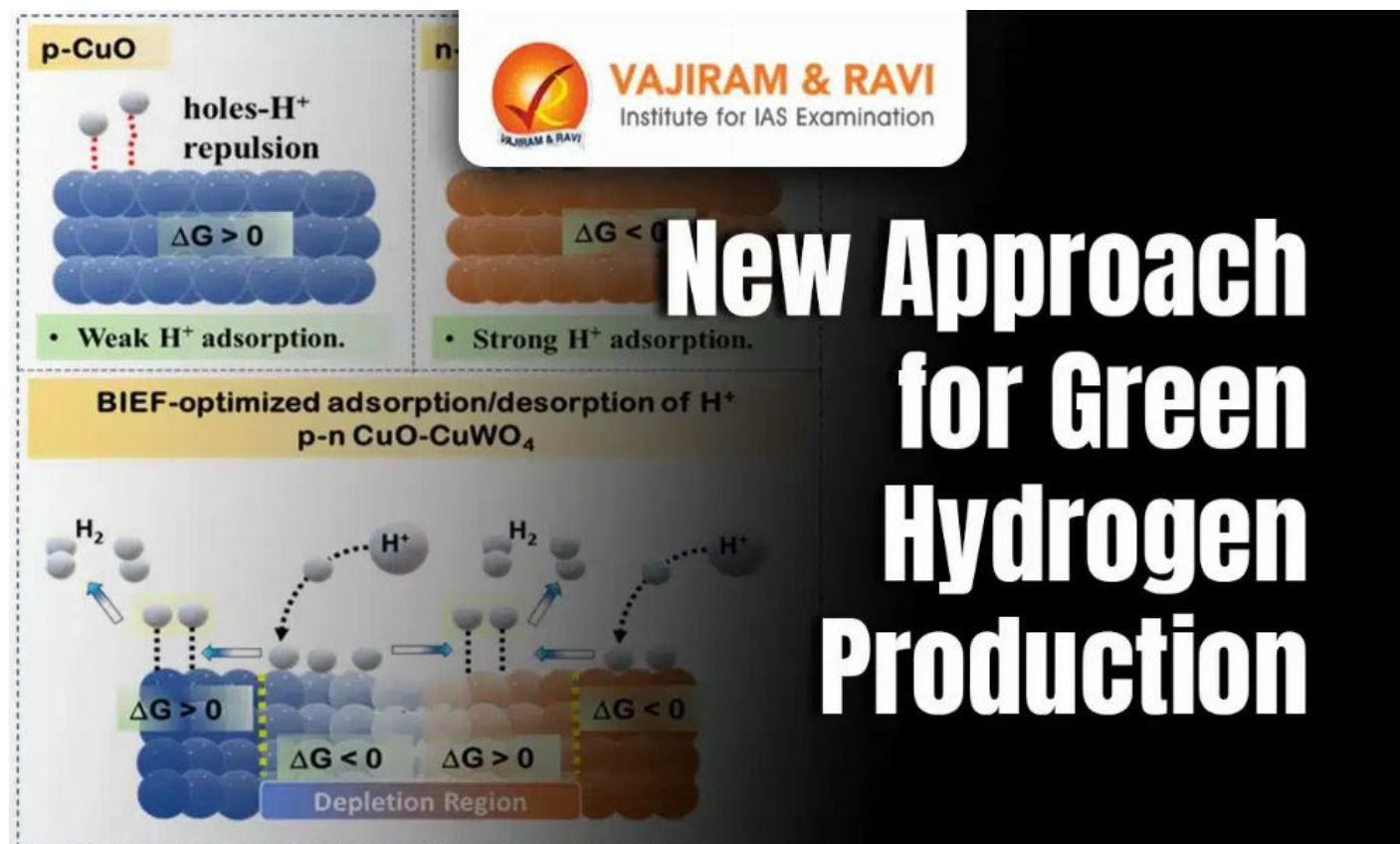


New Approach for Green Hydrogen Production

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New Approach for Green Hydrogen Production Latest News

Researchers at the Institute of Nano Science and Technology (INST), Mohali, have developed new insights into proton adsorption on catalyst surfaces, paving the way for more efficient green hydrogen production.

Key Scientific Findings

- A **novel heterostructure**, combining **Copper Tungsten Oxide (CuWO₄)** and **Copper Oxide (CuO)**, has been created to exploit the **Built-In Electric Field (BIEF)** effect for enhanced hydrogen evolution.
- The structure is formed by growing **CuWO₄ nanoparticles** over a **Cu(OH)₂ precursor**, leading to a **p-n heterojunction** that creates an **asymmetric electronic environment**.
- This **BIEF** plays a crucial role in **modulating proton adsorption and desorption**, directly influencing the **Hydrogen Evolution Reaction (HER)** efficiency.

Mechanism of Proton Adsorption

- The interface between **CuO and CuWO₄** shows variation in **Gibbs Free Energy (ΔG)**, especially near the **depletion region**.
- A **gradient in ΔG** across this interface enhances **hydrogen adsorption at CuO** and **desorption at CuWO₄**, making the system more favourable for **HER**.
- This showcases “**negative cooperativity**”, where increased **proton binding** at one site **reduces affinity** at other sites, facilitating **proton desorption**, a key step in **alkaline hydrogen production**.

What is Green Hydrogen?

- **Green Hydrogen** is produced through the **electrolysis of water** using **renewable energy** sources like **solar, wind, or hydropower**, releasing **no greenhouse gases**.
- It is a **clean, sustainable, and flexible energy carrier**, with **water vapour** as its only by-product.
- Unlike **grey hydrogen** (from fossil fuels), green hydrogen contributes to **zero carbon emissions**.

Green Hydrogen Production Methods

- **Alkaline Electrolysis:** Mature, low-cost method using **KOH/NaOH**; needs **nickel/platinum** electrodes.
- **Proton Exchange Membrane (PEM) Electrolysis:** **High efficiency**, fast, but **expensive** due to **precious metal catalysts**.
- **Solid Oxide Electrolysis (SOEC):** Works at **700-1000°C**, enables **co-electrolysis** of **H₂O and CO₂**, but involves **complex materials** and **high costs**.

New Approach for Green Hydrogen Production FAQs

Q1. What is green hydrogen?

Ans. Green hydrogen is hydrogen produced using renewable energy sources like solar or wind, without emitting carbon dioxide.

Q2. What is the new method recently developed for green hydrogen production?

Ans. Scientists have developed methods like photoelectrochemical water splitting, solid oxide electrolysis, and enzyme-assisted electrolysis, improving efficiency and scalability.

Source: **PIB**

Source: <https://vajiramandravi.com/current-affairs/new-approach-for-green-hydrogen-production/>

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