## Bachelor or Master Thesis:

### High throughput development of organic solar cells on a roll-to-roll printing machine

Roll-to-roll (R2R) printing is currently used as a high throughput method for manufacturing organic solar cells. However, R2R printing machines also offer the possibility of producing a large variety of different cells in a very short time, e.g., by varying the ink composition during the printing process. This enables the high throughput testing of new materials and device architectures and thus accelerates the development of more efficient and stable solar cells.

The Solar Factory of the Future at the Energy Campus Nürnberg runs a R2R pilot line with three slot die stations for coating PET substrates with organic and perovskite thin films, ovens for drying and a laser for patterning them.

In the thesis, the candidate will use a “multi nozzle” slot die developed in a previous bachelor thesis to devise a systematic scheme of optimizing organic cells by varying materials and processing parameters during the coating process, both across and along the substrate. The candidate will start with reproducing standard solar cells, using well established recipes and ideally arrive at cells of improved performance and longer lifetimes. The candidate will learn how to

- manufacture printed solar cells
- operate the pilot line
- characterize printed solar cells
- analyze and understand device data
- improve device performance by systematically varying materials and processes on the basis of a deeper understanding of the device data

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