Hydrogen Europe:
European Hydrogen & Fuel cell Project Database

Project PEGASUS

PEMFC based on platinum Group metAl free StrUctured cathodeS

PEMFC is the fuel cell predilection technology for automotive applications with a large deployment horizon by 2025-30. However, the increasing use of fuel cell electrical vehicles is expected to lead to a quickly growing demand for Platinum Group Metals. PGM production is not only itself related to negative environmental impacts but also raises questions of long-term availability due to the limitation of reserves and Europe's economic dependence on the countries of the materials' origin. Hence, it is of strategic importance that the transition to PGM-free catalysts is made as quickly as possible to ensure Europe's competitive position and to reduce market pressure on the use of scarce noble metals. In that perspective, PEGASUS is exploring the removal of Pt and other critical raw materials and their replacement by non-critical elements enabling efficient and stable electro-catalysis for performing and durable PEMFCs. The overall aim of the project is to bring up the experimental proof of concept for novel catalysts with five underlying objectives supporting a full validation at single cell scale with a focus on the cathode side: 1) High performance, 2) durable and 3) low cost MEA using non-PGM catalysts-based cathode; 4) Robust test protocols for catalysts screening and 5) Understanding of degradation and prevention & mitigation strategies through a MEA design-driven approach. PEGASUS will benchmark (Metal-Nitrogen-Carbon) materials with variants of Carbon supports and Catalyst Layer designs in order to reach the best compromises between chemical activities and mass/charge transfer with the support of intensive experimentation and modelling. Two generations of non-CRM catalysts will be proposed. GEN1 will implement metals {Fe, Mn or Cu} with Nitrogen onto (1D, 2D and 3D) structured carbon support (single structuration). GEN2 will investigate the enhancement of dual-structuration (1D+3D and 2D+3D) on catalyst stability, reactant availability and water management.

Project Information

Type of project : Research
Timing : 01/02/2018 > 31/01/2021
Project Budget : 2.829.016 €

Funding

European Union through FCH JU: **Grant agreement 779550** - **CORDIS link**

Project partners

Coordinator :

CEA - Commissariat à l'énergie atomique et aux énergies alternatives

Partners :

DLR - German Aerospace Center
EWII Fuel Cells A/S (previously IRD)
TOYOTA MOTOR EUROPE NV/SA
MINES ParisTech/ARMINES PERSEE
TECHNISCHE UNIVERSITAET MUENCHEN
ECOLE NATIONALE SUPERIEURE DES MINES DE PARIS
AGENCIA ESTATAL CONSEJO SUPERIOR DEINVESTIGACIONES CIENTIFICAS
HERAEUS FUEL CELLS GMBH

Sub project(s)

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