

IN-SET

BOLETÍN DE VIGILANCIA TECNOLÓGICA

RENEWABLE ENERGY

Resumen de la actualidad tecnológica en transición energética, que recoge tendencias en energías renovables, almacenamiento y materiales, combustibles sostenibles, procesos térmicos y de combustión, infraestructura eléctrica e inteligencia artificial, así como su aplicación en los distintos sectores de consumo.

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PREFACIO



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La electrólisis del agua es hoy la pieza central de la producción de hidrógeno renovable y, con ella, de la descarbonización de sectores difíciles de electrificar. Su despliegue ya no depende solo de instalar más capacidad, sino de resolver los cuellos de botella que surgen al pasar de la demostración a la escala industrial. El sistema de vigilancia tecnológica del Centro Tecnológico para la Innovación en Transición Energética Sostenible (SET Chile) permite seguir ese tránsito. Esta edición de In-SET aborda dos ámbitos del eje de energías renovables: los electrolizadores y los materiales de electrólisis.

Mientras el mercado de electrolizadores crecerá a una tasa anual del 20,6% hasta cerca de 2.200 millones de dólares en 2030, el de materiales para electrolizadores PEM avanza al 31,8%, desde 160 millones en 2026 hasta unos 1.460 millones en 2034. El reporte sobre materiales de ánodo apunta en la misma dirección al identificar las restricciones de suministro como factor determinante, en un mercado donde Asia-Pacífico concentró el 60% de la demanda en 2025.

Ese diagnóstico se refleja en una agenda de investigación convergente entre países. En Alemania, el Fraunhofer ISE presentó un módulo que acopla directamente celdas solares de multiunión con celdas de electrólisis, con una conversión de energía solar en energía química de 31,3%; en Corea del Sur, el KRICT resolvió un problema de durabilidad en celdas de óxido sólido de base níquel. En el frente industrial y de propiedad intelectual el foco es la durabilidad: W. L. Gore e ITM Power publicaron datos de degradación ultrabaja en electrólisis PEM, y las patentes de esta edición —desde un electrocatalizador de óxido de iridio dopado con manganeso hasta electrolizadores con bomba de calor— atacan el mismo problema: usar menos material crítico y hacerlo durar más.

Dos hitos resultan particularmente interesantes. El primero, la empresa Phasecraft obtuvo 4,5 millones de dólares del Departamento de Energía de Estados Unidos para desarrollar algoritmos cuánticos que descubran catalizadores con menor dependencia del iridio, uno de los metales más escasos del planeta; su relevancia está menos en el monto que en el método. El segundo, el inicio de construcción de la planta central de litio de Vulcan Energy en Frankfurt, con tecnología de electrólisis de la canadiense NORAM Electrolysis Systems, muestra a la electrólisis saliendo del ámbito del hidrógeno para instalarse como proceso habilitante en la refinación de minerales.

El estudio de un sistema fotovoltaico-hidrógeno en una zona semidesértica de Marruecos, con rendimientos superiores a 33 kg de H₂ por kWp al año tras más de siete años de operación, describe condiciones muy próximas a las del norte del país, y el caso de Vulcan conecta directamente con la industria del litio.

Encuentros como el World Hydrogen Summit and Exhibition, en Rotterdam, o el Hydrogen Technology World Expo serán los espacios donde estos avances se contrasten con la realidad de los proyectos. Desde SET Chile, y en particular desde la línea de energías renovables, el desafío es traducir esta evidencia en capacidades propias: seleccionar, adaptar y validar tecnologías de electrólisis y materiales asociados, articulando la investigación aplicada con las necesidades de la industria nacional.



Mario Toledo
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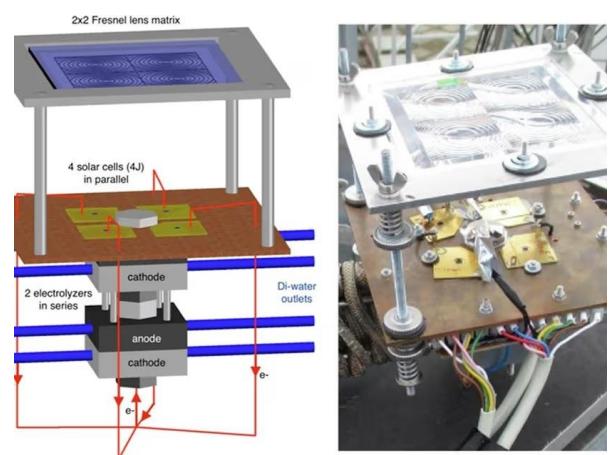
Edición n°2 | julio de 2026 | set.usm.cl

