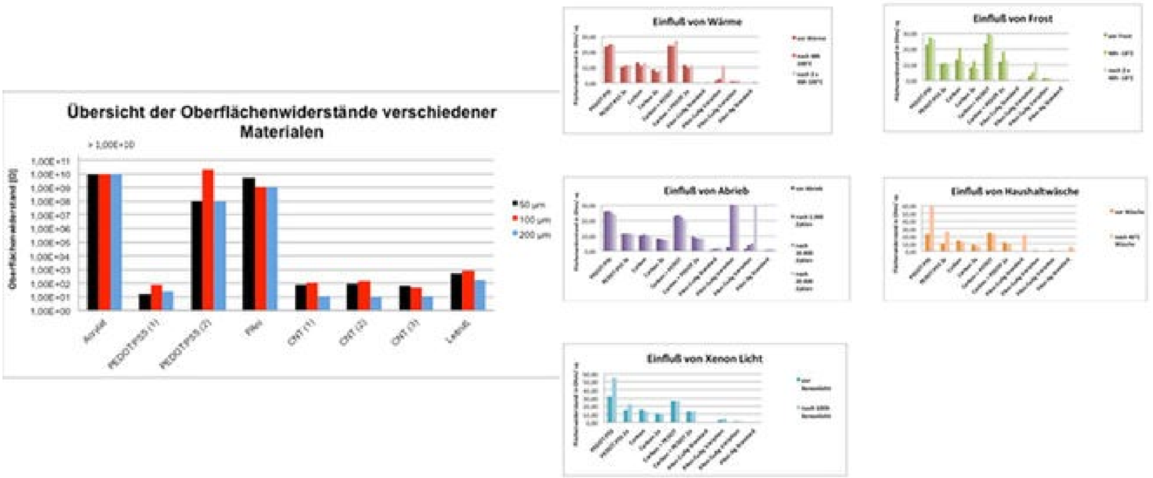

Fig.: Comparison of surface resistances (left) and investigations into durability (right)

Solvent-free textile coating with intrinsically electrically conductive polymers

In project 16949N, solvent-free electrically conductive coatings for textiles were developed. These finishes are based on intrinsically conductive polymers. The conductive polymers were embedded in a polymer matrix of polyacrylate, polyurethane or styrene-butadiene. Intrinsically conductive polymers are able to conduct electrical current via their conjugated electron system in a reduced or oxidized state. Initially, the extent to which the conductive polymers polypyrrole, polyaniline and poly-3,4-ethylenedioxythophene can conduct electricity in coatings on films and textiles was investigated. The work was carried out using polymer dispersions, some of which are commercially available. However, the conductivity of textile and plastic coatings was very different. In the course of the project, this was attributed to the three-dimensional structure of textiles. The addition of conductive carbon pigments such as graphite or CNT or metal pigments led to a drastic improvement in conductivity. The coating dispersions were applied to

The best results were achieved on a densely woven polyester fabric, while significantly higher resistances were achieved on materials with a very pronounced three-dimensional structure. In the following, the project was able to show that it is possible to achieve a sheet resistance of less than 1 ohm/sq with dispersions of intrinsically conductive polymers and conductive pigments. With a dispersion without conductive plastics, a sheet resistance of approx. 30 Ohm/sq is achieved. The use of conductive plastics therefore enables a significant improvement in conductivity.

The conductive coatings were tested in the laboratory for various applications: On the one hand as an electrode for luminous textiles, on the other hand for generating heat or as a sensor.

The interface between the conductive textile coating and conventional electronic components remains problematic. Various methods were tested here, such as embroidery, sewing and gluing.

At the end of the project, the conductive coatings were tested for their stability in use. This includes resistance to abrasion, light, heat, cold and washing, as shown in the diagrams (figure on the right). Good to very good results were achieved with almost all coatings.

The complete final report is available to the interested public in the Federal Republic of Germany and can be requested at ftb@hs-niederrhein.de.

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