



13.03.2024

Seite 1/1

Fully automated assembly of individual components into high-temperature electrolyzers (SOC) and high-temperature fuel cells

© Fraunhofer IKTS

SOEC Technology at a Glance

- **What does SOEC stand for?**

SOEC is the abbreviation for Solid Oxide Electrolysis Cell. SOEC technology refers to high-temperature electrolysis with solid oxide cells.

- **What is high-temperature electrolysis used for?**

High-temperature electrolysis is a process for producing hydrogen from water vapor. If electricity from renewable energies is used for this, it is green hydrogen.

- **What happens during high-temperature electrolysis?**

In high-temperature electrolysis, water vapor is split into hydrogen and oxygen by applying a voltage. The conversion process takes place at temperatures of over 600 °C. The central

thyssenkrupp nucera AG & Co. KGaA, Voßkuhle 38, 44141 Dortmund
T: +49 231 547-7100, F: +49 231 547-2334,
Handelsregister: Amtsgericht Dortmund, HRB 33774
Vorsitzender des Aufsichtsrats: Dr. Volkmar Dinstuhl

Persönlich haftende Gesellschafterin: thyssenkrupp nucera Management AG
Handelsregister: Amtsgericht Dortmund, HRB 33591
Vorstand: Dr. Werner Ponikwar, Dr. Arno Pfannschmidt, Fulvio Federico
Vorsitzender des Aufsichtsrats: Dr. Volkmar Dinstuhl

Fraunhofer-Institut für Keramische Technologie
und Systeme IKTS, Winterbergstraße 28, 01277 Dresden
P +49 351 2553-7231 | www.ikts.fraunhofer.de |
presse@ikts.fraunhofer.de
Fraunhofer-Gesellschaft zur Förderung der angewandten
Forschung e. V., München
Vorstand: Prof. Dr.-Ing. Holger Hanselka, Präsident;
Ass. jur. Elisabeth Ewen; Dr. rer. pol. Sandra Krey;
Prof. Dr. rer. nat. habil. Axel Müller-Groeling

components are the solid oxide electrolysis cells mentioned above, which are stacked to form a SOEC stack.

- **What is special about the SOEC stack technology from Fraunhofer IKTS?**

The SOEC stack technology is based on the oxygen-conducting ceramic electrolyte substrate with two electrodes, paired with chromium-based CFY interconnectors. The electrolyte-supported concept therefore guarantees high long-term stability with regard to high-temperature corrosion and thermal cycling. The stack technology is based on a small number of components and occupies a leading position compared to currently available designs on the global market.

- **How many cells are installed in a SOEC electrolysis stack?**

Depending on the required output, up to 40 electrolysis cells are installed in a SOEC electrolysis stack.

- **What electrolysis outputs are possible with SOEC technology?**

The output of high-temperature electrolyzers ranges from the kW to the high MW range.

- **What are the advantages of high-temperature electrolysis?**

High-temperature electrolysis ensures high efficiency, as operating at high temperatures means that less electrical energy is required to split the water vapor. If high-temperature electrolysis is implemented in processes where large amounts of waste heat are available – such as in the steel industry – the consumption of electrical energy can be reduced by around 20 % compared to other technologies.

- **Are there other advantages in addition to the high efficiency?**

The SOEC electrolyzers can also run in co-electrolysis mode. To do this, water and CO₂ are split into oxygen, hydrogen and carbon monoxide. This produces a synthesis gas from the electrical energy, which can be used for the sustainable production of chemical products and e-fuels via Fischer-Tropsch synthesis.

Ansprechpartner

Fraunhofer Institute for Ceramic Technologies and Systems IKTS:

Annika Ballin

Press and Public Relations

Phone: +49 351 2553-7231

E-Mail: annika.ballin@ikts.fraunhofer.de | presse@ikts.fraunhofer.de

thyssenkrupp nucera:

Katharina Immoor

Head of Communications & ESG

Phone: +49 231 547 2863

E-Mail: katharina.immoor@thyssenkrupp.com