Efficient Production of Solar Hydrogen Through Direct Coupling of Concentrating Solar Cells and Electrolyzer

Etiqueta: Solid electrolytes | Publicada el 01/07/2026

Splitting hydrogen from water molecules via electrolysis requires energy, which ideally comes from renewable energy sources. Scientists at the Fraun-hofer Institute for Solar Energy Systems ISE have developed a combined photovoltaic/electrolysis module that efficiently produces hydrogen directly from solar energy. To do this, the water molecule is split using the high photo-voltage of multi-junction solar cells, which in turn are electrically and thermally connected to electrolyzer cells. A demonstrator from the research team tested outdoors converted up to 31.3 percent of solar energy into chemical energy, based on the higher heating value of hydrogen.

[ver más...](#)



W. L. Gore and ITM Power release electrolyser findings

Etiqueta: Hydrogen production | Publicada el 25/06/2026

W. L. Gore & Associates has announced, in collaboration with ITM Power, the release of improved long-term durability data in proton exchange membrane water electrolysis (PEMWE) detailed in new white paper titled Ultra-Low Degradation in PEM Electrolysis: Enabling Scalable and Efficient Green Hydrogen Production. The companies present results from two PEMWE prototypes tested under differential pressure detailing new benchmarks exceeding international performance targets in PEMWE, a critical technology for scalable green hydrogen production.

[ver más...](#)



Plug Power commissions electrolyser

Etiqueta: Hydrogen production | Publicada el 25/06/2026

Plug Power Inc., a provider of comprehensive hydrogen solutions for the hydrogen economy, has announced the completion of a critical execution phase at the Måde Power-to-X (PtX) facility in Esbjerg, Denmark, developed and operated by European Energy. Power-to-X infrastructure uses renewable electricity to produce hydrogen and other low-carbon fuels, helping decarbonise industrial and energy applications.

[ver más...](#)

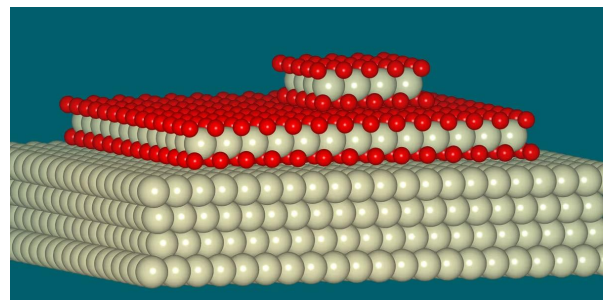


Platinum oxidation observed in real time: the key to longer-lasting electrolysers

Etiqueta: Solid electrolytes | Publicada el 12/06/2026

Electrolysers produce hydrogen. Fuel cells, in turn, generate electricity from hydrogen. Both technologies are considered key building blocks of the energy transition, offering well-established solutions for storing, transporting and producing renewable energy. However, there is a challenge: the pla...

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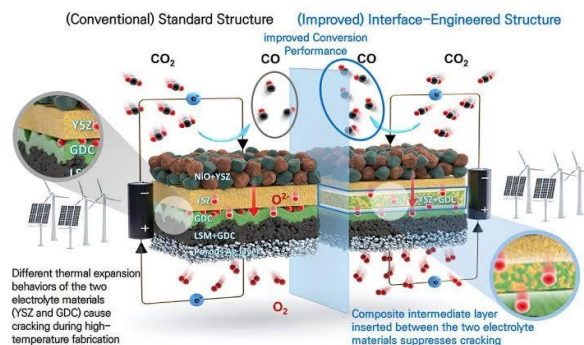


Researchers improve efficiency, durability of nickel-based SOECs for electrochemical CO₂ conversion

Etiqueta: High-efficiency electrolyzers | Publicada el 04/06/2026

A Korean research team has resolved a major durability issue in solid oxide electrolysis cells (SOECs), a technology that converts carbon dioxide (CO₂) into high-value chemical feedstocks. Researchers at the Korea Research Institute of Chemical Technology (KRICT), led by Drs. Min-Chul Kim, Ji Hoon Park, and Jin Hee Lee, developed a new electrolyte interface engineering technology for nickel-based SOECs.

