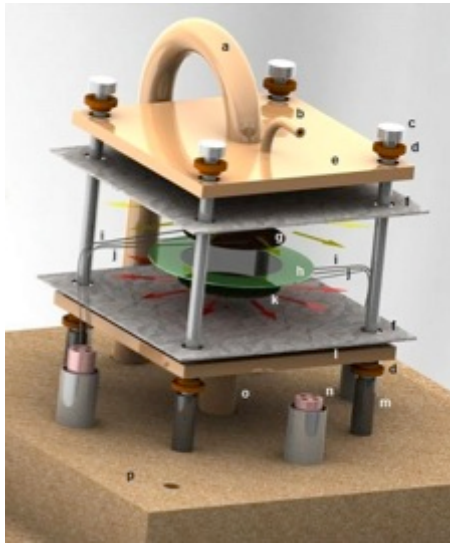


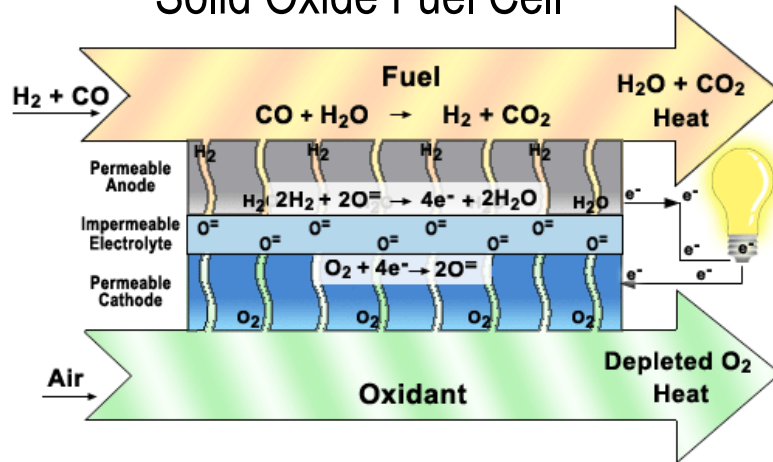
Pressurized high temperature electrolysis - SOEC

FuelMat Group

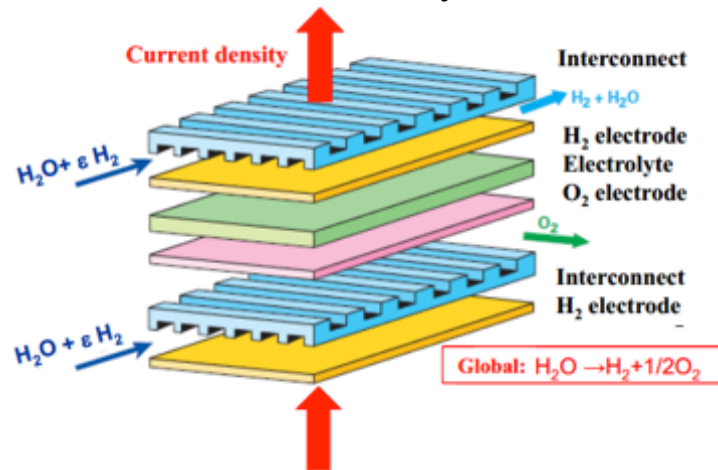


SOFC - SOEC

Solid Oxide Fuel Cell

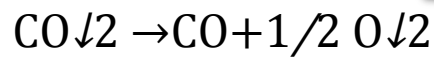
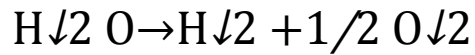


Solid Oxide Electrolysis Cell



Context: power to gas

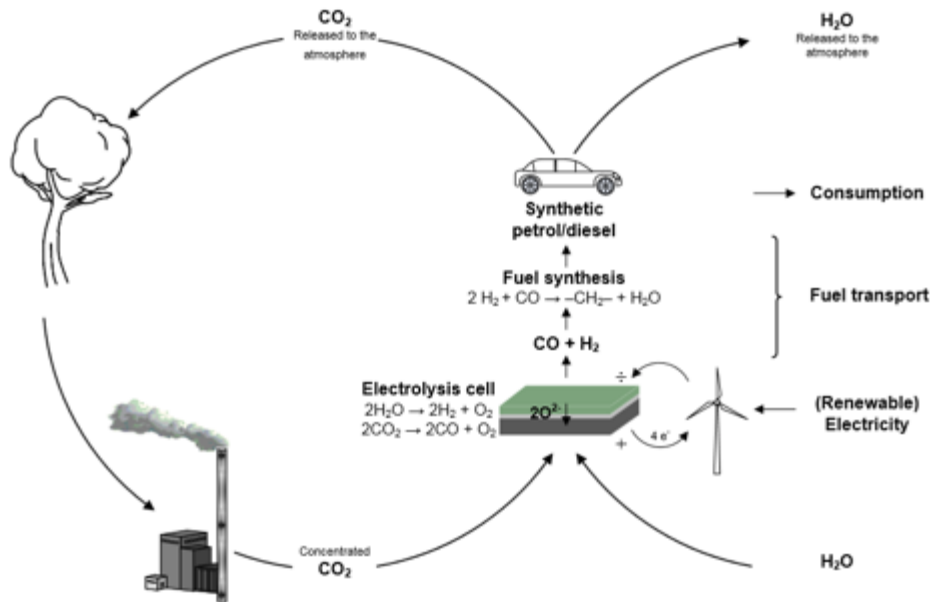
High temperature co-electrolysis:



