Karlsruhe Institute of Technology

Division I – Biology, Chemistry, and Process Engineering

Institute for Micro Process Engineering (IMVT)

photreon – From Solar Photons to Sustainable Values

Photoreactor Panel for the Scalable Production of Low-cost Hydrogen from Water and Sunlight

photreon stands for inexpensive green hydrogen from nothing but water and sunlight. This is made possible by a photoreactor panel invented by researchers at the Karlsruhe Institute of Technology (KIT). Its patented design enables the direct solar production of hydrogen. The entire system is designed for manufacturability, enabling the scalable and cost-effective production of green hydrogen. photreon has strong economic potential: The panel can be used in both small-scale, decentralised systems close to hydrogen consumers and as centralised production plants in sunny locations around the world. In this way, photreon makes the transition to green hydrogen economically viable and strengthens Germany's energy independence as a highly industrialized but resource-poor country.

Sustainable Transformation with Green Hydrogen

The ongoing transition of the energy system towards economic and ecological sustainability increases the demand for green hydrogen. However, it is still too expensive to advance the transition while keeping companies and business locations competitive. There is a lack of incentives and suitable framework conditions both for scaling up hydrogen production capacities and for industries that depend on, or plan to adopt, hydrogen as an energy source. Furthermore, enormous infrastructure investment is required to establish and expand a hydrogen transport network.

