



Carbon Future

CNT effects in red P for SIBs

9200061

21% efficient organic solar cells

9200058

Device-level operando characterization

9200059

Failure mechanisms in PEM electrolyzers

9200060

Electrocatalytic glycerol valorization

9200062

Electrochemical ammonia recovery

9200057

Ambient methane detection

9200056



清华大学出版社
Tsinghua University Press

SciOpen



Highlight

Dual-component interfacial design enables 21% efficient organic solar cells

Yongsheng Chen*

Carbon Future, **2025**, 2, 9200058

<https://doi.org/10.26599/CF.2025.9200058>

perspectives

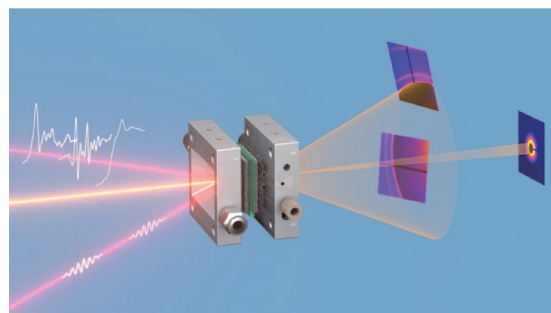
Device-level synchrotron-based *operando* characterization of electrochemistry at scale

Qihao Li* and Héctor D. Abruña*

Operando characterization provides direct access to material states under electrochemical device operating conditions. Synchrotron-based X-ray techniques offer powerful advantages for enabling such measurements.

Carbon Future, **2025**, 2, 9200059

<https://doi.org/10.26599/CF.2025.9200059>



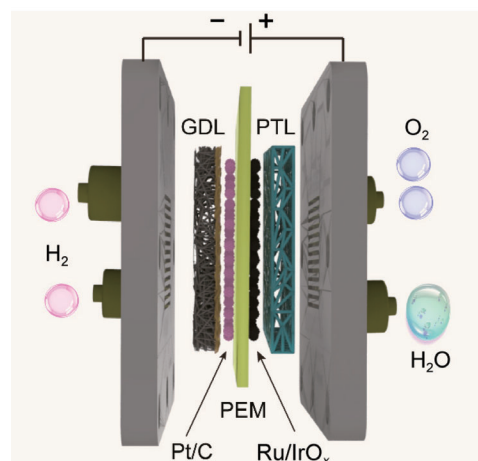
Failure mechanisms in PEM water electrolyzers

Shaoyun Hao, Peng Zhu, and Haotian Wang*

Anode catalyst degradation in proton exchange membrane (PEM) electrolyzers caused by harsh oxidative and acidic conditions hinders commercialization. Deep understanding of these failure mechanisms and integrated advances in materials, engineering, and data-driven design is the key to achieving durable and scalable systems.

Carbon Future, **2025**, 2, 9200060

<https://doi.org/10.26599/CF.2025.9200060>

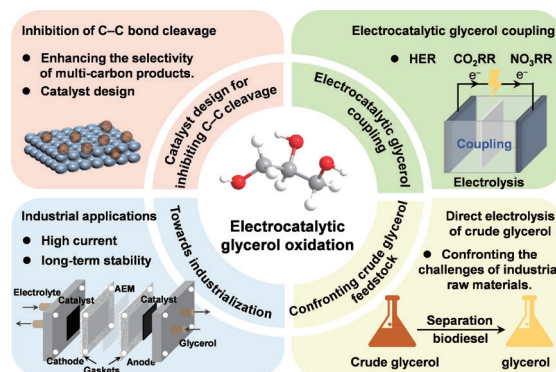


Electrocatalytic glycerol valorization: From catalyst design to integrated systems

Kaiwei Meng, Lin Dong, Wenjun Zhang*, Yanqin Wang, and Zupeng Chen*

This perspective examines the electrochemical oxidation of glycerol as a dual solution for addressing both biodiesel byproduct valorization and renewable chemical production, highlighting advanced catalyst designs to address the inherent challenges of C–C bond cleavage, introducing innovative system coupling strategies, and outlining practical pathways for industrial implementation.