[ver más...](#)

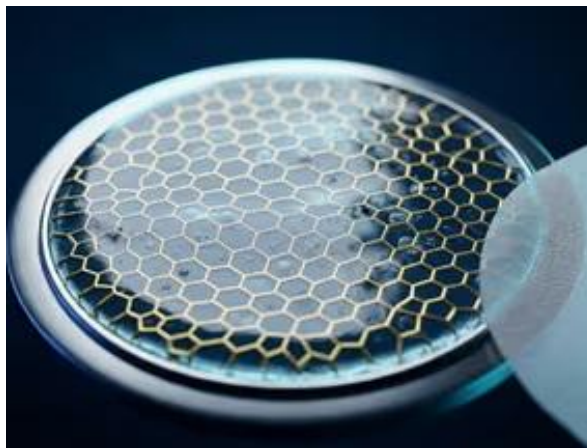


Self-optimising catalysts boost the efficiency of water electrolysis

Etiqueta: Solid electrolytes | Publicada el 13/05/2026

To what extent can self-activating catalysts enhance hydrogen production in electrolyzers? Researchers at Johannes Gutenberg University Mainz (JGU) have investigated this question, and their findings were recently published in the renowned scientific journal *Advanced Energy Materials*. "These catalysts optimize themselves and improve over the course of operation," explained Dr. Dandan Gao from the Department of Chemistry at JGU. "We are therefore convinced that they represent a new paradigm for hydrogen production." In their review article, the researchers systematically consolidate, for the first time, the key characteristics of self-activation.

[ver más...](#)



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La-Co-Mn oxide aerogels as high-performance electrocatalysts for anion exchange membrane water electrolysis

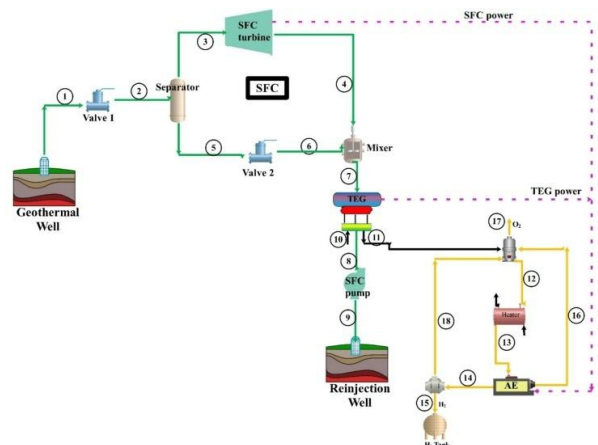
Etiqueta: Electrocatalysts | Publicada el 21/06/2026



Design optimization and performance comparison of green hydrogen production via PEM, alkaline, and solid oxide electrolyzers

Etiqueta: Low-cost electrolyzers | Publicada el 21/06/2026

This study conducts a parametric investigation and multi-objective optimization of hydrogen generation using three types of electrolyzers—proton exchange membrane (PEME), alkaline (AE), and solid oxide (SOE)—in combination with a geothermal power generation system.

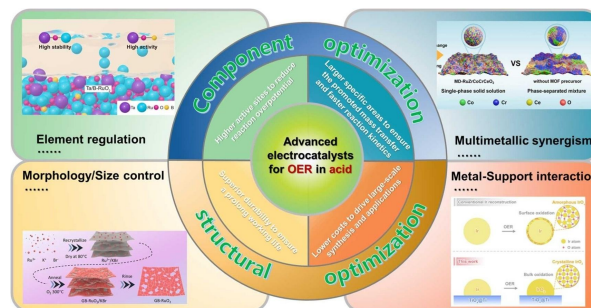


Low-cost electrocatalysts for acidic oxygen evolution reaction: Advances, strategies, and challenges

Etiqueta: Electrocatalysts | Publicada el 21/06/2026

This review discusses compositional tuning strategies, including heteroatom doping and alloying, as well as structural optimization approaches involving advanced supports and morphology control. Additionally, emerging nonprecious metal alternatives are examined. Key mechanisms, such as the adsorbate evolution mechanism (AEM) and the lattice oxygen oxidation mechanism (LOM), are analyzed to guide rational catalyst design.

