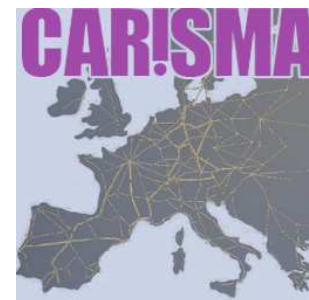




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# CARISMA



Coordination Action of Research on  
Intermediate and high temperature  
Specialised Membrane electrode Assemblies

(Contract number 039041)

***Centre National de la Recherche Scientifique,  
Montpellier, France***

***Jacques Rozière***

***Coordinator: Deborah Jones***



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# Rationale - Why CARISMA ?

- 20 years of European Commission funding of research projects on PEMFC
- Separate actions and initiatives on regional, national, European levels
- No mechanism in Europe of clustering a critical mass of its researchers on high temperature membranes and membrane electrode assemblies
  - no Thematic Network, Coordination Action, or Network of Excellence in the field of MEAs or MEA components
  - Missed opportunities for discussions of roadblocks and possible solutions
- **No "Working Group" with European identity**
- Separate initiatives give a fragmented research effort, and some duplication
- High temperature membranes, catalysts and MEAs are highly challenging goals



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# Aims and Ambitions of CARISMA

- **CARISMA: a means of improving interaction between groups by establishing a forum to integrate the research effort in Europe developing high temperature MEAs and their components**
- **CARISMA: assembles European research expertise from industry, research organisation and universities**
- **CARISMA: an expert group on high temperature MEAs to support the Commission and Hydrogen and Fuel Cell Platform, as and when needed (revisions to the HFP Strategic Research Agenda, Implementation Plan etc.)**
- **CARISMA: Increased impact of Community and nationally funded programmes**
- **CARISMA: means for communication and exchange with equivalent groups in other countries and continents (USA, Japan, China) – in particular IPHE countries**



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# Added value from CARISMA

- **For partners:** opportunities provided to network, interact, link with project partners through workshops, discussion groups etc., participate in symposia with equivalent groups in other continents, jointly identify tools, methodologies, share best practice, collaborate on cross-cutting areas
- **For Europe:** critical mass of high temperature MEA / MEA components researchers assembled, giving an identified European grouping and facilitating interaction of European research with groupings in Third Countries as well as an expert group for consultation and input to European research policy
- Start date: 1st January 2007
- Duration: 24 months
- EC contribution: 560,400 €, Total budget 1,017,560 €



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# Project partnership

## 38 partners

### Industrial partners

- Ionomers, membranes: Solvay-Solexis, PEMEAs, FuMA-Tech
- Catalysts, MEAs: Johnson-Matthey Fuel Cells, Umicore; Catalysts: Ilika
- Gas-diffusion layers: Freudenberg Fuel Cell Technologies; Carbon supports: Timcal
- Automotive OEM: Volkswagen and autobrane OEM partnership
- Distributed power generation: Electricité de France – Eifer
- Centre for Process Innovation Limited Ltd

### Research Organisations

- Centre National de la Recherche Scientifique
- Bulgarian Academy of Sciences, Sophia
- Commissariat à l'Energie Atomique
- Cidetec
- Consiglio Nazionale delle Ricerche
- Deutsches Zentrum für Luft- und Raumfahrt eV
- Energy research Centre of the Netherlands
- Forschungszentrum Juelich
- Forschungszentrum Geesthacht GKSS GmbH
- Kungliga Tekniska Hogskolan
- Max Planck Gesellschaft
- Technical University of Denmark
- Paul Scherrer Institut
- Zentrum für Sonnenenergie- und Wasserstoff-Forschung

