



EINLADUNG

zum Vortrag von

Ass.Prof.Dr. Alexey Cherevan

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Photocatalysis for Solar Fuels: exploring Molecular, Inorganic, and Hybrid Photosystems

am Dienstag, 18. November 2025, um 17:30 Uhr

Ort: Lise-Meitner-Hörsaal, Fakultät für Physik, Universität Wien,
1090 Wien, Strudlhofgasse 4 / Boltzmanngasse 5, 1. Stock

*Barrierefreier Zugang: Boltzmanngasse 5, Lift, 1. Stock rechts über den Gang zum
Hintereingang des Hörsaals*

This talk will showcase the exploration of purely heterogeneous (solid-state), purely homogeneous (molecular), and hybrid photosystems for light-driven water splitting, which my team has accomplished over the past 8 years. In the first part of the talk, I will introduce you to photocatalysis, discuss its challenges, and give a few relevant examples from our systematic study of earth-abundant transition-metal-based co-catalysts for water oxidation and reduction [1-3]. I will then look at photocatalysis from the homogeneous perspective and talk about the design of novel polyoxometalate clusters and their light-driven performance toward water-splitting reactions [4,5]. I will next introduce a hybrid approach that bridges both fields and allows to combine advantages of molecular and solid-state photosystems. As a prime example of this combination, I will showcase the use of fully inorganic molecular clusters as surface-immobilized co-catalysts for photocatalytic water-splitting reactions [6,7]. On one hand, I will discuss the covalent attachment of a $[\text{Mo}_3\text{S}_{13}]^{2-}$ thiometalate anion to photoactive surfaces for light-driven hydrogen evolution [8,9]. On the other hand, I will present an example of linker-mediated electrostatic binding of $[\text{Co}_2\text{W}_{11}]^{7-}$ polyoxometalate onto the TiO_2 surface for photocatalytic water oxidation [10].

References:

- [1] Journal of Materials Chemistry A 2019, 7, 18568-18579 | DOI: 10.1039/C9TA05637H
- [2] Journal of Materials Chemistry A 2021, 9, 21958-21971 | DOI: 10.1039/D1TA05561E
- [3] Advanced Materials Interfaces 2023, 11, 3, 2300695 | DOI: 10.1002/admi.202300695
- [4] ChemSusChem 2021, 14, 2529 | DOI: 10.1002/cssc.202100506
- [5] Journal of Materials Chemistry C 2022, 10, 17048-17052 | DOI: 10.1039/D2TC03508A
- [6] Advanced Science 2020, 7, 1903511 | DOI: 10.1002/advs.201903511
- [7] Advanced Materials 2024, 36, 7, 2305730 | DOI: 10.1002/adma.202305730
- [8] ACS Catalysis 2022, 12, 11, 6641-6650 | DOI: 10.1021/acscatal.2c00972
- [9] Sustainable Energy Fuels 2024, 8, 1225-1235 | DOI: 10.1039/D3SE01658G
- [10] ACS Materials Au 2022, 2, 4, 505-515 | DOI: 10.1021/acsmaterialsau.2c00025

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