

# Design and modeling of a catalytic burner for oxy-combustion in a 10 kW hybrid SOFC + mGT system

Master project (30 credits)

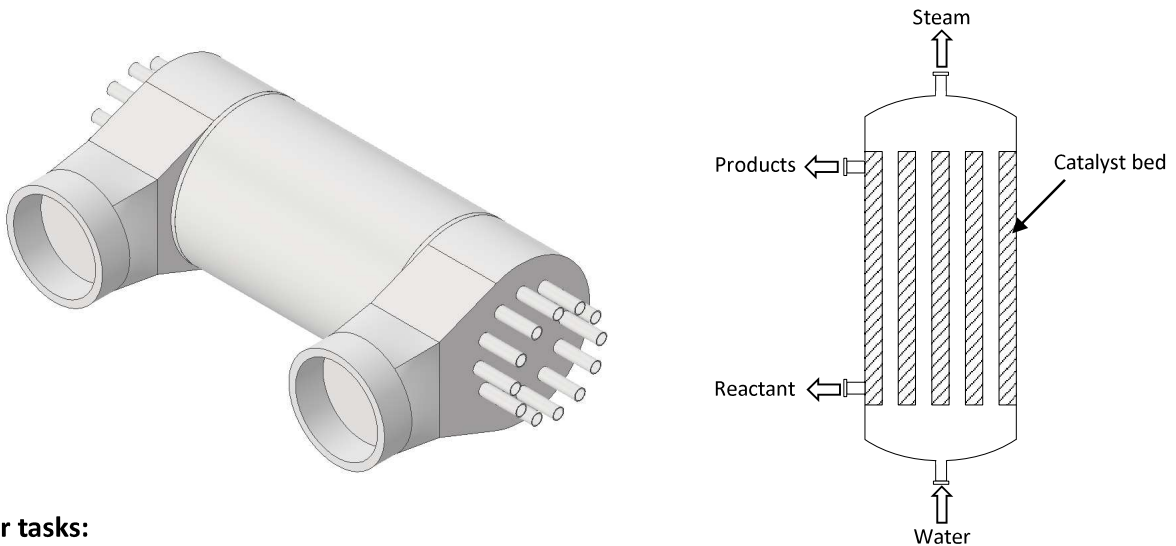
Supervisor: Martin Gay

Prof: Jan Van Herle

## Project description:

A micro gas turbine (mGT) is coupled at the anode outlet of an SOFC to convert the available heat into electricity. For this purpose, the remaining fuel at the SOFC outlet is burned to increase the temperature of the flow. Due to its size, the mGT limits its inlet temperature between 400 °C and 500°C (mainly because of the magnets fixed on the rotor for the electricity production). This requires injection of steam to reduce the flow temperature while increasing the mass flow. However, not enough steam is available inside the system and the burner must be cooled down in another way. A heat exchange with water through tubes inside the burning chamber will be investigated. The produced steam will then be injected at the inlet of the burner (example of a solution below).

The goal of this project is to size and model a burner according to the complex requirements of a 10 kW hybrid SOFC + mGT system.



## Your tasks:

1. Assess an existing design in terms of reaction rates, steam production, heat distribution inside the catalyst bed
2. Investigate new designs to improve efficiency and safety
3. If possible, validate the results on a test rig (inside the lab in Sion)

**Skills:** familiar with simulation softwares (COMSOL, ANSYS, etc.)

## Administrative:

The project will be supervised by Martin Gay. If interested, please send your CV, with a short motivation letter, to Martin.

**Location:** This research work will be conducted at EPFL Sion, or remotely.

**Contact:** Martin Gay, [martin.gay@epfl.ch](mailto:martin.gay@epfl.ch)