

# IMMENSE

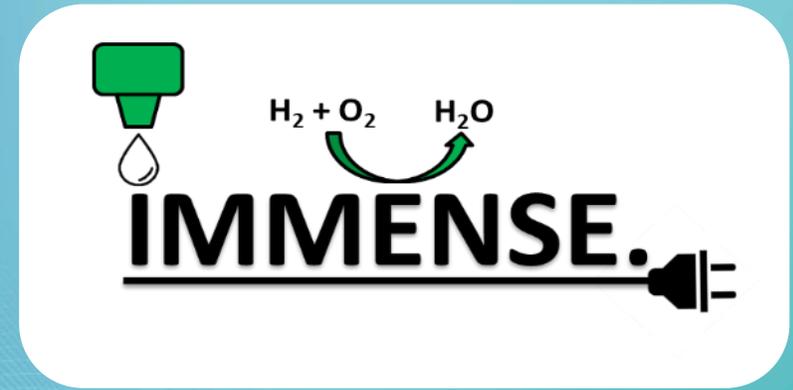
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Inkjet manufacturing of CCMs for PEMFC  
by development of catalytic inks  
& their deposition

Call topic: Functional materials

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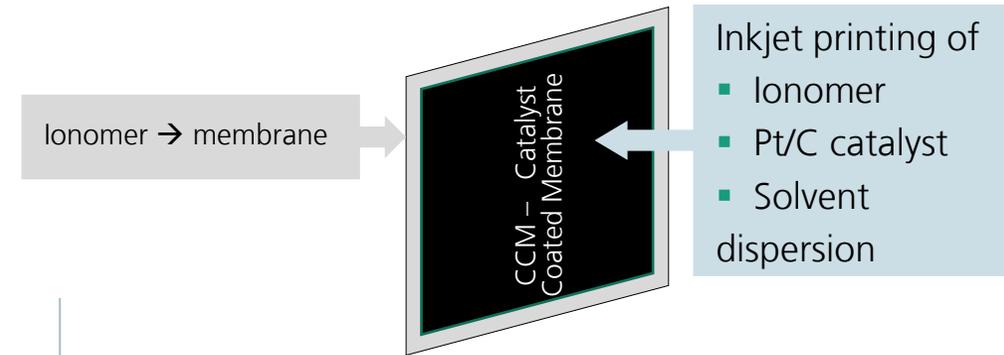
# Objectives of IMMENSE

## Field of activity:

Production of Catalyst Coated Membranes (CCMs) for the application in low temperature Polymer-Electrolyte-Membrane (PEM) Fuel Cells (FC) (PEMFC) by employing **inkjet printing** technology for **newly developed materials**

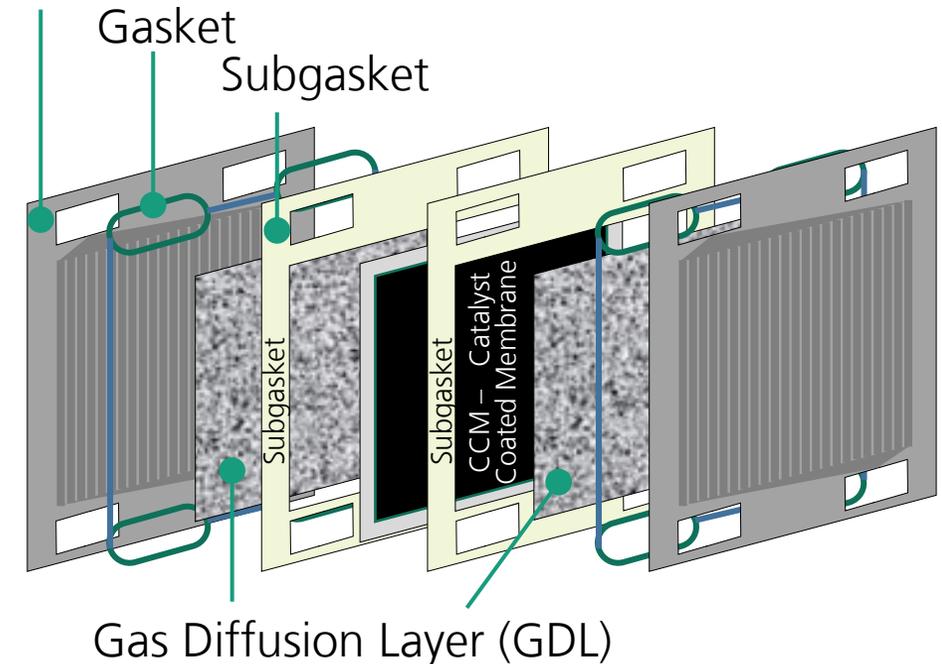
## Objectives

1. Inkjet-ink preparation and inkjet printing process
2. Flexibility in design with new material system
3. Advanced mathematical modelling of stack
4. Short stack fuel cell demonstrator



