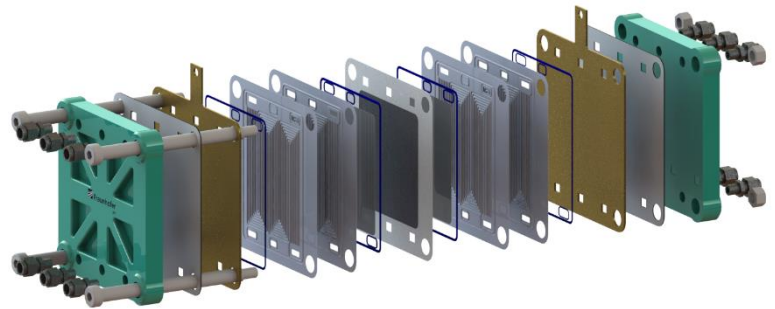
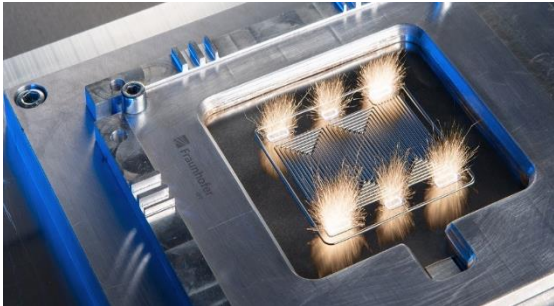


Cost Effective Production of Fuel Cell Stacks and Electrolyzers

As an alternative to battery-powered mobility, hydrogen-based PEM fuel cells (proton exchange membrane) can achieve long ranges without CO₂ emissions. By storing hydrogen in tanks, fuel cell vehicles are lighter than battery-electric cars and achieve significantly longer ranges. Other applications where these properties are needed include aircraft such as short-range airplanes and drones.

For the production of "green" hydrogen, electrolyzers are used whose high dynamics enable direct conversion of sustainably generated electricity into hydrogen as a storage medium and energy carrier. In both systems, however, the production of the individual components and the assembly of the stack still incurs high costs today.



Technology Evaluation and Process Development for Large-Scale Production: The Fraunhofer IPT is developing manufacturing processes and large-scale production chains for different components of a fuel cell stack. The aim is to reduce the high manufacturing costs of stack components. By further developing and automating the production steps, it should be possible to meet the growing demand for fuel cells and electrolyzers and to make large-scale production of stacks more efficient. The Fraunhofer IPT focuses on the core components of a stack: the bipolar plate (BPP) and membrane electrode assembly (MEA) as well as the assembly of the entire stack. Together, these components form one of many individual cells that are connected in series in hundreds. In the case of electrolyser stacks, an electrical input power of several megawatts can be used in this way for the production of green hydrogen. The electrical output power of such fuel cell stacks can be more than 100 kilowatts.

Bipolar plates go through several individual steps in production. The Fraunhofer IPT analyzes and optimizes key production steps in preparation for large-scale production. These include forming as well as laser cutting and laser welding. Different processes are tested and evaluated experimentally for the application of the seal. The production of MEA consists of continuous processes for coating and discrete manufacturing of individual components continuous and discontinuous processes used. In addition to high positioning accuracy of the individual components, the selection of production technologies is crucial for resource-saving insertion of the catalyst. In order to assemble the individual components into a stack in a fully automated manner within a short period of time, we analyze various technologies and select suitable processes for handling the components. The Fraunhofer IPT is setting up production lines for stack manufacturing that prepare stacking for applications in fuel cells and electrolyzers and enable high-volume production of BPP and MEA.

Our services:

- Rapid prototyping and sampling of individual designs in the production of bipolar plates
- Market analyses and consulting on production processes of various components for fuel cells and electrolyzers
- Design of entire production lines for large-scale production (automation and handling solutions)
- Automated cleaning of components
- Technology benchmarks: analysis and evaluation of production technologies
- Consulting on the topic of digitalization of production for quality assurance
- Value stream mapping for production processes

Fraunhofer is one of the world's largest applied R&D organizations, with nearly 80 research units in all sectors of industry, 30000 employees and an annual outlay of Euros 2.9 billion. Of this sum, 2.4 billion euros is generated through contract research. Our global footprint is very strong, with offices and research centers in the Europe, USA and Asia. Some of our renowned innovations are the MP3 format, the white LED, the smallest of cameras. Fraunhofer covers the entire spectrum of energy (Renewables, Storage, E-Mobility, Grid, Hydrogen...) across the value chain from materials to testing and certification. Fraunhofer has been active in India since the past several years, bringing innovative technologies and research competence to India. Fraunhofer in India is the chosen R&D and innovation technology partner of some of the major players in the field of Energy, Environment, Automotive, Electro-mobility, Materials, Production Technology and Smart Cities working with Industry, Government and Public Sector. [>>>CLICK HERE<<](#) to receive more info on this TechFlash.

Kindly get in touch with us if you are interested in this technology or require further information.

Thanks and Regards,

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