



Hydrogen Europe: European Hydrogen & Fuel cell Project Database

Project PECDEMO

Photoelectrochemical Demonstrator Device for Solar Hydrogen Generation

To address the challenges of solar energy capture and storage in the form of a chemical fuel, we will develop a hybrid photoelectrochemical-photovoltaic (PEC-PV) tandem device for light-driven water splitting. This concept is based on a visible light-absorbing metal oxide photoelectrode, which is immersed in water and placed in front of a smaller-bandgap thin film PV cell. This tandem approach ensures optimal use of the solar spectrum, while the chemically stable metal oxide protects the underlying PV cell from photocorrosion. Recent breakthroughs have brought metal oxide photoelectrodes close to the efficiency levels required for practical applications. We will use our extensive combined expertise on nanostructuring, photon management, and interface engineering to design innovative ways to solve the remaining bottlenecks, and achieve a solar-to-H₂ (STH) energy conversion efficiency of 10% for a small area device, with less than 10% performance decrease over 1000 h. In parallel, our academic and industrial partners will collaborate to develop large-area deposition technologies for scale-up to ≥ 50 cm². This will be combined with the large-area PV technology already available within the consortium, and used in innovative cell designs that address critical scale-up issues, such as mass transport limitations and resistive losses. The finished design will be used to construct a water splitting module consisting of 4 identical devices that demonstrates the scalability of the technology. This prototype will be tested in the field, and show a STH efficiency of 8% with the same stability as the small area device. In parallel, our partners from industry and research institutions will work together on an extensive techno-economic and life-cycle analysis based on actual performance characteristics. This will give a reliable evaluation of the application potential of photoelectrochemical hydrogen production, and further strengthen Europe's leading position in this growing field.

Project Information

Type of project : Research

Timing : 01/04/2014 > 31/03/2017

Project website: <http://www.pecdemo.eu>

Project Budget : 3.337.683 €

Funding

European Union through FCH JU: Grant agreement 621252 - [CORDIS link](#)

Project partners

Coordinator :

HELMHOLTZ-ZENTRUM BERLIN FUR MATERIALIEN UND ENERGIE GMBH

Partners :

EPFL - Ecole Polytechnique Fédérale de Lausanne

DLR - German Aerospace Center

TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY

UNIVERSIDADE DO PORTO

EVONIK INDUSTRIESAG

SOLARONIX SA

Sub project(s)

Sub project 1

Country: Germany

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Sub project categories

Research

Project Id: 1061

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