

New milestone in fuel cell research

In the solid oxide fuel cell programme at the Forschungszentrum Jülich another milestone was reached. A stack operated on methane reached a power output of 5.4 kW at an average stack temperature of only 800°C. The stack consisted of just 40 planar single cells produced by the Forschungszentrum in the so called substrate technology. The metallic parts of the stack were machined from a standard ferritic steel. To our knowledge this stack constitutes the first single stack based on a planar technology and operating at temperatures around 800°C that reached this power output. Operation of the same stack using hydrogen as fuel produced 9.2 kW. This was not the maximum achievable output for the stack. The power output was limited because the experimental conditions didn't allow for sufficient cooling needed at even higher power levels.

Technical details:

40 cell stack based on Jülich
substrate cells
cell size 20 cm x 20 cm
361 cm² active surface
ferritic steel interconnects

Operation I:

mean stack temperature 800°C
fuel humidified hydrogen
(90%H₂/10%H₂O)
oxidant air
fuel utilisation 76 %
air stoichiometry 2
stack voltage 30.2 @ 300 A
(0.755V/cell @ 0.83 A/cm²)
power output 9.2 kW

Operation II:

mean stack temperature 800°C
fuel pre-reformed methane
(7%H₂:31%CH₄:62%H₂O)
oxidant air
fuel utilisation 59 %
air stoichiometry 3,5
stack voltage 30.2 V @ 180 A
(0.755V/cell @ 0.50 A/cm²)
power output 5.4 kW

