

GENERAL CONTEXT

The **solid polymer electrolyte direct methanol fuel cell** (DMFC) is a relatively recent addition to the suite of fuel cell technologies; it was initially developed in the early 1990s by researchers at several institutions in the United States, including NASA, JPL and LANL, and in Europe by Siemens, IRD and various research organizations. It is similar to the PEM cell in that it uses a polymer membrane as an electrolyte. However, the platinum-ruthenium catalyst in the DMFC anode is able to oxidize methanol, eliminating the need for a fuel reformer. Therefore methanol can be used directly as fuel, hence the name.

Methanol offers **several advantages as a fuel**. It is inexpensive but has a relatively high energy density and can be easily transported and stored. It can be supplied to the fuel cell unit from a liquid reservoir which can be kept topped up, or in cartridges which can be quickly changed out when spent.

DMFCs operate in the temperature range from **60°C to 180°C**, depending on the solid polymer electrolyte, and tend to be used in applications with **small power requirements**, such as mobile electronic devices or chargers portable power packs and assisted power units. One particular application for DMFCs is the use of DMFC **power units** for materials handling **vehicles**. A number of these units have been sold to commercial warehouses, where the forklift trucks had been conventionally powered with battery packs. By switching to fuel cells, the warehouses can refuel their trucks in a matter of minutes, compared to the hours it would take to charge a battery.

DURAMET PARTNERS

DURAMET involves university, research organisations and industrial partners from five EU member states.

- National Council of Research Institute for Advanced Energy Technologies, Italy 
- Centre National de la Recherche Scientifique, ICGM Montpellier, France 
- Fumatech - Funktionelle Membranen und Anlagentechnologie, Germany 
- Centro Ricerche FIAT, Italy 
- Technische Universität München 
- IRD Fuel Cells, Denmark 
- Politecnico di Torino, Italy 
- PRETEXO, France 
- JRC-IET: Joint Research Centre, Institute for Energy and Transport, The Netherlands 

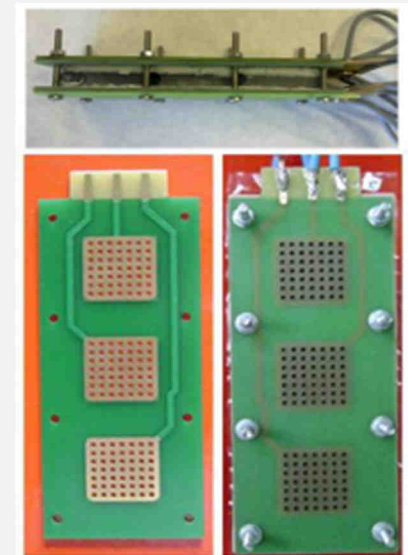
More information about the project and partners on: www.duramet.eu

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Contract n° 278054



Improved Durability and Cost-effective Components for New Generation Solid Polymer Electrolyte Direct Methanol Fuel Cells



Monopolar plates and DMFC ministack operating under passive mode for portable applications

FCH-JU & FP7 funded Project



DURAMET PROJECT OBJECTIVES

The main objective of **DURAMET** is to develop improved durability and cost-effective components for direct methanol fuel cells for application in portable power and assisted power units as well as for remote generation.

The project concerns with the development of DMFC components for application in auxiliary power units (APU) as well as for portable systems. The project covers the following topics:

- **Characterisation and test protocols** including accelerated tests for membranes, catalysts, MEAs and short-stacks;
- **Development of innovative membranes** (high temperature and low temperature) for different DMFC applications;
- **Validation of Membranes and Catalysts in MEAs:** development of **MEAs**, evaluation of their **performance** and **durability** over a range of temperatures for the different applications;
- **Stack Development and Testing:** assessment of DMFC materials under **practical conditions**. Two approaches are pursued: **high temperature APU applications and low temperature portable uses**.

The final target of the project is to demonstrate the enhanced performance and durability of the newly developed or optimized DMFC components, i.e. catalysts, membranes and MEAs, in single cells and in appropriate short stacks with realistic cell area and under practical operation for the different applications.

DURAMET OUTPUT

Direct Methanol Fuel Cells (DMFC) is the first commercial type of fuel cells and more than 20.000 systems are used in everyday applications worldwide such as Recreational Vehicles (RVs), remote power generation, telecom, military applications etc.

Transportation



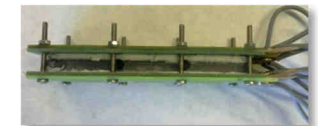
industrial production of polymer membranes



Assisted Power Units



Portable Power Sources



Distributed and remote distribution of electrical energy