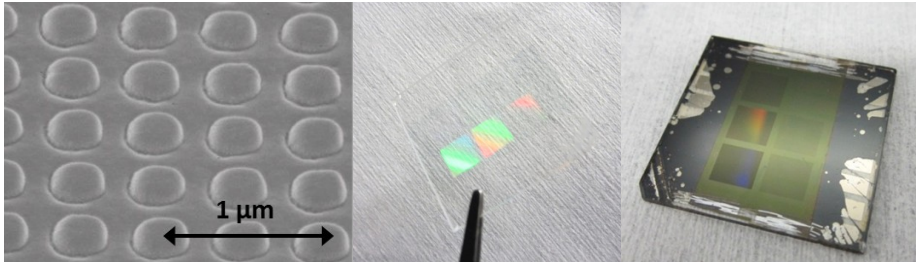## Master thesis

Artificial TiO₂ scaffolds for perovskite photovoltaics

1 μm

Motivation

Perovskite solar cells are the object of intense research efforts worldwide as efficiencies as high as 22.1 % have been recently demonstrated in the lab. Aside material related aspects, specific studies are required to optimize the devices architecture with a view of improving both the charge transport and the optical properties of the cells.

Thus, in a joined project taking place at both the LTI and the IMT, improved perovskite solar cell designs will be investigated by patterning the titanium dioxide (TiO₂) scaffold at the nanometer scale. Such a patterning will serve for both light management purposes, as well as for the introduction of controllable conduction pathways.

Objectives

The candidate will fabricate nano-structured TiO₂ layers with lithography and dry etching techniques. Different patterning methods will be tested, resulting in periodically patterned or disordered TiO₂ scaffolds.

The morphology and optoelectronic properties of the artificially produced TiO₂ scaffolds will be characterized (e.g. by SEM or Photoluminescence Spectroscopy) and their potential evaluated in complete solar cells.

Prerequisites

We are looking for candidates with strong affinity for conceptual and experimental work. Basic knowledge in photovoltaics and photonics are expected. A rigorous and self-dependent working style is essential.

The project offers opportunities to entangle with numerous related research projects, thus the candidate shall be a team player! Looking forward to getting to know you!

Research areas
Solar Energy, Nano-photonics

Places
LTI (KIT, Campus South)
IMT (KIT, Campus North)

Focus
Conceptual Design & Experiment,

Study path
Physics or
Electrical engineering

Application period
Oct. – Dec. 2016

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