Milestone: Cell degradation < 1%/1000 h under dynamic load operation

Dynamic operation of SOEC is related to fluctuating electricity input. In order to lay the basis for comparable results, a test profile was deduced from real wind data. Small degradation rates were confirmed on cell and stack level on state-of the-art cells.

Test item	Conditions	Degradation rate / %/1000 h
State of the art 6-cell stack EPFL)	750°C, co-electrolysis, constant flow	0 (@0.1 A/cm^2)
State of the art 6-cell stack (EPFL)	750°C, co-electrolysis, constant FU	0 (@0.1 A/cm^2)
State of the art cell (EIFER)	750°C, steam electrolysis, constant flow	0 … < 1.0 (@0.5 A/cm^2)
State of the art cell (EIFER)	750°C, co-electrolysis, constant FU	< 1.0 (@0.5 A/cm^2)

Efficient Co-Electrolyser for Efficient Renewable Energy Storage

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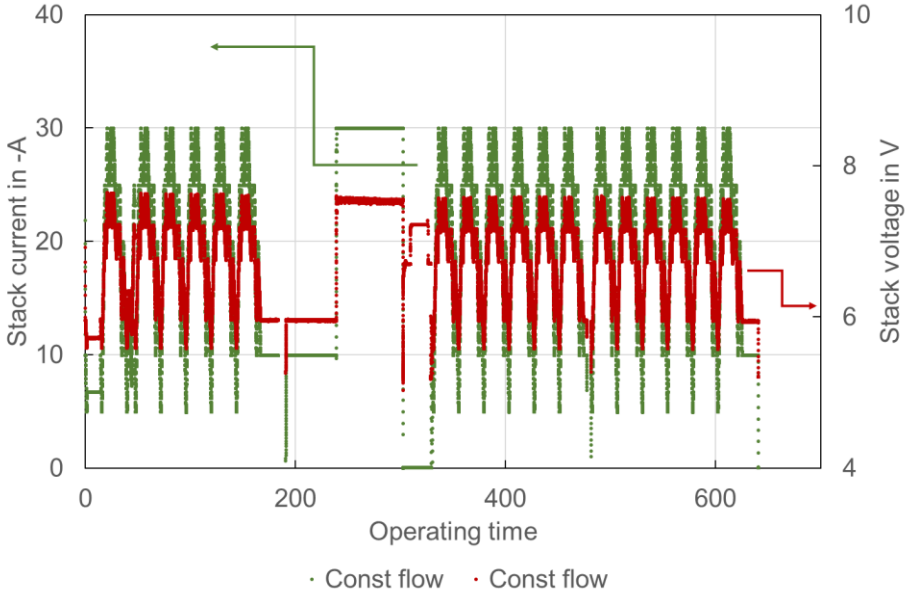
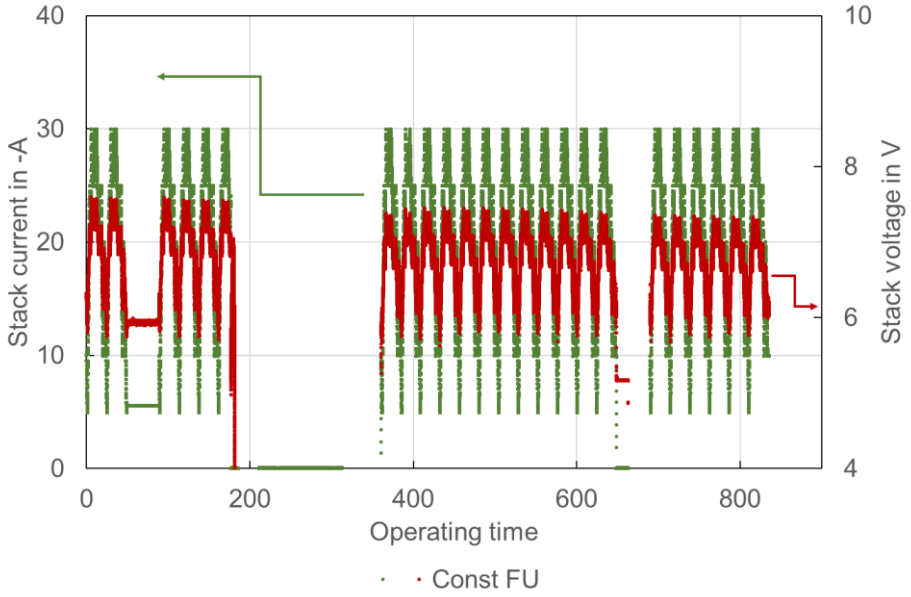
6-cell stack, HTc cells (State-of-the-art)



