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Title: In Situ Carbon Corrosion and Cu Leaching as a Strategy for Boosting Oxygen Evolution Reaction in Multimetal Electrocatalysts

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Source: ADVANCED MATERIALS **Volume:** 34 **Issue:** 13 **Article Number:** 2109108 **DOI:** 10.1002/adma.202109108 **Early Access Date:** FEB 2022 **Published Date:** 2022 APR

Abstract: The number of active sites and their intrinsic activity are key factors in designing high-performance catalysts for the oxygen evolution reaction (OER). The synthesis, properties, and in-depth characterization of a homogeneous CoNiFeCu catalyst are reported, demonstrating that multimetal synergistic effects improve the OER kinetics and the intrinsic activity. In situ carbon corrosion and Cu leaching during the OER lead to an enhanced electrochemically active surface area, providing favorable conditions for improved electronic interaction between the constituent metals. After activation, the catalyst exhibits excellent activity with a low overpotential of 291.5 +/- 0.5 mV at 10 mA cm(-2) and a Tafel slope of 43.9 mV dec(-1). It shows superior stability compared to RuO2 in 1 m KOH, which is even preserved for 120 h at 500 mA cm(-2) in 7 m KOH at 50 degrees C. Single particles of this CoNiFeCu after their placement on nanoelectrodes combined with identical location transmission electron microscopy before and after applying cyclic voltammetry are investigated. The improved catalytic performance is due to surface carbon corrosion and Cu leaching. The proposed catalyst design strategy combined with the unique single-nanoparticle technique contributes to the development and characterization of high-performance catalysts for electrochemical energy conversion.

Accession Number: WOS:000756704400001

PubMed ID: 35062041

Language: English

Document Type: Article

Author Keywords: carbon corrosion; in situ Cu leaching; multimetal electrocatalysts; nanoelectrodes; oxygen evolution reaction

KeyWords Plus: METAL-ORGANIC FRAMEWORKS; WATER OXIDATION; COBALT OXIDES; IRON-OXIDE; DEGRADATION

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Publisher: WILEY-V C H VERLAG GMBH

Publisher Address: POSTFACH 101161, 69451 WEINHEIM, GERMANY

Web of Science Index: Science Citation Index Expanded (SCI-EXPANDED)

Web of Science Categories: Chemistry, Multidisciplinary; Chemistry, Physical; Nanoscience & Nanotechnology; Materials Science, Multidisciplinary; Physics, Applied; Physics, Condensed Matter

Research Areas: Chemistry; Science & Technology - Other Topics; Materials Science; Physics

IDS Number: 0E3IK

ISSN: 0935-9648

eISSN: 1521-4095

29-char Source Abbrev.: ADV MATER

ISO Source Abbrev.: Adv. Mater.

Source Item Page Count: 11

Funding:

Funding Agency	Grant Number
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation)	388390466 EXC 2033-390677874-RESOLV
European Research Council (ERC) under the European Union	833408
Chinese Scholarship Council	
Center for Solvation Science ZEMOS - German Federal Ministry of Education and Research BMBF	
Ministry of Culture and Research of Nord Rhine-Westphalia	
Projekt DEAL	
European Research Council (ERC)	833408

This research was funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) within the collaborative research center/transregio 247 "Heterogeneous Oxidation Catalysis in the Liquid Phase" TRR 247 [388390466] as well as under Germanys Excellence Strategy-EXC 2033-390677874-RESOLV. The project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation program (Grant Agreement CasCat [833408]). J.Z. acknowledges the Chinese Scholarship Council for a Ph.D. fellowship. This work was supported by the "Center for Solvation Science ZEMOS" funded by the German Federal Ministry of Education and Research BMBF and by the Ministry of Culture and Research of Nord Rhine-Westphalia. The authors are grateful to Martin Trautmann for ICP-MS measurements and to Dr. Sabine Seisel for PXRD measurements.Open access funding enabled and organized by Projekt DEAL.

Open Access: Bronze

Output Date: 2026-01-06

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