### University partners

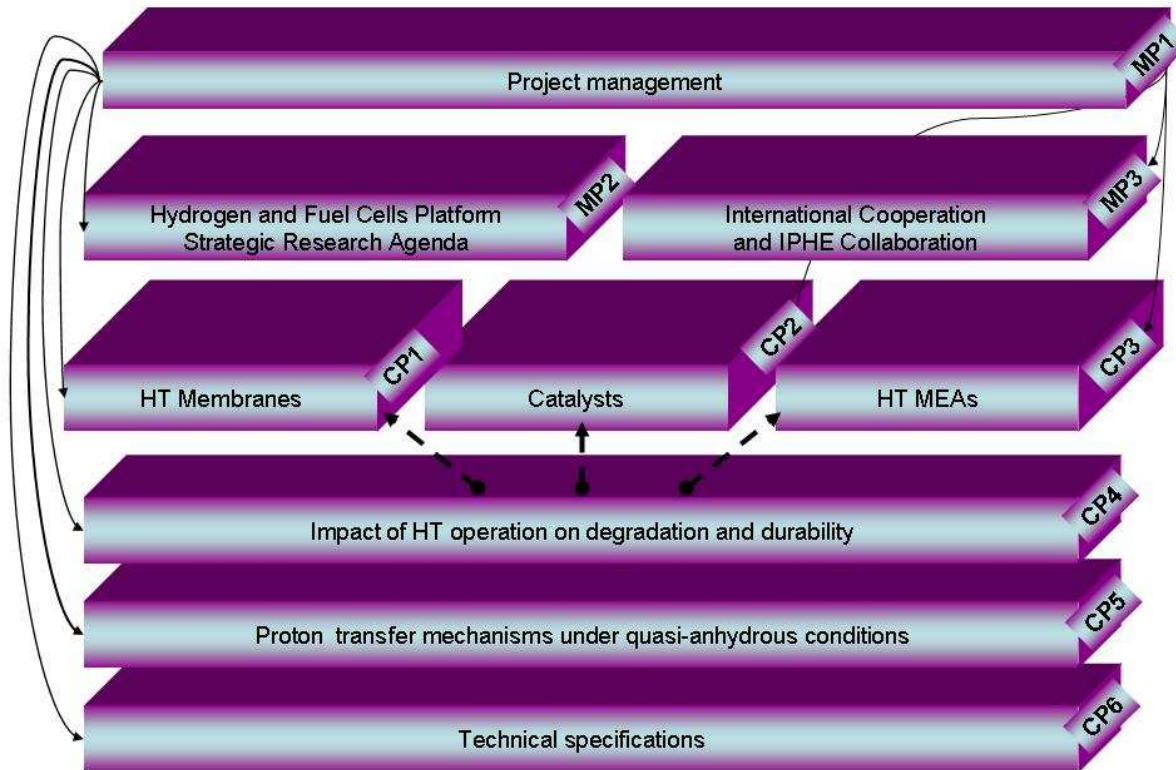
- Chalmers University of Technology
- Technical University of Denmark
- University of Perugia
- University of Helsinki
- University of Lund
- University of Stuttgart
- University of Newcastle upon Tyne
- University of Patras
- University of Rome La Sapienza
- University of Surrey
- Technical University of Munich
- University of Rome Tor Vergata
- University of Reading



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# CARISMA Project Structure



## ➔ CARISMA WPs on:

- HT MEAs and their components
- cross-cutting issues of degradation and mechanisms of proton transfer
- Interaction with HFP
- International cooperation

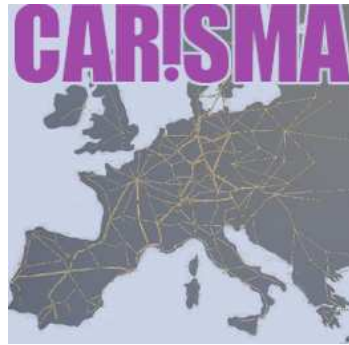


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# Approach to achieving objectives

- Workshops on WP topics, with workshop proceedings as topical issues of *Fuel Cells* and Round Tables to identify key issues and areas for collaboration
- Establish contact with networks in IPHE continents
- Internet site and Intranet area for document archive, shared workspace
- Newsletters (on-line and print)
- European-led International Conference series



# Achievements: workshops and schools

- **May '07: Workshop "Key issues for the improvement of activity and durability of catalysts for PEM fuel cells" (CP2 Workshop)**
- **July '07: Workshop "Degradation issues for MEAs and their components: tools, methodologies and recent results" (CP3/4 Workshop)**
- **November '07: School "Proton Conductors: materials and mechanisms" (CP1/5 School)**
- **November '07: Workshop "Ionomer membranes for medium and high temperature PEM fuel cells" (CP1/5 Workshop)**
- **January '08: "OEM demands for ideal fuel cell MEAs and comparison with technical state of the art - stationary and transport applications" (CP6 Workshop)**



