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Maintenance of flexible electroconductive screen printed layers

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Over the last years smart textiles and wearable textile systems have become popular as a concept. These developments require new materials such as electroconductive textiles. As a result, research into screen printing of conductive silver inks onto flexible substrates has emerged. On the other hand these electroconductive textiles need to be maintained through laundering or dry-cleaning. In this paper the durability of the dry-cleaning maintenance of the screen-printed electoconductive flexible substrates was chosen as these materials will be integrate in garments wich need these kind of maintenance, such as protective clothing, casual jacket or outdoor sportswear. In order to obtain the electroconductive flexible substrates the screen printing method is used and for this four kinds of silver-based conductive inks on polyurethane foam and nonwoven PES substrate, were used. The printed flexible textiles studied here show good electrical properties after printing (< 0.05 Ω/). The electoconductive flexible substrates were dry-cleaned 5, 10, 15, 20 and 60 times and the electrical properties were measured after they were dried and they remained below 2.3 Ω/. In order to preserve very good electrical properties up to 60 dry-cleaning cycles, a protective non-conductive layer was put on top of the printed pattern. The valeus of the square resistance varied between 0.025 to 2.263 Ω/. Furthermore was observed that the PES based ink combines best with PES substrate, while epoxy-based ink gives better results with polyurethane foam. In conclusion a good combination between ink and substrate needs to be found in order to obtain a high-quality electroconductive substrate that can be integrated into garments and easily maintained.

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