavior of hydrogen in bulk tungsten, including diffusion and trapping. Tungsten surfaces have been well studied experimentally, since clean, low-Miller-index surfaces are easily obtainable.

<div class="df\_qntext">Why is it necessary to review publications on hydrogen traps in tungsten?

It is necessary to review publications on hydrogen traps in tungsten because the recent comprehensive review on this subject was published in 2001. Since then, a vast amount of material has been accumulated on this subject, and many papers have been published on hydrogen isotope trapping in tungsten-based materials.

<div class="df\_qntext">Do tungsten platelets retain hydrogen?

It is shown that the platelets can retain substantial quantities of hydrogen, exceeding trapping capacity of other non-cavity defects in tungsten. The properties of the hydrogen platelets formed in tungsten under various conditions are assessed and a formation mechanism is proposed.

<div class="df\_qntext">Does tungsten have a trapping site for hydrogen?

The programmed thermal desorption spectroscopy (TDS) analyses of the samples show existence of various trapping sites for hydrogen in tungsten with de-trapping energies ranging from ~0.7 eV to ~2.1 eV [8 - 11].

<div class="df\_qntext">Can tungsten alloys be used for fusion?

A considerable number of tungsten alloys have already been developed in the course of fusion research. Doping may alter the parameters of hydrogen retention in tungsten, and this should be taken into account in selecting the materials for fusion facilities. Content may be subject to copyright.

<div class="df\_qntext">Is tungsten a non-hydride forming material?

Tungsten is a non-hydride forming material. Hydrogen isotopes can be dissolved in tungsten crystal lattice or can be trapped by lattice defects. When dissolved hydrogen is located in the inter-nodes of the crystal lattice. So far, there is no unambiguous opinion on the form in which hydrogen dissolves in metals.

Tungsten powder that is reduced by hydrogen at low temperature from tungstic acid or tungstic-acid-derived W<sub>2</sub>O<sub>3</sub> contains large concentrations of ~W and burns immediately when in contact with air. If ...

These advances in hydrogen technology have sparked interest in the development of efficient and sustainable methods for storing and transporting hydrogen. This research focuses on ...

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In the next-generation plants, it is possible that tungsten felt wetted with lithium will be used to protect the first wall [4]. Tungsten is a non-hydride forming material. Hydrogen isotopes can be dissolved in ...

The prediction of hydrogen isotope retention in n-irradiated tungsten (W) is an important topic for edge plasma research as it has significant implications for the operation of ITER and fusion reactors.

Hydrogen can be stored in a variety of physical and chemical methods. Each storage technique has its own advantages and disadvantages. It is the subject of this study to review the ...

The effects of tungsten (W) additions (0, 0.1, 0.5 and 1 wt.%) on the hydrogen embrittlement behaviour of microalloyed steels were systematically investigated by means of slow ...

MgH<sub>2</sub> has a high hydrogen storage capacity but suffers from high operating temperature and slow dehydrogenation kinetics due to the strong Mg-H bond. Here, phosphotungstic ...

Recently, tungsten oxide-based materials have emerged as one of the most promising electrocatalytic compounds, due to their activity, low cost and durability in both acid and base ...

**2.1 Hydrogenation performance** As an isotope element of tritium, hydrogen has similar chemical properties to tritium. Since tritium is radioactive and expensive, the preliminary study on the ...

While this provides useful information about the potential trapping processes, modeling can play an important role in elucidating the detailed microscopic mechanisms that lead to hydrogen ...

As a plasma-facing material (PFM), tungsten is subjected to the synergistic irradiation of steady-state plasma and transient thermal load. The study investigated the irradiation damage and ...

**Abstract** Hydrogen isotope retention of tungsten in nuclear fusion reactors is one of the hot research issues all along. In this paper, tungsten samples in different rolled surfaces were ...

With the change of the hydrogen-tungsten ratio, the composition of the explosion residues can be divided into four regions, corresponding to WO<sub>3</sub>, WO<sub>2.9</sub>, WO<sub>2.72</sub> and W. Based on ...

Also, hydrogen is expected to be used as an energy carrier that contribute to the global decarbonization in transportation, industrial, and building sectors. Many technologies have been ...

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In a fusion tokamak, the plasma of hydrogen isotopes is in contact with tungsten at the surface of a divertor. In

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the bulk of the material, the hydrogen concentration profile tends towards ...

The kinetics of hydrogen absorption into tungsten, trapping near vacancies, and the effect hydrogen has on the cohesive properties of bulk tungsten have been analyzed with PAW-DFT-GGA calculations.

Tungsten, given its high heat and neutron resistance, is often the material of choice for plasma-facing components in nuclear fusion reactors. However, understanding and predicting the ...

Atomic hydrogen can reversibly be stored in tungsten trioxide in the form of tungsten bronzes,  $H_xWO_3$  ( $x < 1$ ). The electrochemical hydrogen intercalation reaction is a multistep, ...

It is shown that the platelets can retain substantial quantities of hydrogen, exceeding trapping capacity of other non-cavity defects in tungsten. The properties of the hydrogen platelets ...

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