

GRANT AGREEMENT: **N° 213389**
Project Acronym: **IDEAL-Cell**
Project Title: **Innovative Dual mEmbrAne fueL-Cell**

Funding Scheme: **Collaborative project**
Small of medium-scale focused research project



Date of latest version of Annex I against which the assessment will be made: **11/07/2009**



M24 – 8th of March, 2010

IDEAL-Cell project

Funded by the European Commission within the Seventh Framework Programme: 2008-2012

Project's coordinator:

Dr. Alain THOREL
ARMINES – Mines ParisTech
Boulevard Saint-Michel – 60
PARIS – CEDEX 06 – 75272 France
Tel.: 01 40 76 30 30 – Fax: 01 40 76 31 50 – E-mail: alain.thorel@ensmp.fr

Project website address: <http://www.ideal-cell.eu/>

Logo of the project:





ECOLE NATIONALE SUPERIEURE DES MINES DE PARIS
ARMINES – Centre des Matériaux Pierre Marie Fourt
10 rue Henry Desbrières BP 87
91003 Evry cedex



Summary

This technical report summarizes the final results from the implementation of WP3, which is subordinated to the target for the first part of the project (years 1 and 2) – “proof of the dual membrane fuel cell concept”. The objective of this Work Package concerns the development of the hydrogen conducting electrode/electrolyte couple applying: (i) preliminary selected materials (BCY15 for the electrolyte and BCY15-Ni cermet for the anode), produced inside the consortium and (ii) standard shaping technologies (tape casting and screen printing). BCY15 electrolyte material with high relative density (~ 95%), compositional homogeneity, stable performance in wet hydrogen atmosphere and very high level of conductivity in comparison with data from the literature (the best values measured are $6.6 \times 10^{-2} \text{ S cm}^{-1}$ and $1.6 \times 10^{-1} \text{ S cm}^{-1}$ at 600 °C and 700 °C respectively) was obtained. The registered oxygen conductivity could be also in favour for the central membrane performances. Although the anodes deposited on symmetrical half-cells by tape casting have appropriate microstructure, their ASR is not satisfactory on this stage of development due to chemical reactivity between BCY15 and NiO and needs further improvement. The developed BCY15 electrolyte was successfully applied in the fabrication of the “proof of concept” model cells (WP4). The obtained results will be used as a basis for further optimization of the anode/electrolyte couple in the dual membrane fuel cell during the second part (years 3 and 4) of the IDEAL-Cell project.