TECHNISCHE UNIVERSITÄT CHEMNITZ

Faculty Mechanical Engineering
Institute of Lightweight Structures(IST)
Textile Plastic Composites and Hybrid Compounds(TKV)

Solid-oxide electrolysers can produce renewable hydrogen at high electrical efficiency, but their industrial deployment depends on reliable and cost-effective operation of the complete electrolyser system. Hot balance-of-plant components operate at approximately 600–850 °C in steam-containing atmospheres and are exposed to oxidation, thermal cycling and possible release of volatile chromium species from chromia-forming metallic surfaces. These effects can increase maintenance requirements and contribute to the degradation of downstream components.

One promising approach to addressing this challenge is a hybrid SOEC hot-steam component consisting of a dense, gas-tight alumina liner, a filament-wound oxide-CMC reinforcement and a ceramic-to-metal connection. In such a design, the dense liner would provide a chromium-free steam-contacting surface, while the oxide-CMC overwrap would provide thermal-shock resistance and damage tolerance. We are interested in contributing to the manufacturing and validation of such a component under representative SOEC conditions, as part of a broader effort to improve balance-of-plant reliability, support longer electrolyser lifetime and reduce renewable-hydrogen production costs.

Rather than proposing this as a standalone project, we are looking to join an existing consortium or connect with partners already active in this field, so that we can conduct this research together within a joint CET partnership proposal. We welcome contact from research groups or industrial partners already working on SOEC system integration, hot balance-of-plant components, joining technologies and high temperature testing with a view to combining efforts and adding our capabilities to an ongoing initiative rather than initiating a separate parallel effort.

Contact:
Gokul Varadharajan M.Sc.
gokul.varadharajan@mb.tu-chemnitz.de
+49 371 531 34892

Shaun George Antony M.Sc.
shaun-george.antony@mb.tu-chemnitz.de
+49 371 531 34981

Our expertise to offer:
Ceramic matrix composites, injection molding, additive manufacturing, filament winding, sintering, pyrolysis, material characterisation

Funding program: CET Partnership Joint Call 2026
Seeking: International research and industrial partners
Required field of studies: SOEC, Joining technology, High temperature testing (Corrosion, mechanical)