

## Semester Project - Fall 2024

European Project: AMON (<https://amon-project.eu/>)

### Design of an interlayer for local measurements in a solid oxide short stack fuel by ammonia

#### Context

Solid oxide fuel cell (SOFC) are electrochemical devices that convert chemical energy into electrical energy at high efficiency. In reverse mode (solid oxide electrolyzer, SOE), chemical energy can be produced using electricity by using the same device. This is especially relevant together with intermittent renewable energy where it allows for a seasonal storage of solar energy, for example.

Their lifetime is currently not yet sufficient in both modes for large-scale commercialization. A deep understanding of the local electrochemistry is key to find solutions for improvement such as the control strategy, the materials or the stack design.

#### Objectives and tasks

In the frame of the AMON project, GEM lab is testing short stacks (6 cells, 150W) manufactured by SolydEra, to investigate their behaviour when fuelled with ammonia (SOFC mode). Ammonia cracking being an endothermal reaction, the cell will endure a thermal gradient which will affect the stack reaction kinetic and its material mechanics.

The goal is to design a layer to be inserted in the middle of the stack where thermocouples are integrated in order to have an insight of the local temperature distribution over a cell. A secondary objective would be the design of another layer made for local measurement of the current and the voltage might also be foreseen.

The semester project will focus on CAD using solidworks to design an ingenious system required to be gas tight, machinable and operated at 750°C.

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