

Low energy and high efficiency hydrogen generation through water electrolysis

CSIC and the Polytechnic University of Valencia have developed a water electrolysis system that, thanks to an innovative structure of the electrodes, allows concentrating the electric field in the desired areas in order to facilitate the dissociation of the electrolyte, maximizing the efficiency of the reaction and reducing the voltage requirement and the energy consumption.

Industrial partners are being sought to collaborate through a patent licence agreement to use the technology in the electrochemical industry or in the production of hydrogen through water electrolysis.

An offer for Patent Licensing

Generation of hydrogen with reduced energy input

Water electrolysis is currently the most common method to obtain hydrogen, which is regarded as the fuel of the future due to its clean combustion (without CO₂ emission). In order to support the energy transition there is a need for high efficiency and low cost methods to produce hydrogen.

By introducing a new method to structure the electrodes, this invention reduces the voltage difference that is needed for the reaction while maximizes the concentration of the electric field in areas apart from the surface of the electrodes. This facilitates the electrolysis reaction while allowing the use of thinner electrodes without compromising its resistance or durability. Furthermore, the method can work with electrodes in multiple shapes and structures, so can be adapted to any required specifications.



Hydrogen can be produced through water electrolysis while avoiding the generation of polluting byproducts

Main innovations and advantages

- Facilitates the reactions of electrolysis by reducing the required voltage input.
- Avoids overcharging the surface of the electrodes by redirecting electric charges to other areas, improving their resistance.
- The structure of the electrodes can be easily adapted to any application requirements.
- Its main field of application is the water electrolysis for the generation of hydrogen gas, that can be used as a clean (CO₂-free) fuel.
- Other possible fields of application include: the deposition of atoms in surfaces or layers, the electrochemical reduction of CO₂ to methanol, or the chemical synthesis of a variety of molecules.

Patent Status

Priority patent application filed suitable for international extension

For more information, please contact:

Marc Escamilla

Deputy Vice-Presidency for Knowledge Transfer

Spanish National Research Council (CSIC)

Tel.: (+34) 96 161 29 95

E-mail: m.escamilla@dicv.csic.es
comercializacion@csic.es