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Directional, hierarchical films via spray coating

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The supply of clean, safe and renewable energy is an essential human task. For the benefit of this, it is of reasonable interest to enable energy consumers satisfying their own demand based on renewable energy sources. Towards this self-sufficient and "green"energy supply, the possibility of large scaled and cheap roll to roll solar cell fabrication based on organic materials is an important step. With the potential of flexible, semi-transparent properties these solar cells open new paths of design and application, for example integrated in architecture, clothing and all day accessories. Enhancement of these solar cell's lifetime and efficiency is a key challenge, for which it is necessary to understand and control the morphology and formation of the solar cell layers during the deposition process.
We focus on providing spray coating as a roll to roll compatibility technique in order to investigate directional, functional material deposition. We address metal-biopolymer composite films as a new class of materials, which has high potential in a green energy scenario. For example, protein nanofibrils offer a way of templated structuring and directed material synthesis. It is the aim to install hierarchical nanostructures by mixing metal and polymeric colloids. In situ GISAXS and GIWAXS measurements will display the complex morphology evolution during the spray coating process. The resulting directional optical and electrical properties will be characterized by methods such as ellipsometry and conductivity measurements.

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