Reversible solid oxide Electrolyzer and Fuel cell for optimized Local Energy miX

Project Objectives

The REFLEX project aims at developing an innovative renewable energies storage solution, the "Smart Energy Hub", based on reversible Solid Oxide Cell (rSOC) technology, able to operate either in electrolysis mode (SOEC) to store excess electricity to produce H_2, or in fuel cell mode (SOFC) when energy needs exceed local production, to produce electricity and heat again from H_2 or any other fuel locally available.
The system will be installed in-field in an environmental park, targeting to produce 10 Nm^3/h of H_2 in electrolysis mode and 10 kW in fuel cell mode.

Stacks manufacturing

Optimized "Generation 2" cells and stacks have been developed in the frame of the project for reversible Solid Oxide Cell (rSOC) operation, and to reach the targets of high fuel utilization and high current densities.

After laboratory performance and durability tests in rSOC mode validating project developments, the stacks for the Smart Energy Hub to be installed in-field have been manufactured.
12 stacks, each made of 25 Generation 2 cells of 100 cm^2 active area have been prepared, plus 4 spare stacks.

The scattering between stack medial voltage is low, both in SOFC (fig. a) and SOEC (fig. b) mode.
The improved performance with G2 cells is clearly confirmed with the small series of stacks manufacturing (fig. b)
The scattering of median voltage for the different stacks in the order of magnitude of scattering of cells within a stack (see G. Cubizolles et al., ECS Trans., 103 (1) 351-361 (2021))

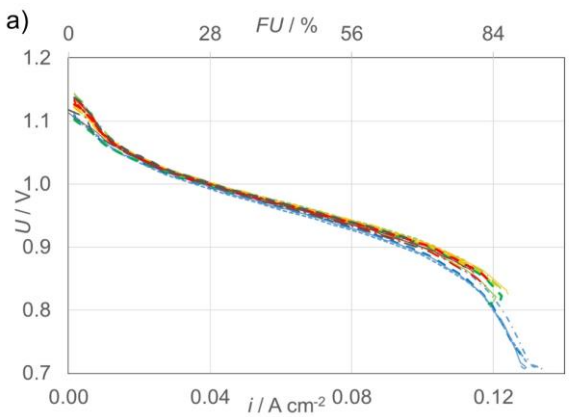

Fig a). SOFC – 700°C, 100% H_2, 1 Nm/min.cm²

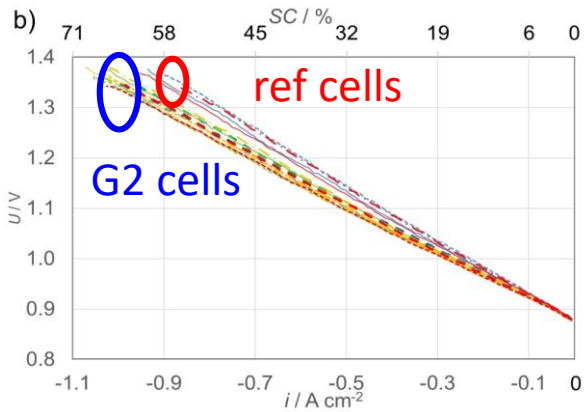

Fig b). SOEC – 700°C, 90%H_2O/10%H_2, 12 Nm/min.cm²

The REFLEX project – www.reflex-energy.eu
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