Flexible Electronics – New Devices on Nearly Any Type of Substrate

by **Angelika Boeer** published: 2011-07-06

Flexible electronic devices – this is a fascinating topic and becoming more and more important these days. Professor Rogers and his team at the University of Illinois are actively developing new systems for such devices. In the journal *Advanced Functional Materials* they present their recent success with a new class of semiconductors that enables the integration of high-performance electronics on nearly any type of substrate.

The new devices are based on single-crystal silicon. This material is already widely and successfully used for transistors or semiconductors, and its continued use for microelectronics seems very promising. In their studies, researchers are going beyond conventional, waver-based implementations to find ways that avoid constraints in size, geometry, mechanics, or simply costs. One example are thin-film electronics on glass for liquid-crystal displays (LCDs). But although many important systems have already been developed on the basis of single-crystal silicon, the production of high-performance devices that incorporate gate dielectrics formed by thermal oxidation remains a challenge.

The scientists at the University of Illinois have now achieved this step and developed a fully formed metal oxide-semiconductor field-effect transistors (MOSFETs) with thermally grown gate oxides and integrated circuits. The devices were constructed from thin, releasable single-crystal silicon semiconductors and can be mounted on all kinds of substrates, ranging from flexible sheets of plastic, to plates of glass, or pieces of aluminium foil. The image shows an array of MOSFETs with a set of logic gates printed onto a plastic (polyimide) substrate.

These new procedures and devices have the potential to bypass the need for additional specialized processes to fabricated large-area electronics and are an important contribution towards applications such as display systems, flexible and stretchable electronics, or other, no-waver-based devices.

J. A. Rogers et al., Adv. Funct. Mater., 2011 ; DOI: 10.1002/adfm.201100124

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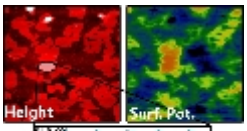

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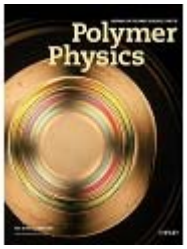

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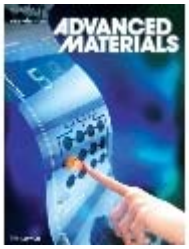

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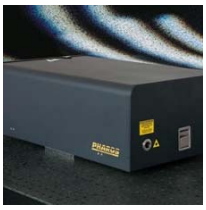

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