Syngas

(F-T process)

Hydrocarbon
chemicals



Context: power to gas

Advantages:

- Storage of renewable or nuclear power into chemicals
- CO₂ converted into synthetic fuel
- Operation at high temperatures confers more favorable thermodynamics and reaction kinetics
- Very high conversion efficiency

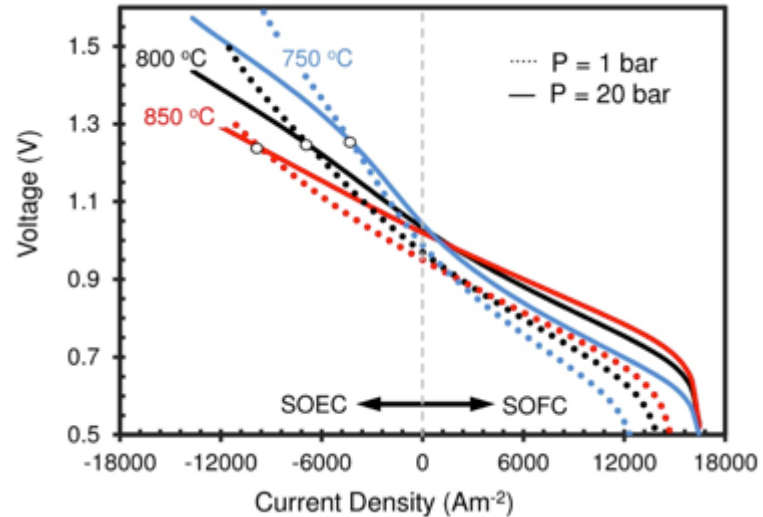
Drawbacks:

- Strong degradation phenomena

Pressurized electrolysis

Advantages:

- Lower voltage at high current density (lower electrical power consumption)
- Operation at high pressure advantageous for system integration

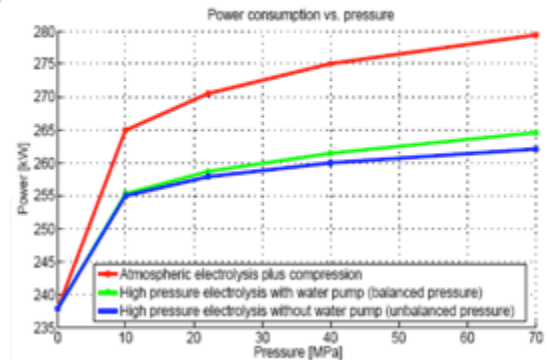


● Energy advantages

Atmospheric electrolysis
+ mechanical
compression

High pressure
electrolysis
(anode+cathode)

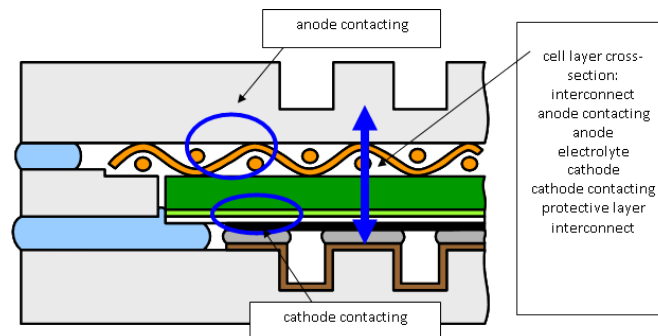
High pressure
electrolysis (only
cathode)



Tasks

Pressurized high temperature testing:

1. low pressure (up to 3 bar) vs. high pressure (up to 15 bar)
→ find out differences in conditions for both cases (e.g. at higher pressures, the whole lines have to be kept sufficiently hot to avoid recondensation)
2. maximum differential pressure that a cell can withstand
→ find the weakest part (cell or seal), check failures

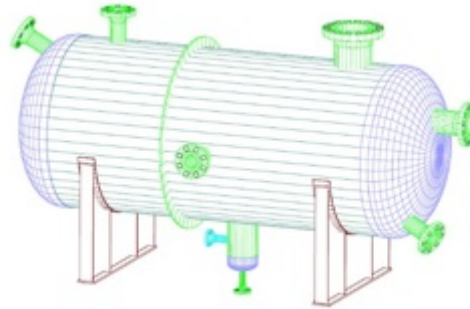


Tasks

Pressurized high temperature testing:

3. homogeneous vs. heterogeneous pressure on two sides

➔ homogeneous: design a pressure vessel



➔ heterogeneous: (e.g. steam side with a liquid feed pump before the evaporator - air side with a compressor)





SOFCPOWER
SOLID OXIDE FUEL CELLS



HTceramix

Thank You !