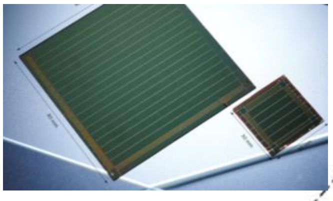
Universität Stuttgart
Institute for Photovoltaics (*ipv*)
High efficiency solar cells

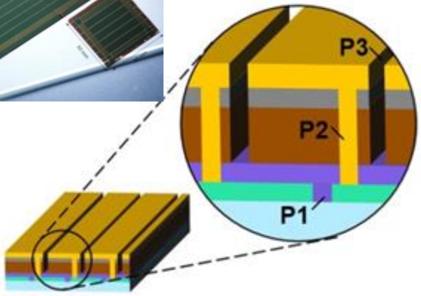
Research work
Master thesis

Manufacture of perovskite mini modules using laser ablation

Perovskite solar cells (PSC) are of huge interest for future photovoltaic power plants. Their solar-to-electricity conversion efficiency has increased rapidly during the last years and reached values of 27.3% at the lab level (0.1 cm^2). However, the ongoing commercialization of perovskite technology require upscaling and the optimization on module level. In a module, the perovskite thin-film solar cells are serially connected, typically realized by alternating deposition and selective removal of layers, for example, using laser ablation, also known as P1-P2-P3 laser structuring.

The aim of this work is to fabricate solar cells and realize the needed laser ablation processes to connect the cells into a module.
For this, a Q-switch pulsed nanosecond laser setup will be used.
The first task is the optimization of the process conditions (laser power, scan rate, overlap..) and the characterization of the samples using different optical methods. Towards the end of this project, perovskite mini modules will be fabricated and the dead area will be minimized.





Ritzer, David B., et al. *Progress in Photovoltaics: Research and Applications* 30.4 (2022): 360-373.

Tasks:
- Literature research laser scribing for PSC and module interconnection
- Experimental optimization of laser scribing processes (P1, P2 and P3)
- Fabrication of perovskite solar cells and thin-films
- Characterization of the samples and analysis of the results

Requirements:
- Basic knowledge of optics, ideally also lasers
- Interest in experimental work, especially in the manufacturing of PSC
- Sense of responsibility
- Structured and independent work

Start at the earliest possible date.
The final report can be written in German or English.
If you are interested, please contact:

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