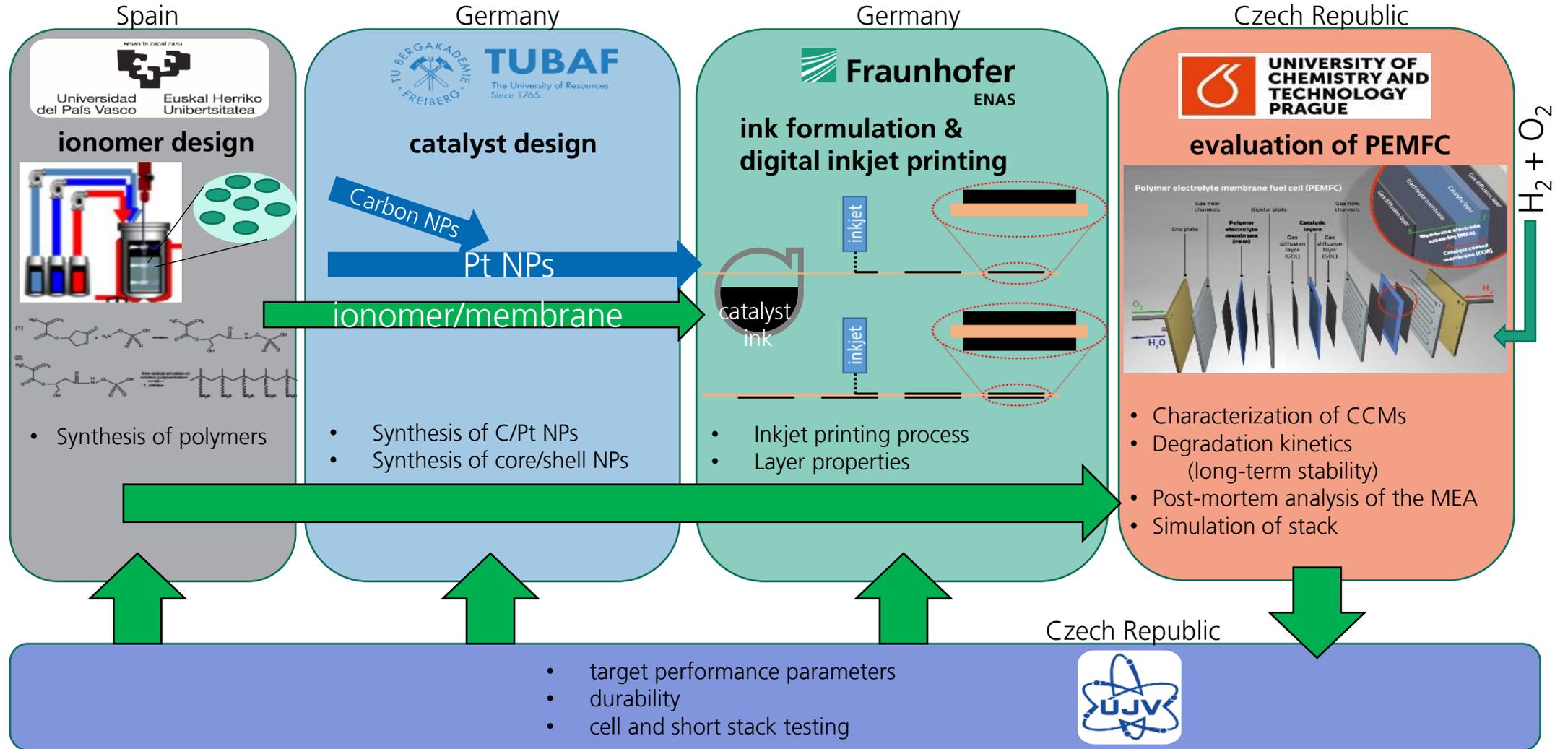
## 1 cell of PEMFC stack

Bipolar Plate (BPP)



# Partners of IMMENSE

## Process workflow



# Top 3 findings of IMMENSE

## Take home message

**Inkjet-printed catalyst layers on PEM employing bio-based ionomers and microwave synthesized catalysts are functional and pave the way for affordable and sustainable energy (SDG 7) and innovative industrial processes (SDG 9)**

- **Inkjet-printed CCMs perform better than state-of-the art ultrasonic sprayed ones at significantly lower Pt loading >> Project results meet industrial target performance parameters**
- **Newly developed materials show performance comparable to commercial ones**
  - Synthesized bio-based ionomers present good and temperature stable ionic conductivity
  - Microwave synthesis of Pt/C catalysts are basis for core shell catalyst development
- **Simulation of catalyst distribution generates better understanding for processes**

# Thank you for your kind attention



*Project IMMENSE was selected in the Joint Transnational Cofund Call 2021 of M-ERA.NET 3, which is an EU-funded network of about 49 funding organisations (Horizon 2020 grant agreement No 958174). The project is funded by*

*Sächsisches Ministerium für Wissenschaft und Kunst – SMWK [Saxony, DE],  
the Technology Agency of the Czech Republic - TA CR [CZ],  
and Agencia Estatal de Investigación [ES].*

