Hydrogen Europe:
European Hydrogen & Fuel cell Project Database

Project BeingEnergy

Integrated low temperature methanol steam reforming and high temperature polymer electrolyte membrane fuel cell

Hydrogen is foreseen to be the energy vector of the future. However, there are still significant barriers to store and transport hydrogen, especially in small portable applications. The success of a portable Fuel Cell system depends to a large extent on the fuel supply that should be accomplished in a cost-effective and comfortable manner. The present project proposes a power supply comprising a methanol steam reformer and high temperature polymer electrolyte membrane fuel cell (HT-PEMFC) operating at the same temperature. The heat integration of these two units originates an increase of up to 14% of the overall efficiency; when reformer and fuel cell operate at the same temperature, the heat involved in the endothermic steam reforming reaction can be supplied by the highly exothermic fuel cell. Moreover, the heat integration also originates a much simpler and compact unit and then robust power supply that can meet and exceed the targets defined by the project call. Because the catalyst characteristics and the low operating temperature, the reformer originates a reformate stream poor in CO (<0.1%), which increases the performance and lifetime of the fuel cell. This remarkable improvement is primarily possible because the development achieved by a team member of a very high active methanol steam reforming catalyst family that can catalyze effectively this reaction at temperatures as low as 170°C. The new integrated power supply will be a landmark in the development of a fuel cell power supply for mass consumption. Additionally, it is considered the development and study of a composite palladium membrane for incorporating in the reformer and of an ionic liquid supported polymer membrane selective for CO2 removal from reformate streams operating up to 200°C and the characterization of developed catalysts towards the low temperature steam reforming of dimethyl ether. These are fundamental developments needed for the foreseen new generation of combined power supplies.

Project Information

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Timing : 01/09/2012 > 29/02/2016
Project website: http://www.beingenergy.eu/
Project Budget : 4.220.423 €

Funding

European Union through FCH JU: **Grant agreement 303476 - CORDIS link**

Project partners

Coordinator :
UNIVERSIDADE DO PORTO
Partners :
DLR - German Aerospace Center
Teknologian tutkimuskeskus VTT Oy
CNR - Consiglio Nazionale delle Ricerche
SerEnergy A/S
UNIVERSITAT POLITECNICA DE VALENCIA
INOVAMAIS - SERVICOS DE CONSULTADORIA EM INOVACAO TECNOLOGICA S.A.
RHODIA OPERATIONS

Sub project(s)

Sub project 1

Country: Portugal
Address:
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Sub project categories
Research

Project Id: 917
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