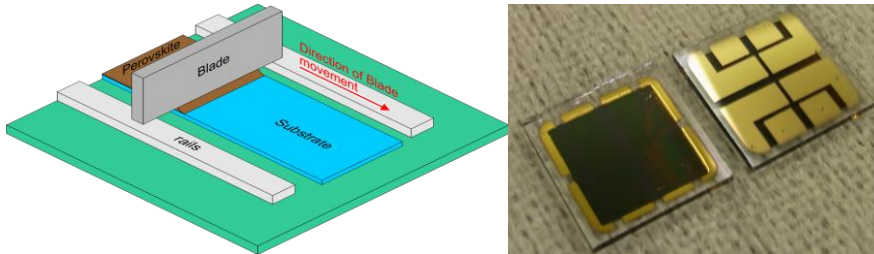


Bachelor Thesis/ Master Thesis

Upscaling of Perovskite Solar Cells under Ambient Conditions via Blade Coating



Motivation

Perovskite solar cells (PSC) are currently one of the most promising emerging photovoltaic technologies. However, highly efficient perovskite solar cells are currently manufactured with the spin coating technique on small substrates in a nearly water- and oxygen-free environment, which is not suitable for an industrial-scale process. Large-scale solution processing methods like blade-coating are examined, but they exhibit different nucleation and crystallization dynamics of the perovskite layer. Therefore, the methods for controlling the perovskite crystallization elaborated in spin coating need to be translated to blade coating, based on an extensive investigation of the crystallization dynamics.

Task

Within the scope of this thesis, a two-step spin coating process for perovskite absorber layers is to be transferred to a blade coating process. For this purpose, the drying and crystallization in blade-coated perovskite layers are examined in an exactly controlled air flow. The differences of the crystallization in spin and blade coating are then evaluated with microscopy aiming at a profound understanding of the perovskite crystallization in solution films. To control the crystallization, different solvent combinations and crystal quenching methods are to be examined.

After all, fully blade-coated PSCs are to be produced with an optimized process. The work is mainly of a practical nature and takes place in an excellently equipped clean room and additional labs. A large number of characterization methods of the fabricated devices are to be applied.

Prerequisite

Prerequisite for the work is pleasure and skill in independent experimental work, team spirit as well as interest in new topics and approaches. Basic knowledge in the field of semiconductor physics and photovoltaics is advantageous but not essential.

Research Field

Experimental

Studies

Electrical Engineering
Physics

Start

From now on

Contact:

Fabian Schackmar
Engesserstr 13
Building: 30.34
Room: 125
Phone: +49-721-608-43981
E-Mail: fabian.schackmar@kit.edu

Simon Ternes
Engesserstr 13
Building: 30.34
Room: 213
Phone: +49-721-608-47188
E-Mail: simon.ternes@kit.edu