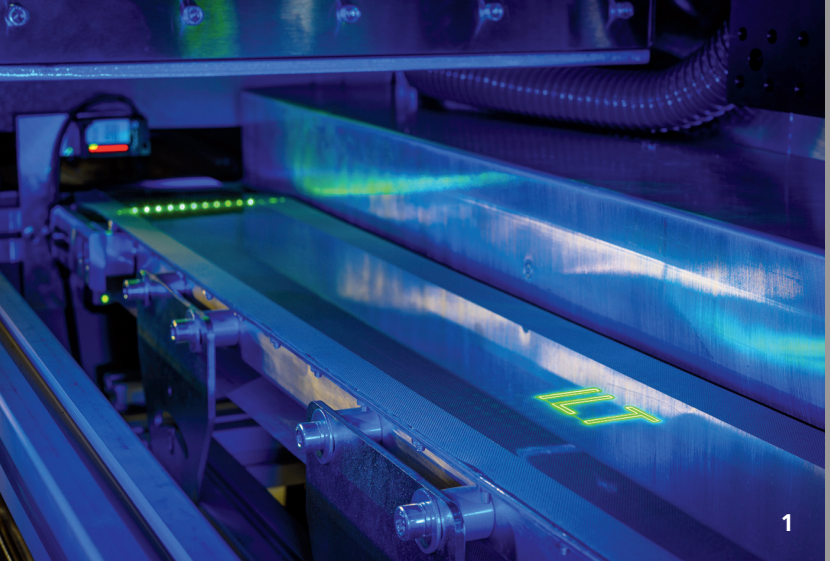

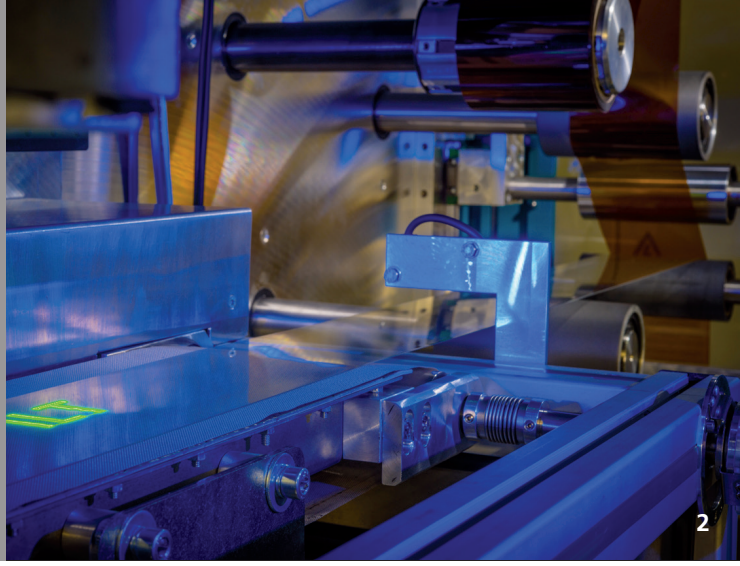

STRUCTURING OF THIN LAYERS IN A ROLL-TO-ROLL PROCESS

Task

Roll-to-roll production lends itself well to the processing of thin and flexible materials. This process makes it possible to offer cost-effective products for a wide range of applications since both inexpensive substrate materials as well as a highly productive process are used. In polymer electronics, in particular, products are generally produced in this way. However, conventional patterning processes, such as lithography, can only partially be transferred to this type of component manufacturing. Laser-based processes can be used to work on both polymeric and inorganic functional layers as well as to significantly increase resolution.

Method

When high-repetition, ultrashort pulsed laser sources are used with optical systems for beam guidance and parallelization, powerful process components can be integrated in a roll-to-roll manufacturing system. Thanks to customized ablation strategies and temporal and spatial power modulation, high process speeds and a selective laser ablation of thin layers can be reached on polymers and metals.

Result

A demonstrator has been implemented in the roll-to-roll system to provide continuous laser-based structuring of semiconducting layers from the thin-film photovoltaic sector. By means of adapted optical systems, the production system is able to process material selectively at high continuous throughput rates. Geometrically flexible processing is also possible due to sensory monitoring of the machined strip material in connection with the use of galvanometer scanners.

Applications

The know-how gained from thin-film photovoltaics can be transferred to the production of flexible OLED displays, solid-state batteries, electronic circuits, and RFID and transmit sensor applications.

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1 Inline structuring with fixed optics and scanning unit.

2 Roll-to-roll track process.

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