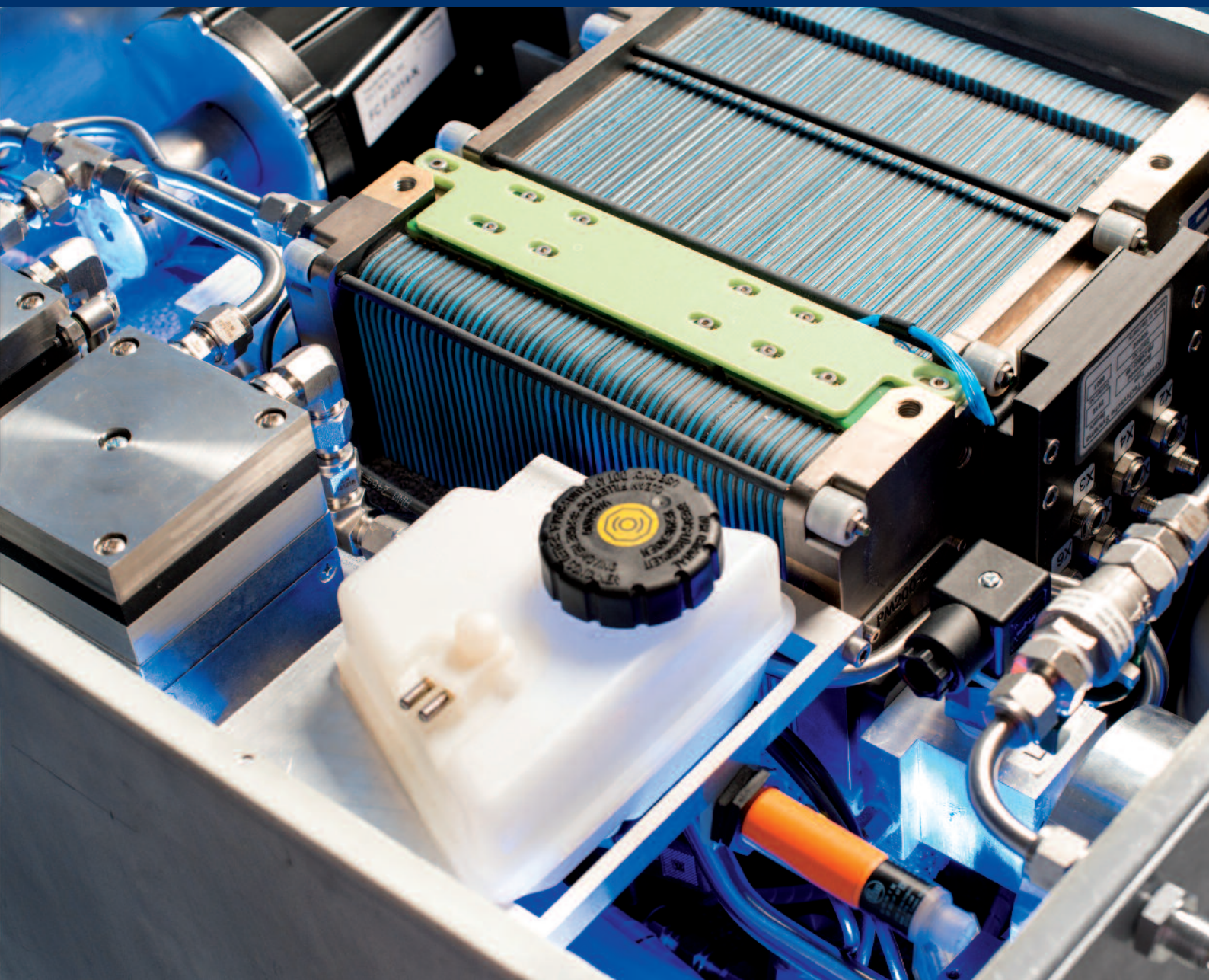
Fraunhofer
ISE

FRAUNHOFER INSTITUTE FOR SOLAR ENERGY SYSTEMS ISE

FUEL CELL SYSTEMS
PROJECTS. PRODUCTS. PARTNERSHIPS.



RESEARCH FOR THE MARKET

Fuel cells are recommended for applications like zero-emission mobility, small traction vehicles, stationary micro combined heat and power plants, and back-up power. The Fraunhofer Institute for Solar Energy Systems ISE in Freiburg supports and advises customers with interdisciplinary know-how and comprehensive services ranging from basic R&D to product commercialization. We work along the entire value chain from cell components, stack and system design including peripherals up to production technologies.

