EXPERTISE AND SOLUTIONS

Our customers can choose between a number of different cooperation models: from direct contract research by Fraunhofer IZM through to joining an EU, federal or state government funded scientific research project.

We provide the following services:

- Developing textile-integrated electronic systems
- Packaging technologies for textile microsystems
- Qualification, reliability testing and failure analysis
- Prototyping manufacturing up to small-series manufacturing level
- Licensing and technology transfer
- Technical servicing, consultation, advanced training and studies
- Fundamental research

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Cover: NCA-bonded RGB smart-pixels on textile circuits with embedded PC-LED drivers (Project: LumoLed.sys)
ELECTRONICS AND TEXTILES

Textiles are an indispensable part of our everyday life. They are not limited to clothing made of fabric, knits and fleece, but also include technical textiles and composite materials. They withstand extreme stresses during washing and have many different functions while being light and highly flexible.

By integrating electronic components, textiles can be enhanced with many different functions such as sensors and lighting. This enables completely new application areas for textiles.

Fraunhofer IZM's research group System-on-Flex has been developing, analyzing and qualifying textile-based electronic systems for over ten years. A main focus is innovative interconnection technologies for textile and stretchable substrates. Functionality and reliability requirements are always determined by the application in question.

Our laboratory for electronics in textiles (TexLab) and diverse equipment for microelectronics assembly and analysis provide the best preconditions for research and development.

APPLICATIONS

The wide variety of electronic textiles available is matched only by the many possible applications, including in the fashion sector, to medical engineering, security and logistics, through to the lighting and construction sectors:

- Textile ECG and EMG sensors for monitoring heart and muscle activity directly in sports clothing (ConText)
- Sensors integrated into clothing as part of personal safety applications (Sinetra, Texteer)
- Large-area fabric with integrated sensors for alarm systems (AlarmTextil)
- Lighting and displays on and in fabric (Place-IT, LumoLED)
- Sensors in fiber-reinforced composite materials for condition monitoring
- Textile RFID transponders for logistics (TextraLog)
- Interactive evening dress and activewear (Cyber Nomade Suite, Sporty Supaheroe Jacket, Klight)
- Anti-theft and anti-fraud protection in clothing and textile accessories (Pocket Lock Backpack)
- Occupancy sensors for vehicle seats (InsiTex)

TECHNOLOGIES

We apply microelectronic processes, such as low-temperature soldering, gluing with conductive and non-conductive adhesives and non-heat based joining such as force fitting and crimping. One simple but extremely robust technique that also meets high reliability requirements is gluing using non-conductive thermoplastic adhesives.

We have also investigated electrical bonding by stitching in depth.

An alternative is offered by flexible electronic systems based on polyurethane substrates, which can be laminated onto textile substrates using conventional processes.

Apart from the bonding technique, system reliability is determined by the encapsulation technology, and here we develop processes for liquid encapsulation and transfer and hot melt molding.

Reliability is another key issue. All systems are validated in-house according to industrial norms for parameters such as temperature, humidity, washing.