Project title	Markers for better Sorting towards Recycling
Partners:	Institut für Aufbereitung und Recycling der RWTH Aachen University (I.A.R.) Centexbel (CTB)
Partners:	01/2017 – 12/2018
Funding:	BMWi IGF-Nr.: 182 EN

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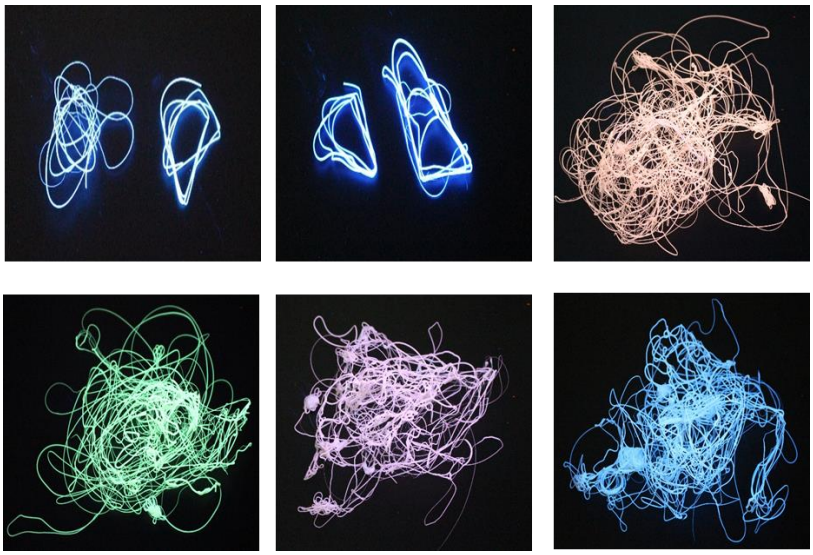
29/05/2019

Mission Statement:

The project "The project “Markers for better Sorting towards Recycling" aims to develop an industry-oriented concept for marking textiles with markers in order to improve the traceability, identification and recyclability of textile products. This project will test different types of markers for their suitability for melt spinning and coating processes. The markers can either be integrated into the filaments or applied to the textile surface. The identification and sorting of the marked products will be evaluated in a pilot line at the I.A.R.. In addition, an industry-oriented concept for the labelling of textiles with different markers will be developed and recommendations for its implementation in the textile sector will be developed.

Approach and results:

The project will test different types of markers for their suitability for melt spinning and coating processes. In addition, a sector-oriented concept for labelling textiles with different types of markers will be developed and recommendations for their implementation in the textile sector will be developed.



Yarns with different UV-active markers (wavelength 365 nm)

At the beginning of the project, markers with different fluorescent colours from different manufacturers were tested in order to find suitable markers that could be incorporated in the melt spinning process. For the detection of the markers incorporated in filaments and textiles, UV LEDs radiating in different wavelength ranges and beam intensities were tested.

In order to achieve the most economical implementation of textile coding from an economic point of view, the minimum marker concentration was determined at which the markers could still be detected in or on the textile. For this purpose, different markers were incorporated in different concentrations. In the melt spinning process, the minimum possible marker concentration varied depending on the marker colour, but was > 0.01 % except for a single marker type. This can have a negative effect on the economic efficiency of the process in case of a later implementation, as the markers are relatively expensive at approx. 100 €/kg.
In addition to different concentrations, several combinations of markers that fluoresce in different colors were tested in order to achieve a higher color selection for information transmission through a coding system. In addition, the development of possible coding systems has made it possible to demonstrate feasible implementations of marker-based coding of textiles for companies. The coding systems are based on sample representations generated by variations of colours, concentrations, distances and sequences of different markers.
The longevity of the marked samples was investigated in extensive test campaigns. According to this, the goal of marker-based recognition of textile composites can be achieved technically, but currently appears to be less lucrative economically due to the effort involved in marker application. Nevertheless, it was shown that the markers applied in the melt spinning process do not have a negative effect on the melt spinning process. In addition, the markers do not result in weaker mechanical properties in the yarn, such as reduced strength. Technological implementation, on the other hand, can be promising if sustainability aspects are also taken into account in the cost-benefit analysis with a view to high-quality product recycling.

Acknowledgements:

The IGF project 182 EN of the Forschungsvereinigung Forschungskuratorium Textil e.V., Reinhardtstraße 14-16, 10117 Berlin, was funded by the AiF within the framework of the Programme for the Promotion of Industrial Community Research (IGF) of the Federal Ministry of Economics and Energy on the basis of a resolution of the German Bundestag. We thank the Arbeitsgemeinschaft industrieller Forschungsvereinigung for the financial support of the research project.

Gefördert durch:

Bundesministerium für Wirtschaft und Energie

aufgrund eines Beschlusses des Deutschen Bundestages

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