GESELLSCHAFT DEUTSCHER CHEMIKER
ORTSVERBAND SIEGEN

Ankündigung

Am Montag, 12. Januar 2026, spricht um 17:00 Uhr
im Hörsaal AR-F 002 des Departments Chemie und Biologie

Prof. Dr. Malte Behrens

Christian-Albrechts-Universität zu Kiel

über das Thema

Nanostructured Solid Catalysts for Sustainable Chemical Production and Energy Conversion

Kaffeerunde ab 16:30 Uhr in Raum AR H 100
organisiert durch das JCF (JungesChemieForum) Siegen

16:15 h Kurzeinführung nur für Studierende und Promovierende (AR- H 100)

Alle interessierten Kolleginnen und Kollegen, Mitarbeiterinnen und Mitarbeiter und Studierende sind zu diesem Vortrag herzlich eingeladen. Gäste sind herzlich willkommen.

Der Ortsverbandsvorsitzende
Prof. Dr. Jörn Schmedt auf der Günne

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Nanostructured Solid Catalysts for Sustainable Chemical Production and Energy Conversion

Chemical energy storage and conversion is a cornerstone of the transition towards the CO_2 emission-free utilization of renewable energy. Many of such processes are catalytic in nature and the development and optimization of new catalysts is a major handle for increasing the efficiency of our energy systems. Prominent examples are water electrolysis to so-called green hydrogen, its use in CO_2 hydrogenation reactions to value-added products or synthetic fuels, or its storage and distribution in form of ammonia.
Ideally, the catalysts for such reactions are made from abundant elements and easy to synthesize. In my lecture, I will introduce the versatile and scalable method of aqueous co-precipitation for catalyst synthesis and show several examples of the resulting nanostructured catalytic materials. These cannot only yield highly performant catalysts, but also form a basis for composition- and structure-activity correlations that help to beIer understand the fundamentals of the complex interfacial chemistry of catalyst conversions on solid surfaces. Examples from our recent work cover the methanation of CO_2[1,2] and ammonia decomposition on Ni and bi-metallic FeCo alloy catalysts for ammonia decomposition,[3] as well as the Alpromo tion of Cu/ZnO-based catalyst for methanol synthesis.[4-7]

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[1] Wang, JH, Chen, SL, Ticali, P, Summa, P, Mai, SM, Skorupska, K, Behrens, M „Support effect on Ni-based mono- and bimetallic catalysts in CO2 hydrogenaJon“ NANOSCALE 16(37), 2024, 17378-17392. DOI www.doi.org/10.1039/d4nr02025a

[2] Wolf, A, Chumakovski, M, Rohr, H, Hauberg, P, Saedi, M, Mangelsen, S, Behrens, M „A Novel CoprecipitaJon Path to a High-Performing Ni/MgO Catalyst for Carbon Dioxide MethanaJon“ CHEMSUSCHEM 2025 Early View e202502052. DOI www.doi.org/10.1002/cssc.202502052

[3] Jelic, J, Rein, D, Najafishirtari, S, Schmidt, FP, Girgsdies, F, Kang, LQ, Wandzilak, A, Rabe, A, Doronkin, DE, Wang, JH, Ortega, KF, Debeer, S, Grunwaldt, JD, Schlögl, R, Lunkenbein, T, Studt, F, Behrens, M „Highly loaded bimetallic iron-cobalt catalysts for hydrogen release from ammonia“ NATURE COMMUNICATIONS 15(1), 2024, 871. DOI: www.doi.org/10.1038/s41467-023-44661-6

[4] Wied, JK, Mockenhaupt, B, Mangelsen, S, Schürmann, U, Kienle, L, Behrens, M, Schmedt auf der Günne, J „Structural changes induced by the promoter Ga in nanocrystalline ZnO support used in methanol catalysis“ DALTON TRANSACTIONS 54(28) 2025, 11095. DOI www.doi.org/10.1039/d5dt00928f

[5] Mockenhaupt, B, Gieser, J, Najafishirtari, S, Baumgarten, L, Jelic, J, Lunkenbein, T, Ras, EJ, Grunwaldt, JD, Studt, F, Behrens, M „On the secondary promoJon effect of Al and Ga on Cu/ZnO methanol synthesis catalysts“ JOURNAL OF CATALYSIS 439, 2024, 115785. DOI www.doi.org/10.1016/j.jcat.2024.115785

[6] Mockenhaupt, B, Wied, JK, Mangelsen, S, Schürmann, U, Kienle, L, Schmedt auf der Günne, J, Behrens, M „Phase evoluJon, speciaJon and solubility limit of aluminium doping in zinc oxide catalyst supports synthesized via coprecipitated hydrozincite precursors“ DALTON TRANSACTIONS 52(16), 2023, 5321. DOI www.doi.org/10.1039/d3dt00253e

[7] Wied, JK, Mockenhaupt, B, Schürmann, U, Kienle, L, Mangelsen, S, Glänzer, J, Celinski, VR, Behrens, M, Schmedt auf der Günne, J „Method for Surface CharacterizaJon Using Solid-State Nuclear MagneJc Resonance Spectroscopy Demonstrated on Nanocrystalline ZnO:Al“ ANALYTICAL CHEMISTRY 96(28) 2024, 11290. DOI www.doi.org/10.1021/acs.analchem.4c01170