# CAMELOT

## UNDERSTANDING CHARGE, MASS AND HEAT TRANSFER IN FUEL CELLS FOR TRANSPORT APPLICATIONS

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| **Project ID** | 875155 |
| **PRR 2024** | Pillar 3 – $H_2$ end uses: transport |
| **Call topic** | FCH-01-4-2019: Towards a better understanding of charge, mass and heat transports in new generation PEMFC MEA for automotive applications |
| **Project total costs** | EUR 2 295 783.50 |
| **FCH JU max. contribution** | EUR 2 295 783.50 |
| **Project start - end** | 1.1.2020–31.12.2023 |
| **Coordinator** | SINTEF AS, Norway |
| **Beneficiaries** | Albert-Ludwigs-Universität Freiburg, Bayerische Motoren Werke AG, Fast Simulations UG, Fuel Cell Powertrain GmbH, Johnson Matthey Hydrogen Technologies Ltd, Johnson Matthey plc, PowerCell Sweden AB, Pretexo, Technische Universität Chemnitz |

http://camelot-fuelcell.eu

### PROJECT AND GENERAL OBJECTIVES

Camelot brought together highly experienced research institutes, universities, fuel cell membrane electrode assembly suppliers and original transport equipment manufacturers to improve their understanding of the limitations of fuel cell electrodes. This enabled the partners to provide guidance on the next generation of membrane electrode assemblies required to achieve the 2024 performance targets.

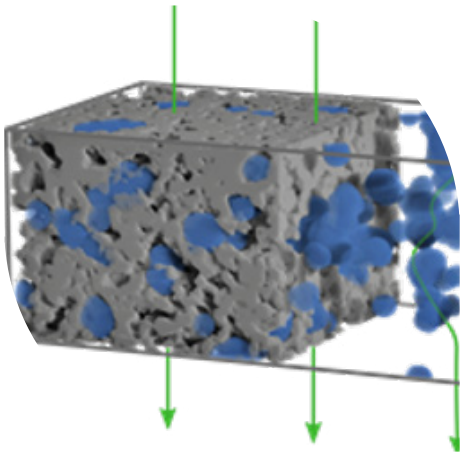
### PROGRESS AND MAIN ACHIEVEMENTS

Next-generation proton-exchange membrane fuel cell catalyst-coated membranes were successfully manufactured at industrially relevant scales – that is, around 300 $cm^2$ – and validated in a 10-cell short stack exhibiting a peak power density of 1.04 $W/cm^2$, corresponding to a total catalyst load of 0.17 mgPt/W.

Advanced catalyst-coated membrane manufacturing techniques were developed to manufacture graded catalyst layers. It was shown that graded catalyst layers could be a promising strategy to homogenise current density and overcome oxygen concentration gradients that develop between the inlet and outlet of a proton-exchange membrane fuel cell.

### FUTURE STEPS AND PLANS

The project has finished.



### PROJECT TARGETS

| Target source | Parameter | Unit | Target | Achieved to date by the project | Target achieved? | SOA result achieved to date(by others) | Year for reported SOA result |
|---|---|---|---|---|---|---|---|
| Project's own objectives | Membrane thickness | µm | < 10 | 6 | ✓ | N/A | 2022 |
| | Total MEA Pt load | $mg/cm^2$ | 0.08 | 0.18 | ⚙ | 0.2 | 2020 |
| | Power density | $W/cm^2$ | > 1.8 | 1.42 (single cell) and 1.04 (short stack) | ⚙ | 1.8 | 2021 |
| SRIA (2021–2027) | Power density | $W/cm^2$ at 0.65 V | 1.2 | 0.64 | ⚙ | N/A | N/A |
| | PGM loading | g/kW | < 0.30 | 0.173 (short stack) | ✓ | N/A | N/A |



Clean Hydrogen Partnership
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