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# Achievements: information sharing

- Through <http://www.carisma-network.eu> → login
- Knowledge Base = Archive of kick-off partner info posters, workshop presentations

The screenshot shows the 'Knowledge Base' website interface. On the left is a navigation menu with sections: 'General Menu' (Home, Preferences, About Knowledge Base, Logout), 'Knowledge Base Menu' (Main View, New Article, Add Question, Maintain Articles, Maintain Questions), and 'Preferences' (Preferences, Edit Categories). The main content area is titled 'Knowledge Base' and features a search bar with the text 'Search in all the Knowledge Base' and a 'Search' button. Below the search bar, it says 'You are in Meeting minutes'. There are three featured articles: 'Kick-off' (Posters, Presentations), 'Workshop on Degradation Issues for MEAS' (Minutes, Posters, Presentations), and 'Workshop on Fuel Cell Catalysts' (Minutes, Presentations). A section titled 'Articles in Meeting minutes and all its subcategories' shows a list of articles with details like '(93) Partner 23\_Solvay-Solexis', '(74) CEA presentation (Alejandro A. Franco)', '(92) Partner 28\_Univ. Of Helsinki', and '(91) Eifer presentation (Mathieu Marrony)'. On the right, there are two lists: 'Latest' (Partner 23\_Solvay-Solexis, Partner 28\_Univ. Of Helsinki, Eifer presentation) and 'Most viewed' (Johnson Matthey Fuel Cell presentation, Partner 31\_Paul-Scherrer-Institut, CNRS-LAMMI presentation).



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# Achievements: International links from CARISMA

→ **CARISMA presentation at US HTMWG** (high temperature membranes working group), **May 14, 2007, Arlington, VA, USA**



- **Joint CARISMA - US HTMWG meeting 10th October, 2007, Washington, USA**
- **Japanese and US representation at CP1 "Ionomer membranes" workshop, November 2007**
- **CARISMA – Japan Workshop in planning phase**



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# Alignment to Implementation Plan

## → IDA 1, transport:

- BR+AR - Action 6 (Membrane: lifetime, water management, lower costs)
- BR+AR – Action 7 (Catalyst: noble metal, activity, sensitivity (reformate gas), costs)
- BR+AR – Transport processes (Water transport in porous media)
- BR+AR - Action 9 (HT membrane: proton conductivity, temperature range, water uptake)

## → IDA 3, CHP and power generation:

- BR - Action 1 (Generic Fuel Cell Technology: Materials, layers and components for cells and stacks, industrially relevant manufacturing and testing methods and testing standards)



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# Cross-cutting issues: training and education, dissemination and public awareness

→ **CARISMA school**  
"Proton Conductors:  
materials and  
**mechanisms**",  
November 2007.  
Targeted audience:  
PhD students, post-  
doctoral researchers,  
young researchers

→ Dissemination of  
CARISMA activities  
through website:

The screenshot shows the CARISMA website interface. On the left, a purple navigation menu lists: home, about us, activities, ressources, contacts, links, and login. Below this is an "About Carisma" section with text describing the Carisma European Coordination Action as a forum for the integration of research in Europe for the development of high temperature MEAs for PEM fuel cells. A central image shows a car with a transparent body, revealing internal components. To the right, a light blue section titled "Carisma News" lists several news items with dates and "Read more" links. The top right corner features the "CARISMA" logo and a map of Europe with network connections.

- home
- about us
- activities
- ressources
- contacts
- links
- login

**About Carisma**  
The **Carisma European Coordination Action** is a forum for the **integration** of the research effort in Europe in the development of **high temperature MEAs for PEM fuel cells**. Integration and **interaction** between groups will be **enhanced** via a number of cornerstones that will underpin the R&D activities of the Coordination Action...  
[Read more](#)

**Carisma News**

- 12/09/2007 First Carisma newsletter issue is now available...[Read more](#)
- 11/09/2007 International Summer School - High Temperature Polymer Electrolyte Membrane Fuel Cells - organised by the FURIM consortium...[Read more](#)
- 04/09/2007 Open positions at Paul Scherrer Institut...[Read more](#)
- 18/07/2007 Registration form for Carisma School on "proton transport mechanisms", joined with Carisma Workshop on "Ionomer Membranes for Medium and High Temperature PEM Fuel Cells"...[Read more](#)
- 12/07/2007 Open position of Times for a Period...



