Fakultät für Naturwissenschaften

Institut für Chemie

lädt ein

gemeinsam mit der Gesellschaft Deutscher Chemiker zum

Vortrag

von Herrn

Prof. Dr. Shannon Boettcher

Departments of Chemical Engineering and Chemistry

University of California Berkeley

“Building the Ultimate Water Electrolyzer”

am: 25.06.2026

um: 09:30 Uhr

wo: im Raum A12.232

Gäste sind herzlich willkommen!

TECHNISCHE UNIVERSITÄT
IN DER KULTURHAUPTSTADT EUROPAS
CHEMNITZ

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Fakultät für Naturwissenschaften

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TUC CHEM
INSTITUT FÜR CHEMIE

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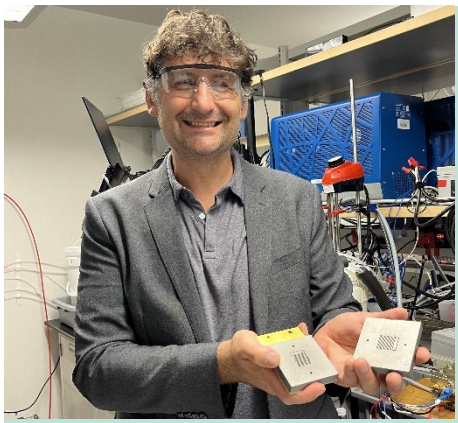

GDCh

“Building the Ultimate Water Electrolyzer”

Commercialized membrane electrolyzers use acidic proton-exchange membranes (PEMs). These systems offer high performance but require the use of expensive precious-metal catalysts such as IrO_2 and Pt that are nominally stable under the locally acidic conditions. Alkaline-exchange-membrane (AEM) electrolyzers in principle offer the performance of PEM electrolyzers with earth-abundant catalysts and inexpensive cell components. Unfortunately, these electrolyzers have poor durability. We are studying and developing new anode catalysts and passivated electrode architectures for AEM electrolyzers where the oxygen evolution catalysts and ionomers are physically separated with a thin-film amorphous oxide that is electrically insulating but conductive to hydroxide ions. We find that HfO_x-based passivation layers show sufficient hydroxide-ion transport to minimally affect the cell performance while substantially suppressing ionomer degradation. Related layers can be formed during operation by adding reactive inorganic species to the ionomer to build a solid-electrolyte layer during operation. By subsequently co-engineering catalyst solid-state chemistry and materials architecture along with the interphase with the ionomer electrolyte, AEMWEs that operate in electrolyte-free water at 2.0 A cm^{-2} and 1.8 V with voltage degradation rates of < 0.2 mV/h are possible. I will highlight the remaining challenges centered around durability and performance that must be addressed for scale-up and commercialization and how we are working to solve these through a combination of mechanistic understanding, applied device work, and industry partnerships.

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