Press Release

thyssenkrupp nucera and Fraunhofer IKTS open First SOEC Pilot Production Plant for Stacks for the Production of Green Hydrogen

- **Important milestone on the road to commercial and large-scale industrial use of highly innovative SOEC electrolysis for decarbonizing industry**
- **Significant cost advantage in certain areas of application thanks to high efficiency of high-temperature electrolysis technology (SOEC)**
- **Strengthening of thyssenkrupp nucera's hydrogen technology portfolio for industrial applications with SOEC as the perfect complement to existing AWE technology**

Arnstadt/Dortmund, May 27, 2025 – thyssenkrupp nucera and Fraunhofer IKTS opened the first SOEC pilot production plant for electrolysis stacks on May 27 in Arnstadt, Thuringia, in the presence of high-ranking representatives from science, politics, and industry. The event was also attended by the Minister President of the State of Thuringia, Prof. Dr. Mario Voigt. With the commissioning of the pilot production plant, the strategic partnership between Fraunhofer IKTS and thyssenkrupp nucera for the development of high-temperature electrolysis (SOEC) is entering the next phase as planned.

In March 2024, the renowned research institute and the world's leading supplier of highly efficient electrolysis technology for the production of green hydrogen in Arnstadt signed a strategic cooperation agreement for the development of the next-generation SOEC electrolyzer. Building on the development work carried out by Fraunhofer IKTS, thyssenkrupp nucera will now work with Fraunhofer IKTS to advance SOEC technology for the manufacture of stacks for the production of green hydrogen on an industrial scale. With high-temperature electrolysis, thyssenkrupp nucera is strengthening its hydrogen technology portfolio for industrial applications.

The electrolysis stacks are manufactured in the pilot production plant designed and built by Fraunhofer IKTS. The SOEC pilot plant initially produces stacks in small quantities and has a target production capacity of 8 megawatts per year. These stacks are the heart of the future SOEC electrolyzers from thyssenkrupp nucera.

SOEC stack technology is based on an oxygen-conducting ceramic electrolyte substrate with two electrodes, which are assembled together with coupling elements, the chromium-iron (CF) interconnectors, on several layers to form the stack. CF-based SOEC technology guarantees high

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corrosion resistance, optimized thermal cycle performance, and high long-term stability with regard to temperature cycling. In addition, stack technology requires only a small number of components and occupies a leading position compared to designs currently available on the global market. The SOEC cell design is also well suited for the desired highly automated series production. Thanks to the large-scale industrial and highly automated series production planned for the future, the high-temperature electrolyzer can also be manufactured at competitive costs.

With innovative high-temperature electrolysis, companies will be able to produce green hydrogen highly efficiently in the future. SOEC electrolysis ensures high efficiency because less electrical energy is required to split water vapor at high temperatures. When commercial high-temperature electrolysis is used in processes that generate large amounts of waste heat, such as in the steel industry, electricity consumption can be reduced by 20% to 30% compared to other technologies.

In addition, SOEC technology offers the major advantage of utilizing industrial CO2 as a raw material and converting it into green synthesis gas together with green hydrogen. This in turn can be used to produce sustainable chemical feedstocks and e-fuels—a unique selling point with enormous potential for the energy transition.

"The outstanding properties of SOEC technology have prompted us to work with our strategic partner Fraunhofer IKTS to develop high-temperature electrolysis to market maturity. We are convinced of the advantages of this electrolysis technology for the production of green hydrogen. It will play a central role in a new, climate-friendly energy mix," says Dr. Werner Ponikwar, CEO of thyssenkrupp nucera.

“By integrating SOEC technology into industrial waste heat sources or directly generating synthesis gas from water and CO_2, companies can maximize the efficiency of green hydrogen production and effectively implement their decarbonization strategy. These unique advantages make SOEC technology a real game changer,” says Professor Alexander Michaelis, Director of Fraunhofer IKTS.

The operation of the pilot production plant will generate the necessary experience that will be incorporated into the construction of a fully automated, large-scale industrial SOEC production plant for high-performance stacks.

Photos:
If you need photos, please contact us.

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About Fraunhofer IKTS:

The Fraunhofer Institute for Ceramic Technologies and Systems IKTS develops high-performance ceramic materials, industry-relevant manufacturing processes, and prototype components and systems in complete production lines up to pilot scale. The portfolio is complemented by expertise in materials diagnostics and testing. The focus is on sustainable and economical solutions for the energy transition, resource conservation, and digitalization. In the field of high-temperature electrolysis, Fraunhofer IKTS has developed various stack designs, builds prototypes, and tests their suitability for different applications and load profiles, including techno-economic evaluation. With currently around 800 employees at 14 locations, Fraunhofer IKTS is the largest ceramics research institute in Europe.
www.ikts.fraunhofer.de

About thyssenkrupp nucera:

thyssenkrupp nucera offers world-leading technologies for high-efficiency electrolysis plants. The company has extensive in-depth knowledge in the engineering, procurement, and construction of electrochemical plants and a strong track record of more than 600 projects with a total rating of over 10 gigawatts already successfully installed. With its water electrolysis technology to produce green hydrogen, the company offers an innovative solution on an industrial scale for green value chains and an industry fueled by clean energy – a major step towards a climate-neutrality. thyssenkrupp nucera successfully made an IPO in July 2023. The company is a member of the SDAX of the Frankfurt Stock Exchange.
www.thyssenkrupp-nucera.com