

Hvorfor er HT-PEMFC interessant?

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IRD Fuel Cells A/S

IRD Products/Competences



Membrane Electrode Assembly (MEA)

PEMFC: 350 mW/cm² @ 0.65 V

DMFC: 120 mW/cm² @ 0.4 V

Bipolar flow plates

Blank, machined or moulded plates

PEMFC & DMFC Stacks

PEMFC: 0.5-3.0 kW

DMFC: 0.1-1.0 kW

Serial Production



Systems and Modules

Successful Demonstration

Remote Monitoring

Easy application

IRD Manufacturing: Flow Plates

Flow Plate manufacturing in Svendborg:

- Flow Plate design
- Low volume production (Machined)
- High volume production (Mold)
- Continuous development
- High Quality
- High production capacity



IRD Manufacturing: MEAs

MEA manufacturing line in Albuquerque, New Mexico

Unique CCM/MEA manufacturing technology for high volume production as well as fast prototyping capability for customers requiring pre commercial volumes.

Capacity for > 15000 m² PEM MEAs per year



IRD Manufacturing: PEM and DMFC Modules

Module characteristics:

- Compact system design
- Zero emission
- High efficiency
- Quick response

- Easy handling
- Plug and play operation
- Integrated solution
- Environmentally friendly energy conversion



Why HT-PEM

Can you see a difference

LT- PEM and HT-PEM

Can you measure a difference

Why HT-PEM

Fuel:

hydrogen produced chemically contains impurities deactivating the fuel cell

LT-PEM very sensitive to CO, < 10 ppm

HT-PEM very tolerant to CO, > 1%

Why HT-PEM

Temperature:

LT-PEM < 100 °C, water - flooding

HT-PEM > 100 °C, steam - drying

Why HT-PEM

Temperature:

typically operating at 160 – 180 °C

Simple B-o-P:

no humidification needed

no cell voltage monitoring system

Fuel Cell Markets

- **Combined Heat and Power:**

Public and Private houses

- **Backup Power:**

Longer run times than batteries, low operations and maintenance requirements, no emissions as compared to generators.

- **Grid Independent Power:**

Custom design to load following characteristics, high reliability, fuel availability, high efficiency, low maintenance costs.

- **Portable Power:**

Energy density, efficiency, and hydrogen/methanol storage

- **Auxiliary Power:**

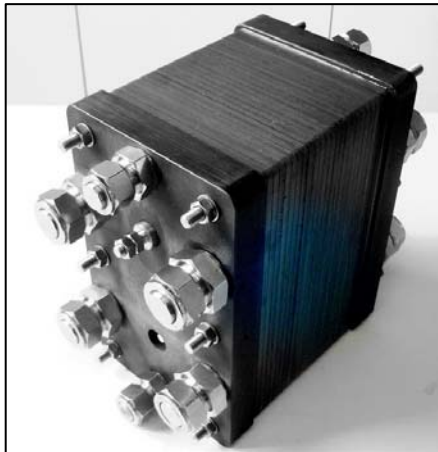
Campers, boating, trucks, airplanes, boats, or military vehicles. Enabling cooling, lighting, or other auxiliary power needs

- **Specialties Vehicles:**

Longer run times, low emissions, and easy start-up. Forklifts, industrial movers.

High Temperature PEM FC Stack

HT PEM FC Stack Specifications*:



Number of cells	40	
	Nominal	Range
Electrical output		
Stack power, kW	1.2	0.1 - 2
Stack current, A	48	0 - 120
Stack voltage, V	24	18 - 36
Efficiency, electrical power, %	48	36 - 70
Fuel supply		
Air pressure, bar(g)	0	0 - 1
Hydrogen pressure, bar(g)	0	0 - 1
λ - air	2.5	2.0 - 4.0
λ - hydrogen	1.5	1.2 - 2.0
Air pressure drop, mbar	< 1	
Hydrogen pressure drop, mbar	< 1	
Operating temperature, °C	160	120 - 180
Stack dimensions	13.5 x 22.7 x 30	

- Liquid-cooled design
- Stacks can be delivered in sizes from 0.5 – 2 kW
- Fuel Supply: Hydrogen/Reformate
- High tolerance to Carbon Monoxide

* using Danish Power Systems' Membrane Electrode Assemblies

Powering Today and Tomorrow

Conclusion:

Advantages: no purification of hydrogen
no humidification of the air

Challenges: price
stability

Thank You for your attention