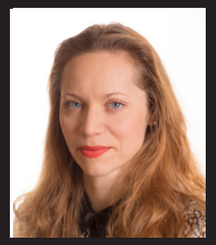

This thesis investigates the manufacturing and characterisation of functionalised textile coatings containing different types of flake-shaped fillers with angle-dependent colour-changing and electrically conductive properties, respectively. Common benefits of these types of flakes are their high aspect ratio, which offers low filler loading with high functional performance. However, when applied on flexible fabric, their impact on the mechanical properties and durability leads to that a trade-off between, for example, flexural rigidity and functional performance need to be taken into account. Both experimental studies, with different functional approaches, explore how formulation additives e.g. rheology modifiers and cross-linker and knife coating parameters e.g. gap height and speed influence the formulation viscosity, which in turn strongly influences the amount of solids deposited on the fabric, and the functional performance.

Multilayered mica pigments can provide an angle-dependent colour change based on the phenomenon of interference, and has great potential in application within the textile design and product authentication fields. However, optimal conditions for intense colour-changing effects using these types of flake-shaped pigments depend on a plane-parallel orientation to a flat substrate. The pigment orientation is challenged by textile substrates, which have a textured surface due to the cross-sectional shape of the fibre, the yarn composition and fabric construction. In addition, the semi-transparent nature of these types of pigments means that the substrate colour highly influences the colour-changing effects.

Metal flake-shaped fillers for high electrical conductivity applications are particularly advantageous for reliable power and signal transferring interconnections in the field of electronic textiles. As the conductivity depends on the electron transport between the metal flakes, the challenge is to establish and maintain the three-dimensional network of contacting surfaces between flakes. Although the network is held together and adhered to the substrate by an insulating polymer film matrix, it is highly sensitive to dimensional impact upon different types of strains. In addition, to these associative challenges, this work studies electrical characterisation methods comparing the performance of linear and square electrical resistance measurement methods including the influence of wear and maintenance tests on the overall electrical properties.

Digital version: http://urn.kb.se/resolve?urn=urn:nbn:se:hb:diva-13691
ISBN 978-91-88269-90-4 (printed)
ISBN 978-91-88269-91-1 (pdf)
ISSN 0280-381X Skrifter från Högskolan i Borås, nr. 87

DOCTORAL THESIS
Textiles and Fashion

Veronica Malm

FUNCTIONAL TEXTILE COATINGS CONTAINING FLAKE-SHAPED FILLERS

FUNCTIONAL TEXTILE COATINGS CONTAINING FLAKE-SHAPED FILLERS

Veronica Malm

– Investigations on selected optical and electrical properties

THE SWEDISH SCHOOL OF TEXTILES
UNIVERSITY OF BORÅS