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# CARISMA Newsletter

European Coordination Action for Research on Intermediate and High temperature Specialised Membrane electrode Assemblies

www.carisma-network.eu

July 2007 - Issue 1

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CARISMA Kick-Off Meeting, CNRS headquarters, Paris, 06th February 2007

CARISMA kicked-off on 6th February 2007 in a meeting of 80 participants at the Paris headquarters of the Centre National de la Recherche Scientifique. The kick-off meeting was the opportunity for the coordinator to present the basis for the project and its objectives, and to outline the programme of activities over the following 2 years. Descriptions of the state of the art and the background to each of the Work Packages were summarised by the respective Work Package Leaders, who also described the aims of each of the work packages and the timing of their networking activities and deliverables. The beginning of CARISMA coinciding with an open call for proposals to RTD Energy, the project officer Hugues van Heracker explained the opportunities for projects on the topics relevant to PEM fuel cells. The poster session was the scene of lively networking (see photo above) and the chance for each group to put on display something of its background, describe its research activities and recent research achievements. These discussions for some, went on long after the official close of the meeting, done in true French style with champagne to mark the beginning of the CARISMA coordination action.



# Cross-cutting issues: training and education, dissemination and public awareness

→ **CARISMA Newsletters**

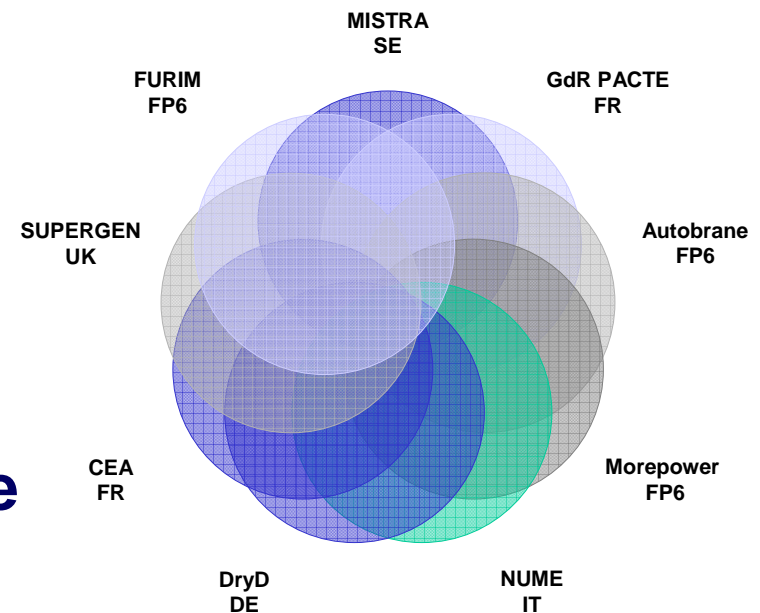


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# Collaborations and Enhanced Cooperation

- **CARISMA interfaces autobrane, FURIM, IPHE-GENIE, NextGenCell...at European level, as well as national and regional projects**
- **CARISMA coordinates with autobrane and autobrane's OEMs**
- **CARISMA has integrated new members into the workshop and networking activities since its inception (unfunded)**





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# International Collaborations

- **CARISMA has initiated interaction with the US HTMWG: joint meetings achieved in 2007 and planned 2008**
- **CARISMA-Japan workshop in planning phase**
- **CARISMA obtained IPHE recognition (September '07) to lever additional resources for international cooperation e.g. with the US "High Temperature Membranes" IPHE-recognised project**
- **CARISMA is already recognised amongst the US and Japanese fuel cell communities as a European Coordination Action on high temperature MEAs**
- **CARISMA networks IPHE-GENIE, with partners from China and Russia**



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# Project future perspectives

- CARISMA has taken firm hold during its first 9 months of existence
- Strong partner involvement substantiates the call for a networking action such as CARISMA
- CARISMA as a European high temperature PEMFC grouping is recognised in other continents
- 2 year project – a means should be found to preserve the CARISMA community after the project end
- International conference series on high temperature MEAs and their components initiated by CARISMA – first conference La Grande Motte, France, September 2008