



Hydrogen Europe: European Hydrogen & Fuel cell Project Database

Project ELECTRA

ELECTRA

High temperature electrolyzers (HTEs) produce H₂ efficiently utilising electricity from renewable sources and steam from solar, geothermal, or nuclear plants. CO₂ can be co-electrolysed to produce syngas and fuels. The traditional solid oxide electrolyser cell (SOEC) leaves wet H₂ at the steam side. ELECTRA in contrast develops a proton ceramic electrolyser cell (PCEC) which pumps out and pressurises dry H₂ directly. Delamination of electrodes due to O₂ bubbles in SOECs is alleviated in PCECs. The proton conductor is based on state-of-the-art Y:BaZrO₃ (BZY) using reactive sintering for dense large-grained films, low grain boundary resistance, and high stability and mechanical strength. A PCEC can favourably reduce CO₂ to syngas in co-ionic mode. Existing HTEs utilise the high packing density of planar stacks, but the hot seal and vulnerability to single cell breakdown give high stack rejection rate and questionable durability and lifetime economy. ELECTRA uses instead tubular segmented cells, mounted in a novel module with cold seals that allows monitoring and replacement of individual tubes from the cold side. The tubes are developed along 3 design generations with increasing efforts and rewards towards electrochemical performance and sustainable mass scale production. Electrodes and electrolyte are applied using spraying/dipping and a novel solid state reactive sintering approach, facilitating sintering of BZY materials. ELECTRA emphasises development of H₂O-O₂ anode and its current collection. It will show a kW-size multi-tube module producing 250 L/h H₂ and CO₂ to syngas co-electrolysis with DME production. Partners excel in ceramic proton conductors, industry-scale ceramics, tubular electrochemical cells, and integration of these in renewable energy schemes including geothermal, wind and solar power. The project counts 7 partners (4 SMEs/industry), is coordinated by University of Oslo, and runs for 3 years.

Project Information

Type of project : Research

Timing : 03/03/2014 > 02/06/2017

Project website: <http://www.mn.uio.no/smn/english/research/projects/chemistry/electra/index.html>

Project Budget : 4.007.084 €

Funding

European Union through FCH JU: Grant agreement 621244 - [CORDIS link](#)

Project partners

Coordinator :

UNIVERSITETET I OSLO

Partners :

Stiftelsen SINTEF

Abengoa Innovación

AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS

MARION TECHNOLOGIES S.A.

COORSTEK MEMBRANE SCIENCES AS

CRI EHF

Sub project(s)

Sub project 1

Country: Norway

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Sub project categories

Research

Project Id: 954

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