**Objective**

The development of Solid Oxide Fuel Cells (SOFCs) operating on hydrocarbon fuels (natural gas, biofuel, LPG) is the key to their short to medium term broad commercialization. The development of direct HC SOFCs still meets lot of challenges and problems arising from the fact that the anode materials operate under severe conditions leading to low activity towards reforming and oxidation reactions, fast deactivation due to carbon formation and instability due to the presence of sulphur compounds. Although research on these issues is intensive, no major technological breakthroughs have been so far with respect to robust operation, sufficient lifetime and competitive cost.

T-CELL proposes a novel electrochemical approach aiming at tackling these problems by a comprehensive effort to define, explore, characterize, develop and
realize a radically new triode approach to SOFC technology together with a novel, advanced architecture for cell and stack design. This advance will be accomplished by means of an integrated approach based both on materials development and on the deployment of an innovative cell design that permits the effective control of electrocatalytic activity under steam or dry reforming conditions. The novelty of the proposed work lies in the pioneering effort to apply Ni-modified materials electrodes of proven advanced tolerance, as anodic electrodes in SOFCs and in the exploitation of our novel triode SOFC concept which introduces a new controllable variable into fuel cell operation.

In order to provide a proof of concept of the stackability of triode cells, a triode SOFC stack consisting of at least 4 repeating units will be developed and its performance will be evaluated under methane and steam co-feed, in presence of a small concentration of sulphur compound.

Success of the overall ambitious objectives of the proposed project will result in major progress beyond the current state-of-the-art and will open entirely new perspectives in cell and stack designs.

Field of science

/engineering and technology/environmental engineering/energy and fuels/biofuels
/engineering and technology/environmental engineering/energy and fuels/fossil energy/gas
/natural sciences/chemical sciences/electrochemistry/electrolysis
/engineering and technology/environmental engineering/energy and fuels/fuel cell
/engineering and technology/environmental engineering/energy and fuels

Programme(s)

Call for proposal

FCH-JU-2011-1

Funding Scheme

JTI-CP-FCH - Joint Technology Initiatives - Collaborative Project (FCH)

Coordinator
Participants (7)

IDRYMA TECHNOLOGIAS KAI EREVNAS
Greece
EU contribution
€ 294 600
Address
N Plastira Str 100
70013 Irakleio
Website Contact the organisation
Administrative Contact
Andreas Plagakis (Mr.)

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS
France
EU contribution
€ 173 440
Address
Rue Michel Ange 3
75794 Paris
Website Contact the organisation
Administrative Contact
Sandrine Magnetto (Ms.)

ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE
Switzerland
EU contribution
€ 182 400
AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS
Spain
€ 256,363

MANTIS DEPOSITION LIMITED
United Kingdom
€ 143,531

Prototech AS
Norway
€ 150,933
Administrative Contact

Ivar Wærnhus (Dr.)

SOLIDPOWER SPA

Italy

EU contribution
€ 231 600

Address
Viale Trento 115/117
38017 Mezzolombardo Tn

Activity type
Private for-profit entities
(excluding Higher or Secondary Education Establishments)

Contact the organisation

Administrative Contact

Alberto Ravagni (Dr.)

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