



## PRESS BRIEFING

### **Flexible solar cells and high-performance photovoltaic modules**

Press briefing  
December 1, 2020  
Page 1

**Whether on the roof of a house or in electronic devices: Using the power of the sun is one of the most sustainable ways to generate energy. A Fraunhofer research team is working on an innovative manufacturing process that will open up new areas of application.**

Photovoltaics are an essential part of the energy change. »But the potential is far from being fully exploited«, says Ixchen Elias Ilosvay, scientist at the Fraunhofer Institute for Microsystems and Solid State Technologies EMFT. However, innovative manufacturing processes are needed to push the development of solar modules with higher efficiency and new properties such as optical transparency or mechanical flexibility. Researchers from Fraunhofer EMFT and the Fraunhofer Institute for Solar Energy Systems ISE are following a promising approach in the joint project LEO (platform technology for the resource-saving production of conductor paths on large surfaces equipped with electronics): They are working on a process that enables resource-saving and cost-efficient production of large-area printed conductor path patterns. Such conductor path patterns are also needed for solar cells as electrical contacts for conducting the photoelectric energy.

#### **Cost-efficient and resource-saving**

The researchers use a thin laser-structured aluminum layer as a masking for the galvanic deposition of the electrical conductor paths. The process is not only cost-efficient, but also protects the environment and saves resources: »With our aluminum masking instead of the usual photoresist used for structuring the conductor paths, we avoid organically contaminated waste water, which can only be purified in a very complex and cost-intensive process«, explains Dr. Markus Glatthaar from Fraunhofer ISE. »Aluminum can be filtered out of the wastewater relatively easily and the small amount produced in our process can be completely recycled«.

The technology can be used to produce flexible and transparent organic solar cells in a roll-to-roll process that can be integrated into various applications. With the newly developed process sequence, the team has already been able to produce 20 µm wide, galvanically reinforced conductor paths on film substrates for flexible organic solar cells. A second application scenario aims at the production of novel, highly efficient

**Fraunhofer EMFT** researches and develops sensor systems and actuators for people and the environment at its locations in Munich, Oberpfaffenhofen and Regensburg. The competences of the approx. 130 employees include manufacturing-oriented microtechnologies, innovative sensor solutions, microdosing and secure electronics.



hetero-junction solar cells: The cold metallization developed in the LEO process could make their production significantly more cost-effective in the future. »Metallization has been a sticking point so far, because hetero-junction solar cells cannot tolerate the high-temperature process currently used for standard solar cells«, explains Glatthaar. The scientist hopes that these high-performance solar cells can establish themselves on the market more quickly with the new manufacturing process.

**Press briefing**  
**December 1, 2020**  
**Page 2**

### **Research for sustainability**

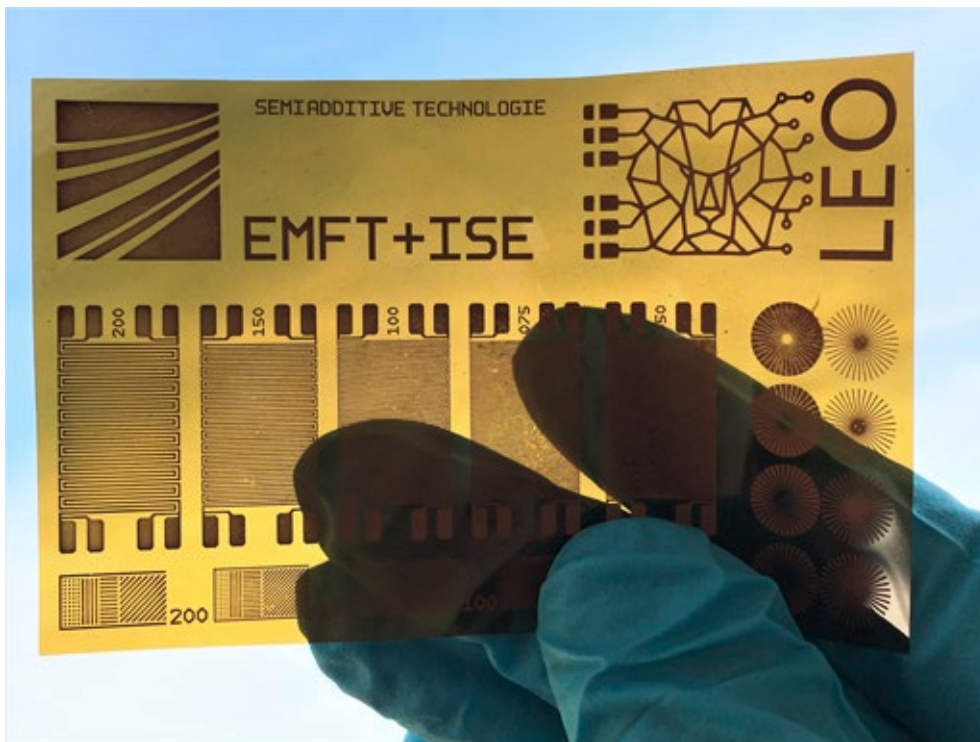
The two researchers are personally strongly motivated to contribute to more sustainability with their work. »I grew up in a tropical developing country. It formed me to experience things like deforestation of the rainforests, fires, the extinction of species, outbreaks of new diseases, hurricanes and floods, but also droughts«, says Ixchen Ilosvay. For Markus Glatthaar, a look back into the past shows how research can help solve urgent environmental problems: »By consistently introducing appropriate technologies, it was possible to stop the death of forests and the disappearance of the ozone layer at that time. With my work on solar cells and environmentally friendly production processes, I hope to make my contribution to protecting our environment«.

### **Roll-to-roll: An old principle reinterpreted**

The roll-to-roll process for the production of printed electronics has a well-established role model: newspaper printing. In this process, unprinted carrier material is wound up on a roll, with an empty roll on the opposite side. The individual printing processes run one after the other in between, with the carrier material being spooled onto the empty roll on the other side of the press. In the laboratories of Fraunhofer EMFT, researchers use this method to produce ultra-thin electronic components and systems on film. These electronic foils are used, for example, in medical technology as sensors close to the body, in robotics and also in solar cells. The so-called „roll-to-roll“ process is particularly efficient for such large-area components or systems.



### Photo:



Press briefing  
December 1, 2020  
Page 3

Photo description: In the LEO project, cost-effective copper conducting path structures are created for use in large-area electronic components such as solar modules.

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### Project Logo:



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