Session of "Fokus Materialchemie" – Thursday, **DD.MM.2025** 13:00
@ Seminarraum BA 05 (TU-Wien, Getreidemarkt 9, BA, OG. 05, BA05G02)
join us on ZOOM (ID: 983 0066 2349)

Photocatalysis on thin films
(Exploring spatial and compositional control)

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Addressing the growing global energy demand through environmentally benign and sustainable energy solutions is one of the major challenges of the 21st century[1,2]. With an ever-growing world population, it is not only important to meet its energy demand but also to meet it in a sustainable way. Decades of accumulated emissions from fossil-based energy sources, the global energy crisis triggered by wars and national conflicts regarding the supply and transportation of fossil fuel has highlighted the vulnerability of the current energy systems[3,4]. Clean energy systems are therefore needed to meet the increasing global energy demand with reduced fossil fuel dependence and its associated environmental damage. Sustainably produced hydrogen is increasingly seen as a promising clean energy alternative because of its zero-emission profile, highest gravimetric energy density, and potential applications in fuel cells and chemical industries. Sunlight-driven photocatalytic water splitting into hydrogen and oxygen offers a low-emission, cost-effective pathway that aligns with global efforts toward decarbonization and achieving net-zero emissions[5,6,7]. Often carried out using light absorbing metal oxides as nanoparticulate suspensions which can be difficult to handle, replace/replenish and hard to characterize, thin films (particulate or densely packed) on the other hand, have gained popularity owing to these advantages. Synthetic routes to fabricate photocatalytically active films have been described alongside the parameters (time, photon flux, precursor type and concentration etc) that allow gradient photodeposition on such films using different metal co-catalyst.

References

1. International Energy Agency, *Renewables 2023: Executive Summary*, IEA, 2023, available at: https://www.iea.org/reports/renewables-2023/executive-summary.
2. International Energy Agency, *Global Energy Review 2025: Key Findings*, IEA, 2025, available at: https://www.iea.org/reports/global-energy-review-2025/key-findings.
3. International Renewable Energy Agency, *Geopolitics of the Energy Transition: Energy Security*, IRENA, 2024, available at: https://www.irena.org/Publications/2024/Apr/Geopolitics-of-the-energy-transition-Energy-security.
4. International Renewable Energy Agency, *Transition to Renewables Calls for a New Approach to Energy Security*, IRENA Press Release, 2024, available at: https://www.irena.org/News/pressreleases/2024/Apr/Transition-to-Renewables-Calls-for-New-Approach-to-Energy-Security.
5. B.-L. Su, *Nat. Sci. Rev.*, **2023**, *10*, nwad139.
6. F. Xu and B. Weng, *J. Mater. Chem. A*, **2023**, *11*, 4473–4486.
7. W. Zhao, H. Chen, J. Zhang, P. J. Low and H. Sun, *Chem. Sci.*, **2024**, *15*, 17292–17327.