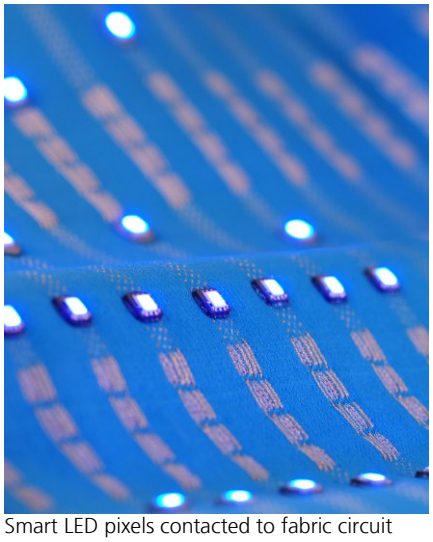
Fraunhofer IZM

Technische Universität Berlin

++++++++ Light-Emitting Textiles +++++++++

Lumoled.sys:

Technology Platform for Textile-Based Organic Light-Sources and Addressable Textile-Integrated Light-Sources



Smart LED pixels contacted to fabric circuit I²C-bus using elastomeric non-conductive adhesive (NCA). The smart pixels contain a microcontroller which allows addressing each pixel individually.

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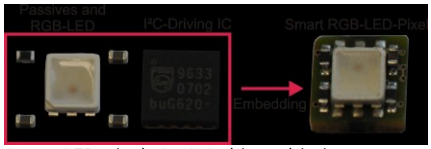
Background

Lumoled.sys is a 2.5-year research project started in May 2010. It is funded by the Fed. German Ministry of Education & Research and coordinated by VDI/VDE-IT. All partners are research institutes as the project focuses on feasibility. These are TITV Greiz, STFI Chemnitz, TU Darmstadt, Fraunhofer IAP and Fraunhofer IZM.

Goal

Lumoled.sys operates at two levels. On the fiber level, organic LEDs (i.e. light emitting diodes) are developed by depositing organic layers onto the fibers. On the fabric level, a contacting process is investigated for connecting electronic modules with fabric circuits in a low cost and reliable manner. This is a technology that in principle could be applied to all sorts of electronic modules, yet in the project these modules are smart LED pixels. These pixels have addresses to control the color and the light intensity of each pixel individually.



Smart LED pixel: An I²C driver chip is embedded into a multilayer printed circuit board (PCB). Afterwards passive components and an RGB-LED (red-green-blue light emitting diode) are assembled onto the PCB. Each pixel can be addressed individually via the bus to change its color or light intensity.

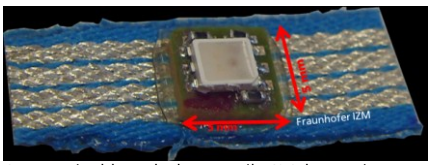
Realization

The part of IZM is to develop the smart pixels and the contacting technology for connecting the pixels to the fabric circuit. For the latter, IZM develops an adhesive bonding process. A non-conductive adhesive is placed between the fabric circuit and the electronic module. Then pressure and heat is applied. The adhesive melts and lets the contact partners touch. Subsequent cooling solidifies the adhesive and keeps the contact permanently.

Publications

T. Linz, M. von Krshiwoblozki, H. Walter, and Ph. Foerster, "Contacting electronics to fabric circuits with non-conductive adhesive bonding," Journal of the Textile Institute, pp. 1-12, March 2012.

M. von Krshiwoblozki, T. Linz, A. Neudeck, and Ch. Kallmayer, "Electronics in Textiles – Adhesive Bonding Technology for Reliably Embedding Electronic Modules into Textile Circuits," publication planned for autumn 2012



Smart pixel bonded to textile I²C bus using non-conductive adhesive (NCA).Pressure and temperature is applied to the assembly stack. This melts the adhesive. The contact partners touch. Cooling solidifies the adhesive which preserves the contact permanently.