

Foam-like structure of titania films via spray coating for photovoltaic application

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Due to high surface to volume ratio and their bicontinuous morphology, foam-like nanostructures are becoming more interesting in photovoltaics. Controlling the pore size is crucial for photovoltaic applications, such as in case of dye-sensitized solar cells (DSSCs) and solid state DSSCs. In this study, spray coating is used, which is deposition method allowing for scaling-up to large scale production. A sol-gel process is used to form the nanostructured titania films. The structural evolution of the films was probed by in situ grazing incidence small angle X-ray scattering (in situ GISAXS) on the nanoscale during the spray process. The morphology of the sprayed films is characterized with scanning electron microscopy (SEM) and optical microscopy. The pore size can be controlled from 5.7 to 10.5 nm by changing the recipe of the sol-gel solution as well as by the details of the applied spray circles.

Primary author: Mr SU, Bo (TU München, Physik-Department, LS Funktionelle Materialien)

Co-authors: Mr SCHAFFER, Christoph (TU München, Physik-Department, LS Funktionelle Materialien); Mr CALLER-GUZMAN, Herbert (TU München, Physik-Department, LS Funktionelle Materialien); Prof. MÜLLER-BUSCHBAUM, Peter (TU München, Physik-Department, LS Funktionelle Materialien); Dr V. ROTH, Stephan (DESY, P03); Dr KÖRSTGENS, Volker (TU München, Physik-Department, LS Funktionelle Materialien); Ms YAO, Yuan (TU München, Physik-Department, LS Funktionelle Materialien)

Presenter: Mr SU, Bo (TU München, Physik-Department, LS Funktionelle Materialien)

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