

# Low - temperature synthesis of nano-patterned TiO<sub>2</sub> thin films by combining sol-gel synthesis and nano-imprinting

*Friday, 23 May 2014 15:00 (30 minutes)*

Nanostructured titania thin films are widely used in a variety of applications such as photovoltaics, photocatalysis, and gas sensing. For solar cell applications, a large surface-to-volume ratio of the inorganic semiconductor is needed, because the morphology influences charge carrier transport routes and the exciton dissociation, which occurs at the interface of the inorganic and the organic parts, and therefore the probabilities of electron-hole recombination.

The optical, electrical, and catalytic properties of TiO<sub>2</sub> could be tuned by its morphology.

In the present work a low-temperature route is used to obtain a mesoporous titania thin films with a foam-like morphology, which is attractive for many applications requiring moderate use in energy input or low temperature processing. The synthesis combines sol-gel chemistry with block copolymers as structure directing templates.

Using the nanoimprinting technique, an additional superstructure in the range of tens of nanometers is imprinted on the surface of the titania thin films to increase the surface area.

To investigate the nanostructure of the thin films, scanning electron microscope (SEM) is used to get information about the surface of the films and grazing incidence small angle x-ray scattering (GISAXS) is used to get information from inside the thin films.

**Primary author:** ABDELSAMIE, Amr (TU München)

**Co-authors:** SONG, Lin (TU München); Prof. MÜLLER-BUSCHBAUM, Peter (TU München)

**Presenter:** ABDELSAMIE, Amr (TU München)

**Session Classification:** Student Sessions