



# Hydrogen Europe: European Hydrogen & Fuel cell Project Database

## Project IRAFC

Development of an Internal Reforming Alcohol High Temperature PEM Fuel Cell Stack

The main objective of the proposal is the development of an internal reforming alcohol high temperature PEM fuel cell. Accomplishment of the project objective will be made through:

- Design and synthesis of robust polymer electrolyte membranes for HT-PEMFCs, which will be functional within the temperature range of 190-220oC.
- Development of alcohol (methanol or ethanol) reforming catalysts for the production of CO-free hydrogen in the temperature range of HT PEMFCs, i.e. at 190-220oC.
- Integration of reforming catalyst and high temperature MEA in a compact Internal Reforming Alcohol High Temperature PEMFC (IRAFC). Integration may be achieved via different configurations as related to the position of the reforming catalyst. The proposed compact system does away with conventional fuel processors and allows for efficient heat management, since the “waste” heat produced by the fuel cell is in-situ utilized to drive the endothermic reforming reaction. The targeted power density of the system is 0.15 W/cm<sup>2</sup> at a cell voltage of 0.7 V. Thus, the concepts of a catalytic reformer and of a fuel cell are combined in a single, simplified direct alcohol (e.g. methanol) High Temperature PEM fuel cell reactor. The heart of the system is the membrane electrode assembly (MEA) comprising a high-temperature proton-conducting electrolyte sandwiched between the anodic (reforming catalyst + Pt/C) and cathodic Pt/C gas diffusion electrodes. According to the configuration and the operating conditions described above, the IRAFC is expected to be autothermal, highly efficient and with zero CO emissions. In addition, the direct consumption of H<sub>2</sub> by the MEA (fuel cell) and the electrochemical promotion effect is expected to enhance the kinetics of reforming reactions, thus facilitating the efficient operation of the reforming catalyst at temperatures below 220°C.

## Project Information

**Type of project :** Research

**Timing :** 01/01/2010 > 30/06/2013

**Project Budget :** 2.427.821 €

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## Funding

European Union through FCH JU: [Grant agreement 245202 - CORDIS link](#)

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## Project partners

**Coordinator :**

[Advanced Energy Technologies \('Advent'\)](#)

**Partners :**

[Nedstack fuel cell technology B.V.](#)

[CNRS - Centre National de la Recherche Scientifique](#)

[FORTH/ICEHT - Foundation for Research and Technology - Hellas/ Institute of Chemical Engineering Sciences](#)

[UNIWERSYTET MARIII CURIE-SKLODOWSKIEJ](#)

[INSTITUT FUER MIKROTECHNIK MAINZ GMBH](#)

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[Sub project\(s\)](#)

**Sub project 1**

**Country:** Greece

**Address:**

KIFISIAS 44 KTIRIOU B 15125 Athens

**Sub project categories**

Research

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Project Id: 1029

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