High-priority product: MEA development

Designation of multi-material multi-functional product:	*Please entitle your product* **Membrane Electrode Assembly** (MEA)
General description of product (3 – 4 sentences):	*Please explain purpose, application and advantage of your product* The Membrane Electrode Assembly (MEA) is the core component of a fuel cell that helps produce the electrochemical reaction needed to separate electrons from protons. MEA is a complex "stack" of several technological elements (membrane, ionomers, catalysts and their supports, conductive electrode agents, gas diffusion layers (GDL) including microporous layers (MPLs).
Multi-materials needed/required:	*Please indicate, which different materials are foreseen* A typical MEA is composed of a Polymer Electrolyte Membrane (PEM), two catalyst layers, and two Gas Diffusion Layers (GDL). Membrane must to be the best ion conductor with enough mechanical performance especially considering gas pressure and thermal constraint. Anode and cathode integrate platinum (around 0.5 mg/cm²), this could be reduced without electric results degradation. Gasket must withstand thermal stress.
Multi-functionality needed/required:	*Please explain the multi-functional approach of your product* On the anode side of the MEA, a fuel (hydrogen, methanol etc.) diffuses through the membrane and is met on the cathode end by an oxidant (oxygen or air) which bonds with the fuel and receives the electrons that were separated from the fuel. Catalysts on each side enable reactions and the membrane allows protons to pass through while keeping the gases separate. In this way cell potential is maintained and current is drawn from the cell producing electricity.
Expected improvement:	*Please indicate and explain the improvements you expect* • Increasing life time (membrane, GDL) • Improvement on coupling MEA/BPP • Cost reduction on catalysts (reduction of Pt load or replacement of Pt); • Higher proton conductivity, larger voltage breakdown, bettter mechanical behaviour and higher temperature stability (80°C to 110/120 °C) for the membrane.

Bottlenecks to overcome for reaching the expected improvement	*Please indicate, which bottlenecks do you have to overcome for realizing your product?* • Implement multimetallics or non-noble catalysts; • Investigate more stable materials and enhance material capabilities • Improve understanding of degradation and interaction on material and BoP components • Pt reduction without electric power performance or life time degradation • New membrane material with mechanical and thermal capabilities • New ionomer with capability to increase strongly durability
Functional requirements:	*Please indicate functional requirements of your product (e.g. geometrical requirement, minimum feature sizes, aspect ratios, surface roughness, material requirements, process requirements, characterization requirements)* • Reduction Pt => 0.3 mg/cm² • Increasing active area : 300 cm² (20x15 cm) • Membrane high temperature 150 °C • Life time > 6000 h • Duration improvement < 10µV/hour @ 1,5 A/cm² • Cost reduction < 40 €/kw
Technical sketch of product (if applicable):	*Please insert a sketch indicating geometrical dimensions of your product*