
Contribution ID: **59** Type: **Poster**

# A GISANS study of bio-hybrid films: Influence of pH on spray-coated ß-lactoglobulin:TiO2 film morphology for bio-templated titania nanostructures

*Wednesday, December 9, 2020 5:40 PM (20 minutes)*

Nanostructured metal oxides such as TiO2 play a major role in hybrid photovoltaics. They can serve as the inorganic charge acceptor of the active layer. For this, a designed structure is of high importance to address different challenges on different length scales. This includes mesoscopic pores for an eased backfilling of the organic donor material and a high interfacial area between donor and acceptor domains, having domain sizes of tens of nanometers for efficient charge carrier separation. A hierarchical morphology of high surface-to-volume ratio is hence beneficial for the device performance. Diblock copolymer directed sol-gel chemistry offers a way to fabricate templated TiO2 films on an industrially relevant scale, e.g. by spray-coating. However, involved organic solvents lead to a restricted potential in environmentally friendly processing. To overcome this issue, we investigate water-based sol-gel templating with the use of biopolymers. The bovine whey protein ß-lactoglobulin is known to form differently structured aggregates by denaturing at different pH values. In combination with a water-based TiO2 precursor, different bio-hybrid film morphologies are obtained by spray-coating. The influence of pH on the film morphology is investigated by bulk and surface-sensitive grazing incidence small-angle neutron scattering (GISANS). The obtained results are complemented by real-space imaging with scanning electron (SEM) and atomic force microscopy (AFM).

**Primary author:** HEGER, Julian Eliah

**Co-authors:** GEIGER, Christina (Technical University of Munich, Chair of Functional Materials); WIDMANN, Tobias (TU München, Physik Department, LS Funktionelle Materialien); KREUZER, Lucas (TU München, Physik Department, E13); YIN, Shanshan; MÜLLER-BUSCHBAUM, Peter (TU München, Physik-Department, LS Funktionelle Materialien)

**Presenter:** HEGER, Julian Eliah

**Session Classification:** Joint poster session of MLZ User Meeting and DN2020

**Track Classification:** UM: Soft Matter