[ver más...](#)

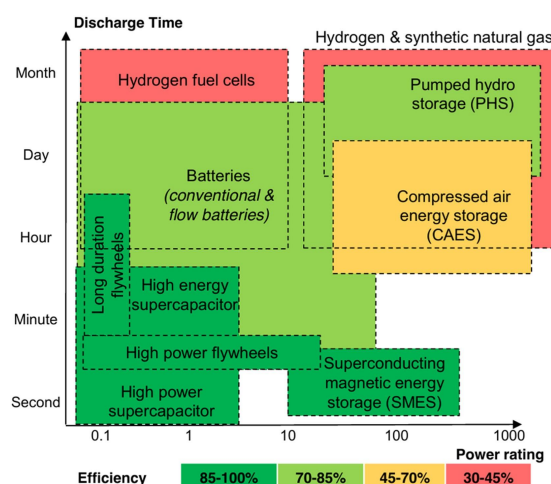


Performance evaluation of photovoltaic and hydrogen coupled systems for sustainable energy storage

Etiqueta: Hydrogen production | Publicada el 21/06/2026

This study investigates the hydrogen production yield of a hydrogen system coupled with three types of photovoltaic (PV) technologies—monocrystalline, polycrystalline, and amorphous silicon—operating in a semi-desert region of Morocco. The results show that the hybrid PV-hydrogen system achieves annual yields exceeding 33 kg H₂/kWp/year even after more than seven years of operation.

[ver más...](#)

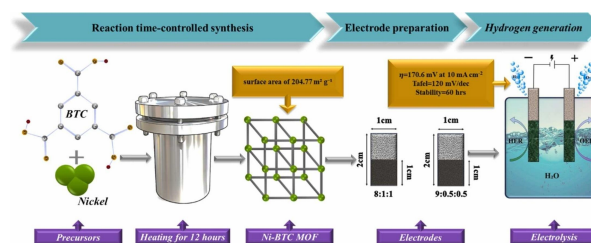


Reaction time-controlled Ni-BTC MOF for sustainable hydrogen evolution catalyst

Etiqueta: HEA-based catalysis | Publicada el 21/06/2026

Designing efficient and robust electrocatalysts is essential for sustainable hydrogen production via water electrolysis. In this work, a reaction time-controlled, morphology-tailored Ni-BTC MOF, synthesized over 12 h, is developed as an effective electrocatalyst for the HER.

[ver más...](#)

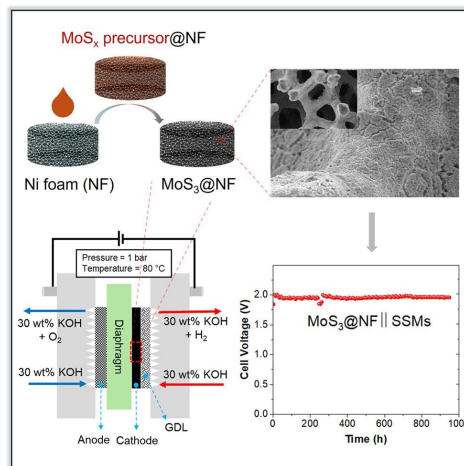


Scalable conformal MoS_x catalyst for efficient hydrogen evolution at industrial-level current density in alkaline electrolyzers

Etiqueta: High-efficiency electrolyzers | Publicada el 21/06/2026

Green hydrogen derived from renewable-powered water electrolysis is central to carbon neutrality and future low-carbon energy systems. Although alkaline water electrolyzers (AWEs) have achieved megawatt-scale deployment, they are still limited by low current density and energy efficiency, impeding cost-effective hydrogen production.

[ver más...](#)



PATENTES

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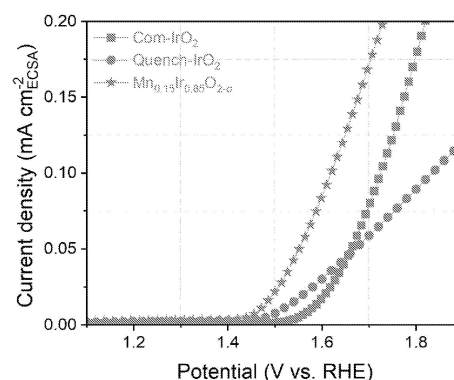
An iridium-based electrocatalyst and method of forming the same

Etiqueta: Electrocatalysts | Publicada el 11/06/2026

There is provided an iridium oxide based electrocatalyst comprising manganese (Mn)-doped iridium oxide particles, wherein each of the Mn-doped iridium oxide particles comprises 1-25 wt % Mn based on the total mass of the manganese-doped iridium oxide particle, and wherein the electrocatalyst has a thermodynamic oxygen evolution reaction (OER) overpotential of ≤ 0.78 V. There is also provided an electrode assembly comprising the electrocatalyst, and a method of forming the electrocatalyst.

