

# Wearable IT devices: Dyeing process gives textiles electronic properties

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Polymerized glove that can be used to digitally capture hand movements. Credit: Oliver Dietze

"Our goal was to integrate interactive functionalities directly into the fibers of textiles instead of just attaching electronic components to

them," says Jürgen Steimle, computer science professor at Saarland University. In his research group on human-computer interaction at Saarland Informatics Campus, he and his colleagues are investigating how computers and their operation can be integrated as seamlessly as possible into the physical world. This includes the use of electro-interactive materials.

Previous approaches to the production of these textiles are complicated and influence the haptics of the material. The new method makes it possible to convert textiles and garments into e-textiles, without affecting their original properties—they remain thin, stretchable and supple. This creates new options for quick and versatile experimentation with new forms of e-textiles and their integration into IT devices.

"Especially for devices worn on the body, it is important that they restrict movement as little as possible and at the same time can process high-resolution input signals", explains Paul Strohmeier, one of the initiators of the project and a scientist in Steimle's research group. To achieve this, the Saarbrücken researchers are using the in-situ polymerization process. Here, the [electrical properties](#) are "dyeing" into the fabric: a textile is subjected to a chemical reaction in a water bath, known as polymerization, which makes it electrically conductive and sensitive to pressure and stretching, giving it so-called piezoresistive properties. By "dyeing" only certain areas of a [textile](#) or polymerizing individual threads, the computer scientists can produce customized e-textiles.



Bruno Fruchard presents a textile that changes its conductivity depending on the degree of stretch Credit: Oliver Dietze

In their test runs, the researchers have produced gloves that can digitally capture hand movements, a zipper that transmits different electric currents depending on the degree of opening, and sports tapes that act as user interfaces that are attached to the body.

Also, materials other than textiles can be treated with the process. Audrey Briot, an artist from Paris, has created an evening gown with touch-sensitive feathers that generate sounds via a computer when touched. She polymerized the feathers using the Saarbrücken [computer scientists'](#) method. The dress was nominated for the STARTS Prize of the European Commission.

**More information:** Cedric Honnet et al. PolySense: Augmenting Textiles with Electrical Functionality using In-Situ Polymerization: [hci.cs.uni-saarland.de/wp-cont ... I\\_Polymerization.pdf](https://hci.cs.uni-saarland.de/wp-content/uploads/2020/10/Polymerization.pdf)

Provided by Saarland University

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