

Window display

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Just one click and the window turns into a display. At the Hannover Messe from April 20 to 24, Fraunhofer research scientists will be demonstrating light-permeable conductive coatings as the basis for transparent displays.

A movie hero points a remote control at a window through which you can see a green park landscape. A few seconds later colorful letters and images appear on the glass. In the future, such scenarios could be part of everyday life. The basis for these transparent displays is provided by light-permeable coatings which conduct electricity. At present their manufacture is cost-intensive, however, and small series are not an economic proposition.

This will change in the future: research scientists at the Fraunhofer Institutes for Surface Engineering and [Thin Films](#) IST in Braunschweig, for Solar Energy Systems ISE in Freiburg, for Silicate Research ISC in Würzburg, for Mechanics of Materials IWM and for Photonic Microsystems IPMS in Dresden are pooling their expertise. “Institutes with different types of expertise in the production of coatings have got together to provide the first contact point for conductive transparent coatings,” explains Dr. Bernd Szyszka, department manager at the IST.

The research scientists are pursuing two approaches. The first involves directly printing the structures. Up to now, the coatings have been structured by lithographic processes, an elaborate and cost-intensive exercise. There is a special technique, the sol-gel process, by which the coatings can be simply applied by printing, but to date the conductivity

of the coatings produced in this way has not been good enough for transparent displays. “We have already been able to improve the conductivity of the printed coatings fivefold, which makes them suitable for displays, and we believe we can improve them even further. At present their conductivity is a tenth of that achieved by conventional coatings,” says Löbmann. The researchers have already produced initial demonstrators. Apart from being easy to manufacture, the printed coatings have further advantages. They are cheaper than conventional techniques and the new process is about one order of magnitude faster.

The second approach being pursued by the researchers is to develop new types of coatings which conduct electricity differently from conventional coatings. “Conventionally, the transparent coatings have been n-conductors. But in these semiconductors, electrons carry the current flow,” project manager Dr. Peer Löbmann from the ISC. “We are developing transparent coatings made of p-conducting materials, in which moving gaps between the electrons conduct the current.” Although these materials do not conduct the current as well as n-conductors and are not as transparent, if n-conductors are combined with the p-conductors they can be used to make transparent diodes, transistors and solar cells. The researchers have already recorded their first success and have produced a transparent conductor using the sol-gel process. In a further step they are now improving the conductivity of the coatings.

Provided by Fraunhofer-Gesellschaft

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