6-cell stack, HTc cells (State-of-the-art)



EPFL:

750°C, co-electrolysis (65%H_2O/25%CO_2/10%H_2)

Constant flow: reactant flow of 12 Nml/mincm^2

Constant gas utilization: varying of flow for 50% conversion

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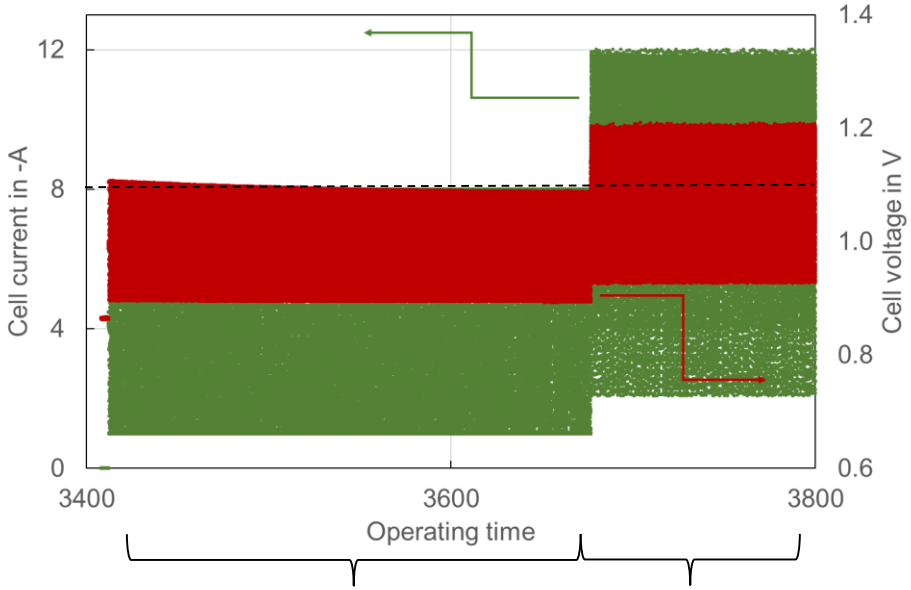
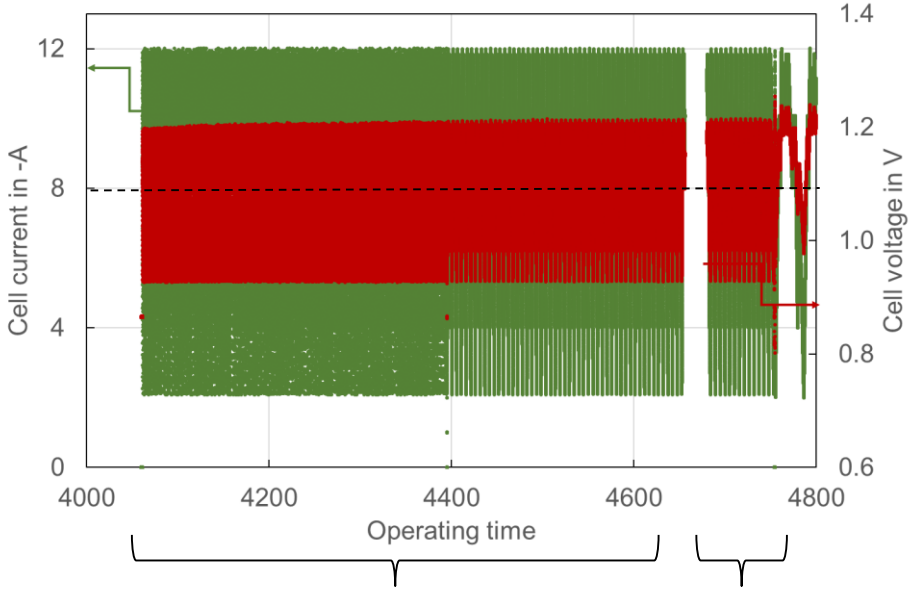
cell, HTc (State-of-the-art)



Steam SOEC, 2 ramping rates and current amplitudes, const. flows

cell, HTc (State-of-the-art)



Steam SOEC, 3rd ramping rate, const. flow

Co-SOEC, 4th ramping rate, const. FU

EIFER:

Constant flow: 750°C, steam electrolysis (90%$H_2$0+10%H_2 12 ml/min*cm²)

Constant gas utilization: 750°C, co-electrolysis (25%CO_2 65%H_2O und 10%H_2)