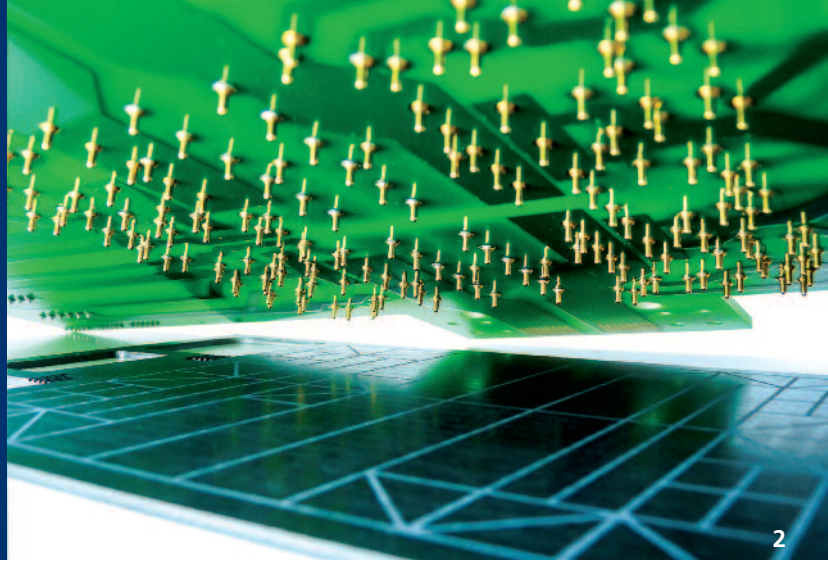
We develop membrane fuel cell systems since the early 1990s. Make use of our experience!

Titel *1.5 kW_{el} low-temperature PEM fuel cell system based on a commercial stack for an energy self-sufficient telecommunication station.*

1 *Walk-in climate chamber for temperatures between -40 °C and +80 °C and relative humidities from 10 to 95 percent. Throughput of conditioned air up to 2000 m³/h. We test systems and stacks up to 20 kW_{el} regarding start, operational, and stop behavior at extreme climate conditions. In addition, we can integrate balance of plant components like compressors, pumps, fans, and valves, in order to evaluate stacks in a system environment. A detailed insight into the state of health is enabled by single cell monitoring of up to 50 cells simultaneously including electrochemical impedance spectroscopy.*

2 *Spatially resolved characterization of an automotive single cell with regard to construction, cell components and performance at various operating conditions. Current or voltage as well as electrochemical impedance spectra from 0.1 Hz to 10 kHz can be measured within each of up to 68 segments. (photos Rammelberg)*


1


2

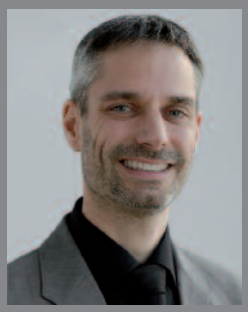
We are experts in the field of efficient fuel cell systems and component optimization. Make use of our know-how and far-reaching network with industry and science.
We offer our expert assistance in the following areas and beyond: scientific analysis of materials, performance and life-time, laboratory prototype development, product optimization, component specification and testing according to international standards.

Our understanding of the physico-chemical processes and our many years of practical experience enable us to provide solutions customized to your specific development, production and market. Make our expertise work for you to realize your component or system needs, validate your design system or optimize control strategies.

Would you like more information? Tell us what we can do for you. We offer you assistance from the development phase to the patented market-ready product.

Our Portfolio

- ex-situ and in-situ performance and degradation analysis of cell components
- spatially resolved characterization of segmented single cells up to 790 A
- modelling from micro scale to system level
- cell and stack design for various materials
- testing of fuel cell stacks up to 20 kW_{el} with single cell monitoring
- characterization of fuel cell systems up to 20 kW_{el}
- testing of peripheral components analyzing functionality and lifetime
- investigating components, stacks, and systems under extreme climate conditions
- system development, including battery hybrids and hydrogen generation
- control strategies, power and control electronics
- safety technology, testing of components and systems according to international standards
- development of production technologies for components and stacks
- monitoring of field tests, expert reports and scientific studies



»OUR SCIENTIFIC, RELIABLE RESULTS LEAD

THE WAY TO YOUR SUCCESSFUL PRODUCT!«

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