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Flexible and durable highly conductive coatings for smart textile applications

The aim of this research is to develop highly conductive coating compounds for the emergence of comfortable and durable garments with integrated technology. Metals as filler particles for coating and printing pastes are the focus in this work. This, due to that metal provides excellent conductive properties particularly important for producing reliable electronic circuits used in e.g. wearable body monitoring systems. The research presented center on the frequently reported research challenges; to overcome the stiffening effects of metals and the poor mechanical resistance of the conductive film, commonly shown during folding, abrasion and washing [1,2]. This affects the comfort for the wearer and the durability. A prior concern is also the toxicological effects of certain metal particles, possibly leaking out into the environment during washing or wearing. Therefore the mechanical resistance and adhesion of these types of coatings are further investigated.
Today, the use of metal compounds for flexible electronic fabrics are frequently reported including their use for electromagnetic shielding and even antimicrobial effects [3]. In this work, conductive coatings containing silver-coated copper flakes are evaluated for their electrically and thermally conductive properties, using square resistance measurements and infrared camera imaging respectively. Different approaches for improving the durability of the conductive films are comprised, such as addition of a cross-linking agent and encapsulation of the conductive film.

This work was supported by the R&D board at the University of Borås.

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