

## European Solar and Energy Storage Solutions

# Using deuterium to make solar power generation equipment



## Overview

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The new method has the potential for robust and sustainable deuterium evolution, enabling deuterium production at a high rate of  $9.745 \text{ mmol g}^{-1} \text{ h}^{-1}$ . The activity, thermodynamic, and kinetic characteristics are also investigated and compared between photocatalytic heavy water ( $\text{D}_2\text{O}$ ) splitting and water ( $\text{H}_2\text{O}$ ) splitting.

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The team found that the catalyst system can efficiently generate deuterium at a high rate of up to  $9.745 \text{ mmol g}^{-1} \text{ h}^{-1}$ . Because  $\text{D}_2\text{O}$  is needed to run certain nuclear reactors, the nuclear industry creates radioactively contaminated  $\text{D}_2\text{O}$  waste.

In this paper, we discuss two ways to use DEs more practically in applications: 1) point power generation, in which a single DE is used alone, and 2) distributed power generation, in which a large number of DEs are gathered as one cluster and distributed.

Scientists are actively researching how to produce tritium, a process called breeding, as part of a subsystem of a fusion power plant at the rate needed to make future power plants self-sufficient for their tritium supply.

Here we present the successful scaling of a thermally integrated photoelectrochemical device—utilizing concentrated solar irradiation—to a kW-scale pilot plant capable of co-generation of . How much deuterium can a catalyst produce?

The produced gases were analyzed using gas chromatography. The team found that the catalyst system can efficiently generate deuterium at a high rate of up to  $9.745 \text{ mmol g}^{-1} \text{ h}^{-1}$ . Because  $\text{D}_2\text{O}$  is needed to run certain nuclear reactors, the nuclear industry creates radioactively contaminated  $\text{D}_2$

O waste.

Is deuterium common?

Deuterium is common: about 1 out of every 6,500 hydrogen atoms in seawater is in the form of deuterium. This means our oceans contain many tons of this hydrogen isotope. The fusion energy released from just 1 gram of deuterium-tritium fuel equals the energy from about 2,400 gallons of oil. Tritium is not common.

What are deuterium and tritium?

Deuterium and tritium are promising fuels for producing energy in future power plants based on fusion energy. Fusion energy powers the Sun and other stars through fusion. Deuterium and tritium are isotopes of hydrogen, the most abundant element in the universe.

Can deuterium be separated from hydrogen?

Separating deuterium from hydrogen is challenging because of the nearly identical physicochemical properties of the two isotopes. Current technologies for deuterium production have poor separation capabilities and high energy costs. Therefore, there is a need for cost- and energy-efficient deuterium-generation technologies.

Is deuterium water heavier than ordinary water?

Water made from deuterium is about 10 percent heavier than ordinary water. That's why it is sometimes referred to as "heavy water." It would sink to the bottom of a glass of ordinary water.

How much fusion energy is released from deuterium-tritium fuel?

The fusion energy released from just 1 gram of deuterium-tritium fuel equals the energy from about 2,400 gallons of oil. Tritium is not common. It is a radioactive isotope that decays relatively quickly, with a 12-year half-life. It is rare in nature and not immediately available for use in potential power plants.

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### Analyzing Antimatter: How it could be produced & stored in

By using solar energy for replicators (provided it can create antimatter), or The TNG technical manual states onboard antimatter generation, Deuterium is chilled with 1/1000th of absolute ...

### Helium-3 as a Perspective Fuel for Power Generation through

Abstract The aneutronic D3-He (deuterium-helium-3) fuel cycle is considered as a viable alternative to D-T (deuterium-tritium) fusion since it is ecologically much safer than ...



### starting nuclear power, no idea how : r/Seablock

U dont need heavy water for uranium cells. After recycling used up cells u will get fusion catalyst store them for later use. Once u are able to make a deuterium reactor u will use deuterium and ...

### New Method for Deuterium Production

The team found that the catalyst system can

efficiently generate deuterium at a high rate of up to  $9.745 \text{ mmol g}^{-1} \text{ h}^{-1}$ . Because  $\text{D}_2\text{O}$  is needed to run certain nuclear reactors, the nuclear industry creates radioactively ...



## Mars Surface Power Generation Challenges and Considerations

prevented the solar arrays from generating sufficient keep-alive power and forced controllers to suspend operations after the vehicle was no longer able to communicate with Earth. Reduced ...

## How realistic is fusion power, and how close are we to it?

Not to mention there has been no demonstration of actual power generation from the latter, and is inherently more difficult to make an efficient thermodynamic loop using the heating of neutrons ...



## Helium-3 as a Perspective Fuel for Power Generation through

The aneutronic  $\text{D}_3\text{-He}$  (deuterium-helium-3) fuel cycle is considered as a viable alternative to  $\text{D-T}$  (deuterium-tritium) fusion since it is ecologically much safer than the latter. ...



## Solar power system equipment: needs, costs, pros, ...

What is a solar panel system? A roof-mounted solar panels system absorbs and converts the energy-packed photons of natural sunlight into a usable energy form. Solar panel systems are often referred to as PV, or photovoltaic, solar power ...



## Solar power technology for electricity generation: ...

In addition, a comparison is made between solar thermal power plants and PV power generation plants. Based on published studies, PV-based systems are more suitable for small-scale power

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