Carbon Future, **2025**, 2, 9200062
<https://doi.org/10.26599/CF.2025.9200062>



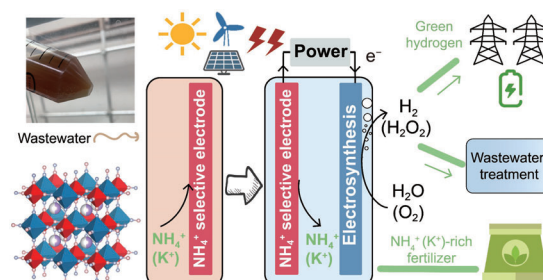
Review

Toward circular nitrogen: Electrochemical ammonia recovery using redox-active materials

Rui Wang*

Electrochemical ammonia recovery using redox-active materials enables selective ammonia uptake, driven by either renewable electricity or spontaneous oxidation of organic matter in manure wastewater, thereby supporting sustainable agriculture.

Carbon Future, **2025**, 2, 9200057
<https://doi.org/10.26599/CF.2025.9200057>



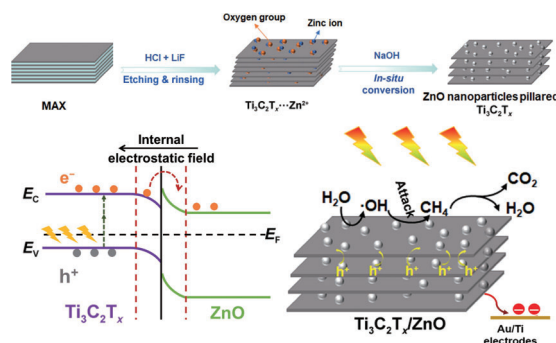
Research articles

Hetero-engineering-driven hydroxyl radical generation on ZnO-pillared MXene enables moisture-tolerant methane sensing at ppm level

Renjie Chen, Yi Xia*, Li Yang, Sufang He, Qiuni Zhao, Xiang Li, Yunzhu Wang, Jiyun Gao, Ming Hou, Mingjun Wang, Liexing Zhou, Lan Xiang*, Sridhar Komarneni*, and Shenghui Guo*

This work develops a ZnO-pillared $\text{Ti}_3\text{C}_2\text{T}_x$ MXene heterostructure via self-assembly, which enables highly sensitive, room-temperature methane detection even under high humidity. The enhanced performance is attributed to the visible-light-driven generation of hydroxyl radicals at the heterointerface, which facilitate methane oxidation and overcome humidity interference.

Carbon Future, **2025**, 2, 9200056
<https://doi.org/10.26599/CF.2025.9200056>



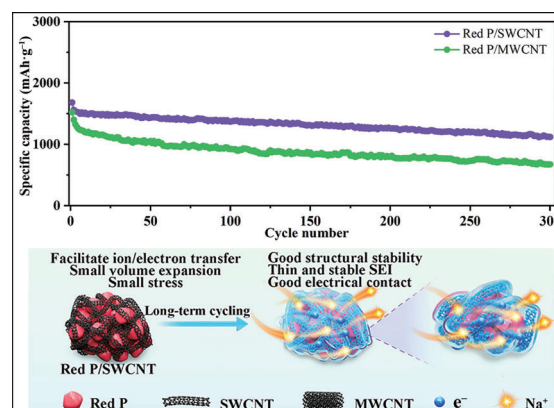
Insights into the carbon nanotube effect on the electrochemical performance of red phosphorus anode

Yanbin Wei, Chenxi Zhang*, Yukang Zhu, Zonglong Li*, Sibao Chen, and Fei Wei*

This paper provides an insight into the red phosphorus (Red P) sodium storage decay mechanism, and systematically studies the different mechanisms of single-walled carbon nanotube (SWCNT) and multi-walled carbon nanotube (MWCNT) acting in the anode of Red P.

Carbon Future, **2025**, 2, 9200061

<https://doi.org/10.26599/CF.2025.9200061>



Carbon Future

(Quarterly, started in 2024)

Vol. 2 No. 4 December 2025

碳未来 (英文) (季刊, 2024年创刊)

第2卷 第4期 2025年12月出版

主管单位：中华人民共和国教育部

主办单位：清华大学

支持单位：鄂尔多斯实验室、清华大学化学工程系

出版发行：清华大学出版社有限公司

印刷单位：北京地大彩印有限公司

EDITOR-IN-CHIEF Fei Wei

SPONSORED BY Tsinghua University

SUPPORTED BY Ordos Laboratory

Department of Chemical Engineering, Tsinghua University

PUBLISHED BY Tsinghua University Press

WEBSITE <https://www.sciopen.com/journal/2960-0561>

ONLINE SUBMISSION <https://mc03.manuscriptcentral.com/cf>

