

Development of Fuel Cell Materials and Processes

The ENERMAT laboratory has been created in 2014 in the framework of a collaboration between the Karlsruhe Institute of Technology (KIT) and EIFER. It is located at the Institute for Chemical Technology and Polymer Chemistry (ITCP) at KIT Campus South.

Activities at ENERMAT:

- Promotion of EIFER's expertise in materials science and processes for energy, using conventional and less costly techniques such as screen-printing, and tape casting.
- Development of EDF patents linked to materials and processes before their exploitation phase.
- Evaluation of advanced materials for energy in strategic applications such as electricity production in fuel cell, electrochemical hydrogen production in electrolyzer, gas separation membrane and E-Fuels production.



Samples produced in ENERMAT

From Powder to Power

Manufacturing of innovative powder-metallurgical processed materials, covering the whole production process, from the raw material to the finished product in 3 steps.

Powder Synthesis

- Solid-state reaction
- Pechini Process
- Sol-Gel Process

Powder Processing

- Pressing
- Screen-printing (5 to 40 μm)
- Tape-casting (20 to 2000 μm)
- Nano-Infiltration
- Sintering under air (1600°C)
- Sintering under atmosphere (1000°C)

Electrochemical Measurements

- Electrochemical Impedance Spectroscopy (EIS)
- Application profiles: power, temperature and reversibility
- Cell area from 3 to 50 cm^2 , pO_2 pH_2 pH_2O
- Microscopic Analysis



Latest Public Funded Projects



OxiGEN (EU 2018 – 2020)

Next-generation Solid Oxide Fuel Cell stack and hot box solution for small stationary applications. <http://www.oxygen-fch-project>



MethQUEST (BMW 2018 – 2021)

Production and use of methane from renewable sources in mobile and stationary applications. <http://www.methquest.de>



ARCADE (BMBF 2019 – 2023)

Advanced and Robust metal supported Cell with proton conducting ceramic for electrolysis Applications in Defossilized Energy systems.



Uni.Twente/Shell/EIFER (NWO 2022 – 2023)

CO_2 methanation using high temperature PCC electrolyzers.



KIT/CSM (NSF-DFG 2022 – 2024)

Electrochemically enhanced low-temperature catalytic NH_3 synthesis.

References

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