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CeGlaFlex project: wafer-thin, unbreakable and flexible ceramic and glass

Only twice as thick as a strand of hair, or around 100 µm: that's how thin the transparent, scratchproof and malleable ceramic layers of the future that are meant to protect portable electronics are. Since March 2017, the methods and process chains for producing this material have been in development at the Fraunhofer Institute for Laser Technology ILT as part of a three-year research project called CeGlaFlex.

Mobile electronics, regardless of whether it is a cellular phone, tablet or blood pressure monitor, rely on the quality of their touch-screen displays. In keeping with the trend of individually shaped smart devices, they should be not only scratchproof, unbreakable and chemically stable, but also easy to mold. However, this presents a dilemma for manufacturers. "Hardened glass does not possess the required design flexibility, while malleable plastic is easily scratched," explains Christian Kalupka, ultrafast laser expert at Fraunhofer ILT. "Transparent ceramics offer an alternative. Although they have the desired properties, they are not yet available in the desired sizes and lack appropriate processing methods."

An eye on the complete process chain

This was reason enough for the Fraunhofer-Gesellschaft to initiate the internal CeGlaFlex research project (process chain for malleable ceramic and glass-based switching and display elements) in March 2017. It involves market-oriented strategic pre-competitive research (MaVo) to develop techniques and process chains. Its objectives are to:

- manufacture thin, and as a result malleable and transparent, ceramics and display laminates.
- process transparent ceramics and thin glass compounds, which can be spatially reshaped without damaging the material's functions.
- produce integrated switching and display elements on malleable substrates made of ceramic-glass compounds.

The MaVo project is implementing the complete process chain at five Fraunhofer Institutes. The Fraunhofer Institute for Ceramic Technologies and Systems IKTS in Dresden is developing thin, highly transparent ceramics. In Aachen, the Fraunhofer

Editorial Notes

DPetra Nolis M.A. | Group Manager Communications | Phone +49 241 8906-662 | petra.nolis@ilt.fraunhofer.de
Fraunhofer Institute for Laser Technology ILT | Steinbachstraße 15 | 52074 Aachen, Germany | www.ilt.fraunhofer.de

FRAUNHOFER INSTITUTE FOR LASER TECHNOLOGY ILT

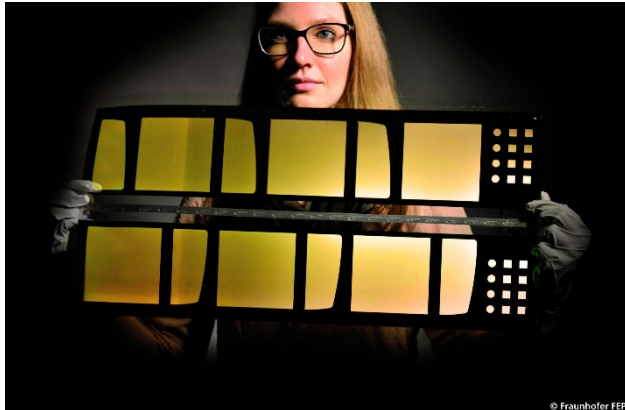
Institute for Production Technology IPT is working on processes for the precise mechanical finish (grinding, polishing) of surfaces and edges of transparent, thin ceramics and glass, while the neighboring Fraunhofer Institute for Laser Technology ILT focuses on customized laser processing (polishing, structuring, separating). In Halle (near Leipzig), the Fraunhofer Institute for Microstructure of Materials and Systems IMWS is developing material testing methods that are important for assessing component quality. Final implementation of the process takes place at the Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP in Dresden, which builds marketable demonstrators.

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Huge market potential

Kalupka is optimistic about the project's future. "Thanks to the technologies developed in the joint project, wafer-thin ceramic will be used to manufacture flexible and unbreakable displays for portable electronics of the future. I'm confident that they will play a major role in the success of many smart mobile devices."

FRAUNHOFER INSTITUTE FOR LASER TECHNOLOGY ILT



Picture 1:
A matter of shape: the Fraunhofer CeGlaFlex project is developing very thin, malleable and transparent protective covers for OLEDs in the roll-to-roll process.
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Picture 2:
Structuring process by direct ablation with ultrashort pulse laser radiation.
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For further information

M. Sc. Christian Kalupka | Micro and Nano Structuring Group | Phone +49 241 8906-276 | christian.kalupka@ilt.fraunhofer.de

Dipl.-Phys. Martin Reininghaus | Head of the Micro and Nano Structuring Group | Phone +49 241 8906-627

martin.reininghaus@ilt.fraunhofer.de | Fraunhofer Institute for Laser Technology ILT, Aachen, Germany | www.ilt.fraunhofer.de