[ver más...](#)

Figure 1

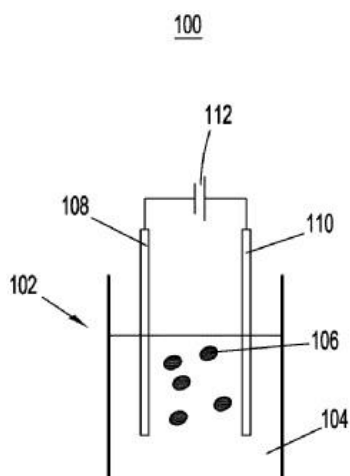


Electrochemical reduction of sulfur from sulfur-containing solid carbon-based materials

Etiqueta: Electrocatalysts | Publicada el 28/05/2026

A process for removing sulfur from a sulfur-containing solid carbon-based material includes adding a sulfur-containing solid carbon-based material to an aqueous electrolyte solution comprising an effective amount of an electrolyte in an electrochemical cell, and subjecting the aqueous electrolyte solution to an effective voltage and current to at least partially oxidize at least a portion of sulfur in the sulfur-containing solid carbon-based material.

[ver más...](#)

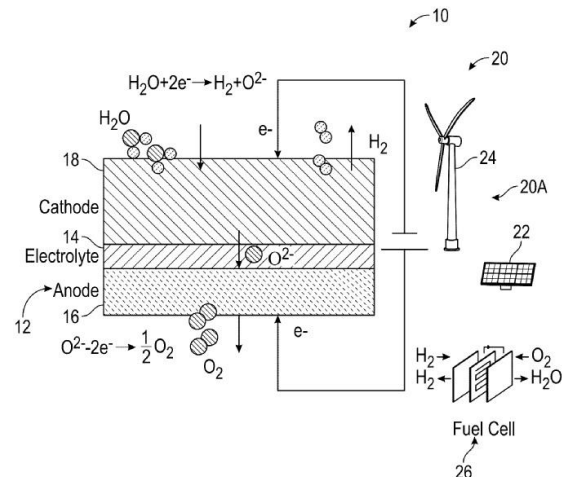


Hydrogen production unit having solid oxide electrolyzer cells (soecs) using proton exchange membrane (pem) fuel cells

Etiqueta: High-efficiency electrolyzers | Publicada el 28/05/2026

A green hydrogen production unit may have at least one solid oxide electrolyzer cell (SOEC) to generate hydrogen gas from water by electrolysis. A green power supply may be coupled to the at least one SOEC. A green back-up power supply may be coupled to the at least one SOEC.

[ver más...](#)

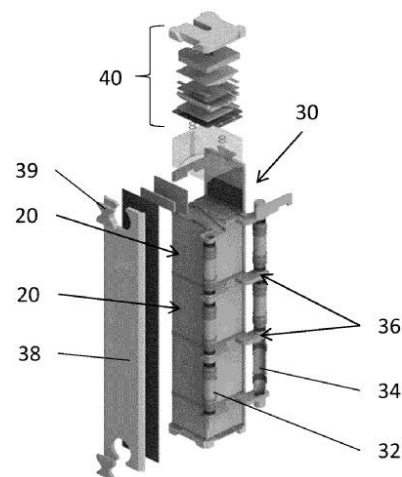


Strontium-rich lsm air electrode for solid oxide electrochemical cell

Etiqueta: High-efficiency electrolyzers | Publicada el 14/05/2026

A solid oxide electrochemical cell includes a solid oxide electrolyte, a fuel electrode located on a first side of the solid oxide electrolyte, and an air located on a second side of the solid oxide electrolyte. The air electrode includes strontium-rich lanthanum strontium manganite.