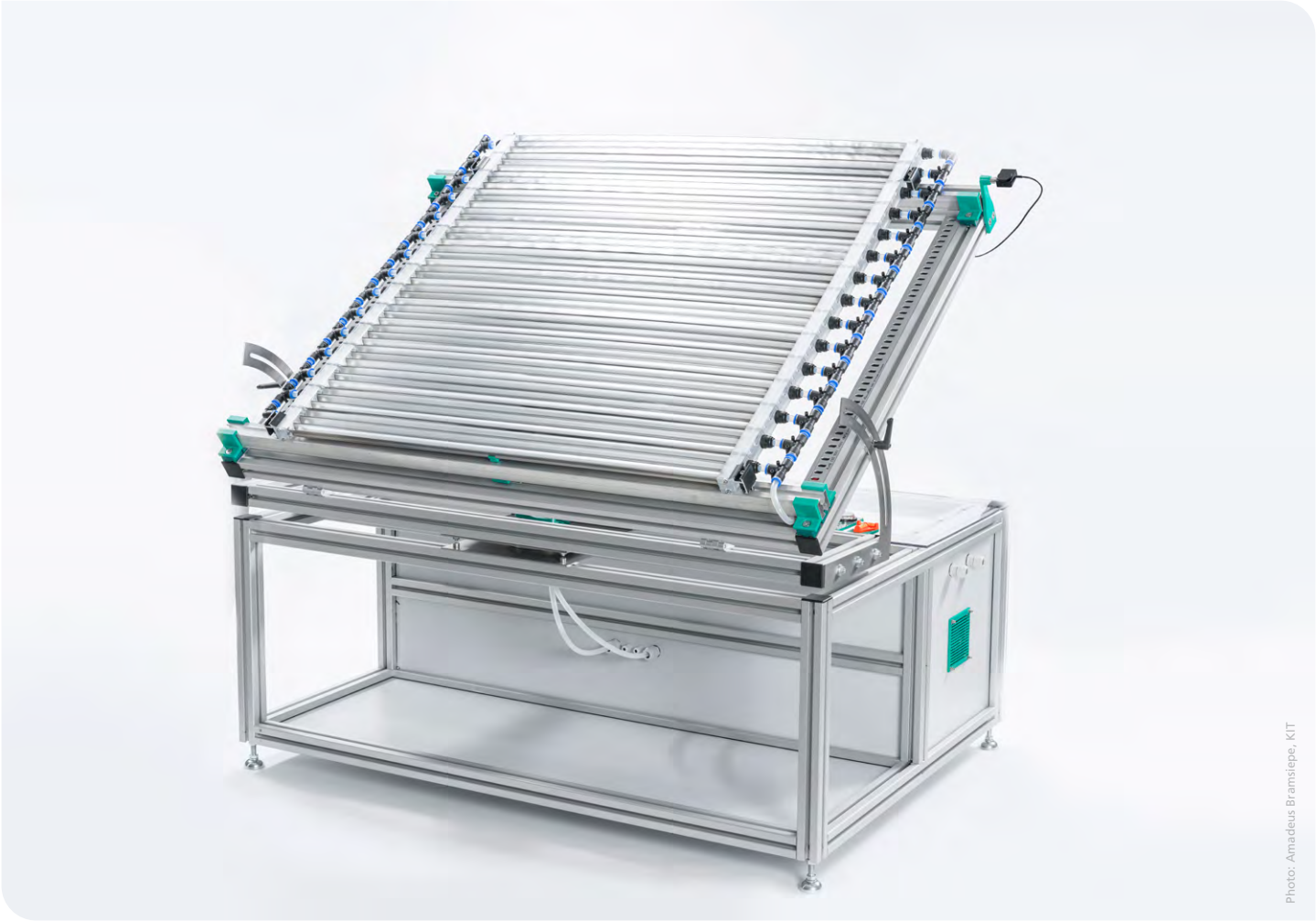


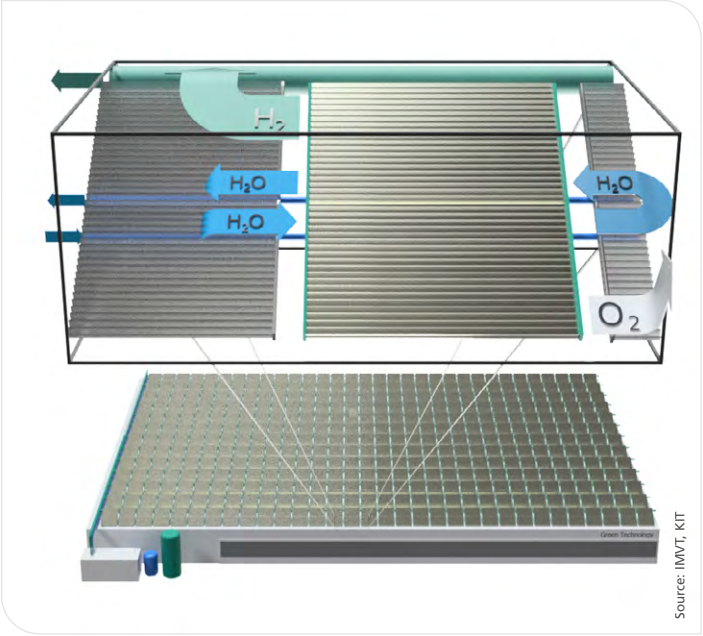
Photo: Amadeus Bramsiepe, KIT

The one-square-meter prototype of photreon's photoreactor panel to produce purely solar hydrogen.

Scalable Photocatalytic Process

photreon offers a solution for the inexpensive production of green hydrogen. Its unique selling point and key competence is a photoreactor panel, for which a patent application has been filed. This panel allows to efficiently produce green hydrogen through a photocatalytic process. Compared to electrolyzers, the system manufactured and offered by photreon is more cost-effective and requires no electricity for hydrogen production. With only water and sunlight, photreon aims to serve two market segments.

Firstly, photreon's technology is suitable for large-scale production of hydrogen for the global supply via production facilities operated by multinational energy companies in sunny regions around the world. As photreon's technology stores the sun's energy chemically in the form of the energy vector hydrogen, there is no need to connect the large-scale plant to transmission grids. Thanks to its very low investment costs and a simple, scalable design, it can produce hydrogen at remarkably low cost when deployed in areas with consistently high solar radiation.



photreon's photoreactor technology illustrated by the example of the decentralized production of inherently green hydrogen directly at the location of the industrial consumer.

Secondly, photreon's technology is also attractive for companies with small or medium-sized hydrogen consumption located in e.g. northern Europe. Currently, the high cost of purchasing hydrogen due to expensive distribution and supply chains prevents potential customers from switching to green hydrogen. On-site electrolytic hydrogen production is often unattractive due to the complexity of the system and the high investment costs involved. However, photreon enables small and medium-sized consumers to produce hydrogen market-independently, inherently green, directly, and without detours. This makes customers independent not only of the electricity market, but also of complex supply chains. Thanks to the system's simplicity and low investment costs, even small and medium-sized consumers can become hydrogen prosumers.

One-square-meter Prototype

The one-square-meter prototype of photreon's photoreactor panel is already in use. Currently, the team is working on demonstrating, scaling, and improving the long-term stability of their technology. photreon is looking forward to welcoming pilot customers, project partners, and investors to join them on their journey towards a future powered by green hydrogen produced from nothing but sunlight and water.

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