Project Report

Application No. 2020
Short title Molten Carbonate Fuel Cell---Identification of the performances for modeling purposes

Objectives: short, medium and long term (<250 words)

The experimental targets were achieved successfully by testing 16 different compositions, relative to 16 different working conditions, and collecting the fuel cell feedback. The model is then validated confirming the possibility of using MCFC as CO2 separator/concentrator from flue gases of power origin.

Brief summary of work carried out:

The Fuel Cell Laboratory (FCLab) and Prof. Milewski discussed and defined in detail the best test campaign and the fuel composition to fit the model needs and the FCLab test rig requirements (operative conditions, flows, gas molar fractions, water content, etc.).
The test campaign was preceded from preparatory activities as:
- test rig check and validation (gas distribution system, power line, communication line, instruments, acquisition software, data storage)
- flow meter controller and electronic load calibration
- the 100 cm2 fuel cell assembly
- fuel cell arrangement in the test bench
- start-up, according to FCLab procedures.

After that polarization curves (VJ curves) were led to characterize 16 mixtures used to feed the fuel cell in different operative conditions. Each VJ curve is done increasing the current from OCV (Open Circuit Voltage) until the voltage threshold of 600 mV by 1A step of at least 10 minutes, to reach voltage stability and statistical consistency. The collected data were then processed, to obtain the main informations, and showed in a report to handle easily the results and make comparisons.
Before and after the data collection some standard tests were led on the fuel cell to verify its healthy state after the test campaign to exclude that degradation issues can affect the mcfc performances and main parameters.

Main achievements intended for publication <250 words

Model validation: the tested model showed a very good agreement with experimental results.

Difficulties encountered <250 words

no difficulties

Further comments:

Model validation: the tested model showed a very good agreement with experimental results.