

# Simone Pokrant

*Functional Materials, Chemistry and  
Physics of Materials, Paris-Lodron  
Universität Salzburg*

**Tuesday, 12<sup>th</sup> October 2021, 16:00 s.t.**

TU Wien, Institut für Angewandte Physik, E134  
1040 Wien, Wiedner Hauptstraße 8-10  
Yellow Tower „B“, 5<sup>th</sup> floor, SEM.R. DB gelb 05 B



## Particle design for photocatalytic and photoelectrochemical water splitting

Almost 50 years after the first demonstration of photocatalytic water splitting by Fujishima and Honda using  $\text{TiO}_2$  in 1972 [1], the exploitation of photocatalytic and photoelectrochemical water-splitting for solar fuel production is still hindered by an unfavorable device efficiency versus cost ratio [2]. For photocatalytic or photoelectrochemical applications high active surface areas and good charge-transport properties are key features to enhance device performance [3]. Favorable charge transport properties are usually obtained in defect free structures such as single crystals, where the surface area is small in comparison to agglomerates of porous nanoparticles. Nanoparticles, however, suffer from reduced charge extraction and, in the case of photoelectrochemical water splitting, from reduced transport properties to the back electrodes because of multiple grain boundaries. Lately, the careful design of singlecrystalline particles with well-defined facets and decorated with cocatalysts has been proven to be a successful concept to achieve high efficiencies for the model system  $\text{SrTiO}_3$  [4]. In this talk, these concepts will be presented and it will be shown how they can be used and extended to improve the performance of the visible light absorbing photocatalyst  $\text{LaTiO}_2\text{N}$  in the context of photocatalytic and photoelectrochemical water splitting.

[1] A. Fujishima and K. Honda, *Nature* 238 (1972) 37.

[2] J.H. Kim, D. Hansora, P. Sharma, J.-W. Jang, and J.S. Lee. *Chemical Society Reviews* 48 (2019) 1908.

[3] T. Hisatomi, J. Kubota and K. Domen, *Chem Soc Rev* 43 (2014) 7520-7535

[4] T. Takata, J. Jiang, Y. Sakata, M. Nakabayashi, N. Shibata, V. Nandal, K. Seki, T. Hisatomi, and K. Domen, *Nature* 581 (2020) 411

All interested colleagues are welcome to this seminar lecture  
(30 min. presentation followed by discussion).

Friedrich Aumayr  
(LVA-Leiter)

Ulrike Diebold  
(Seminar Chair)