[ver más...](#)

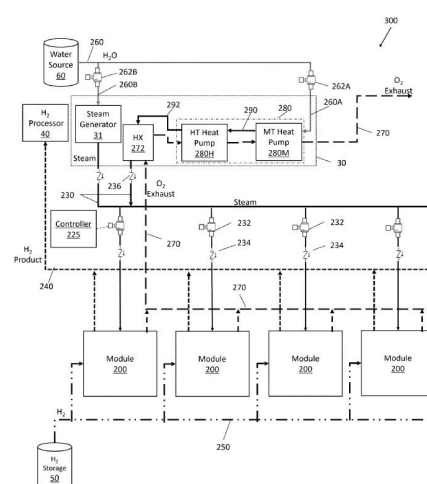


Electrolyzer system including a heat pump and method of operating thereof

Etiqueta: High-efficiency electrolyzers | Publicada el 07/05/2026

An electrolyzer system includes stacks of electrolyzer cells configured receive steam and air, and output a hydrogen product stream and an oxygen exhaust stream, and a first heat pump configured to extract heat from the oxygen exhaust stream to generate a first portion of the steam provided to the stacks.

ver más...



PROYECTOS

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US firm secures \$4.5m to develop quantum-designed hydrogen catalysts with less iridium

Etiqueta: HEA-based catalysis | Publicada el 16/06/2026

UK- and US-based Phasecraft has secured \$4.5m from the US Department of Energy (DOE) to develop quantum algorithms aimed at discovering new catalysts for hydrogen production that reduce reliance on iridium, one of the world's rarest metals. The funding comes from the DOE's Advanced Research Projects Agency-Energy, which launched a programme to advance solutions to chemistry and materials science problems using quantum computing.

[ver más...](#)



Vulcan Energy advances Frankfurt lithium refinery project with NESI's electrolysis technology

Etiqueta: High-efficiency electrolyzers | Publicada el 08/05/2026

NORAM Electrolysis Systems Inc. (NESI), a Vancouver-based clean technology company advancing industrial electrochemical processing, is marking a major international commercialization milestone as construction begins on Vulcan Energy Resources' Central Lithium Plant at Infraser Industrial

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MERCADO

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Electrolyzers Market Report 2026

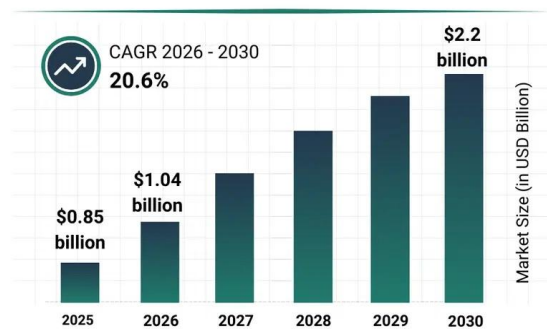
Etiqueta: Hydrogen production | Publicada el 01/07/2026

The electrolyzers market size has grown exponentially in recent years. It will grow from \$0.85 billion in 2025 to \$1.04 billion in 2026 at a compound annual growth rate (CAGR) of 21.5%. The growth in the historic period can be attributed to government support for hydrogen initiatives, early deployment in industrial gas production, increasing pilot green hydrogen projects, growth in renewable power generation, advancements in electrolysis technologies.

[ver más...](#)

Electrolyzers Market Report 2026

The Business Research Company

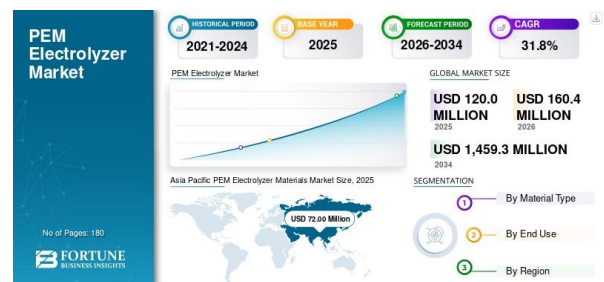


PEM Electrolyzer Materials Market Size, Share & Industry Analysis

Etiqueta: Electrocatalysts | Publicada el 22/06/2026

The PEM electrolyzer materials market size was valued at USD 120.0 million in 2025. The market is projected to grow from USD 160.4 million in 2026 to USD 1,459.3 million by 2034, exhibiting a CAGR of 31.8% during the forecast period. Asia Pacific dominated the PEM electrolyzer materials market with a market share of 60% in 2025.

