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Fundamentals Of Photocatalytic Splitting of Water

Fact Sheet

Project Information

FOPS-water

Grant agreement ID: 336679

Project closed

Start date
1 March 2014

End date
28 February 2019

Funded under
Specific programme: "Ideas" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Total cost
€ 1 498 800,00

EU contribution
€ 1 498 800,00

Coordinated by
UNIVERSITAT WIEN
Austria

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RESULTS PACK

Frontier chemistry: Helping to achieve a truly green and circular economy for Europe

2 June 2021

Objective

Hydrogen produced by sunlight is a very promising, environmentally-friendly energy source as an alternative for increasingly scarce and polluting fossil fuels. Since the discovery of hydrogen production by photocatalytic water dissociation on a titanium dioxide (TiO2) electrode 40 years ago, much research has been aimed at increasing the process efficiency. Remarkably, insights into how water is bound to the catalyst and into the dynamics of the photodissociation reaction, have been scarce up to now, due to the lack of suitable techniques to interrogate water at the interface. The aim of this proposal is to provide these insights by looking at specifically the molecules at the interface, before, during and after their photo-reaction. With the surface sensitive spectroscopic technique sum-frequency generation (SFG) we can determine binding motifs of the ~monolayer of water at the interface, quantify the heterogeneity of the water molecules at the interface and follow changes in water molecular structure and dynamics at the interface during the reaction. The structure of interfacial water will be studied using steady-state SFG; the dynamics of the water photodissociation will be investigated using pump-SFG probe spectroscopy. At variable delay times after the pump pulse the probe pulses will interrogate the interface and detect the reaction intermediates and products. Thanks to recent developments of SFG it should now be possible to determine the structure of water at the TiO2 interface and to unravel the dynamics of the photodissocation process. These insights will allow us to relate the interfacial TiO2-water structure and dynamics to reactivity of the photocatalyst, and to bridge the gap between the fundamentals of the process at the molecular level to the efficiency of the photocatalys. The results will be essential for developing cheaper and more efficient photocatalysts for the production of hydrogen.

Fields of science (EuroSciVoc)

natural sciences > chemical sciences > catalysis > **photocatalysis**

natural sciences > chemical sciences > inorganic chemistry > **transition metals** engineering and technology > environmental engineering > energy and fuels > renewable energy > **hydrogen energy**

natural sciences > physical sciences > optics > **spectroscopy**

Programme(s)

FP7-IDEAS-ERC - Specific programme: "Ideas" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

Topic(s)

ERC-SG-PE4 - ERC Starting Grant - Physical and Analytical Chemical sciences

Call for proposal

ERC-2013-StG
See other projects for this call

Funding Scheme

ERC-SG - ERC Starting Grant

Host institution

UNIVERSITAT WIEN

EU contribution

€ 1 498 800,00

Total cost

No data

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UNIVERSITATSRING 1
1010 Wien
Austria

Region

Ostösterreich > Wien > Wien

Activity type

Higher or Secondary Education Establishments

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV

EU contribution

€ 1 498 800,00

Total cost

No data

Address

HOFGARTENSTRASSE 8
80539 Munchen
Germany

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Bayern > Oberbayern > München, Kreisfreie Stadt

Activity type

Research Organisations

Links

Contact the organisation Website
Participation in EU R&I programmes
HORIZON collaboration network

Beneficiaries (2)

UNIVERSITAT WIEN

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€ 1 498 800,00

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Activity type

Higher or Secondary Education Establishments

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[Contact the organisation] [Website]
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MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG DER WISSENSCHAFTEN EV

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EU contribution

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Total cost

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