[ver más...](#)

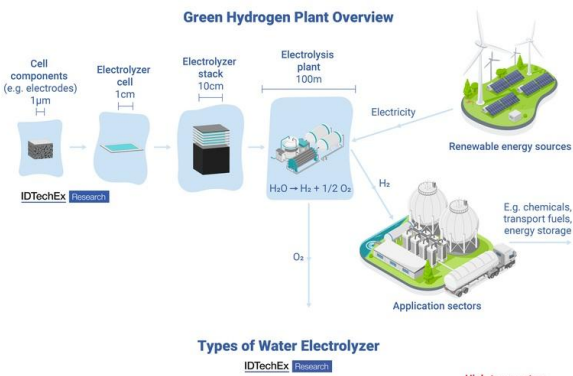


Green Hydrogen Production & Electrolyzer Market 2027-2037

Etiqueta: UTES (Underground Thermal Energy Storage) |
Publicada el 21/06/2026

As global decarbonization efforts accelerate, green hydrogen is emerging as an important solution for reducing emissions across hard-to-abate sectors that are difficult to electrify. IDTechEx forecasts the global green hydrogen market will reach US\$166 billion by 2037, growing at a CAGR of 48%.

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EVENTOS

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World hydrogen Summit and Exhibition

Etiqueta: Hydrogen production | Publicada el 21/06/2026

Brought to you by the Sustainable Energy Council and RX Global, in partnership with the Dutch Government, the Province of South Holland, the City of Rotterdam and the Port of Rotterdam, World Hydrogen is recognised as the official meeting place where hydrogen deals get done and key partnerships are forged. Progress must be assessed and benchmarked against industry and decarbonisation goals – are we on track? Join 10,000 global industry experts to exchange key insights, build new alliances and sign bold agreements that will kickstart the next wave of hydrogen project developments into the 2030s.

[ver más...](#)



Hydrogen Technology World Expo

Etiqueta: Electrocatalysts | Publicada el 01/06/2026

Hydrogen Technology World Expo and Carbon Capture Technology World Expo are the must-attend conferences and exhibitions dedicated to discussing advanced technologies and innovations for low-carbon hydrogen production.

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REPORTES

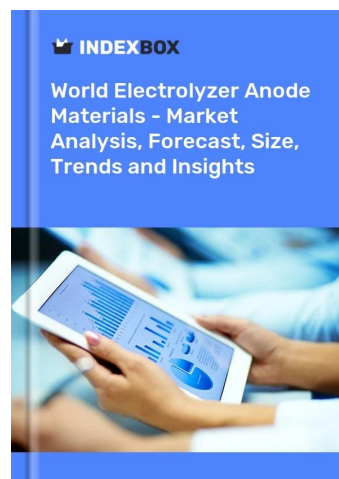
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World Electrolyzer Anode Materials Trends and Insights

Etiqueta: HEA-based catalysis | Publicada el 01/07/2026

This report provides an in-depth analysis of the Electrolyzer Anode Materials market in the World, including market size, structure, key trends, and forecast. The study highlights demand drivers, supply constraints, and competitive dynamics across the value chain. The analysis is designed for manufacturers, distributors, investors, and advisors who require a consistent, data-driven view of market dynamics and a transparent analytical definition of the product scope.

[ver más...](#)



Global Hydrogen Review 2026

Etiqueta: Hydrogen production | Publicada el 18/06/2026

The IEA's Global Hydrogen Review 2026 provides an update on hydrogen production and demand worldwide and identifies the latest developments relating to policy, infrastructure, trade, investments and innovation. The report is an output of the Clean Energy Ministerial Hydrogen Initiative and is intended to provide an update to energy sector stakeholders on the status and future prospects of hydrogen, and to inform discussions at the Hydrogen Energy Ministerial Meeting organised by Japan.

[ver más...](#)





NORMATIVAS

Edición n°2 | julio de 2026 | set.usm.cl

Infrastructure & Energy Europe – Regulatory Compass Q2 2026

Etiqueta: Hydrogen production | Publicada el 07/07/2026

This newsletter provides you with timely insights on key regulatory developments across Europe, as well as industry highlights of recent publications from our team. Our goal is to keep you informed of the latest trends, challenges and opportunities in the energy and infrastructure sectors – helping you anticipate changes, navigate complex regulations and make informed decisions for your business.

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