

Project title: industrial RePAN

Partners: Biederlack GmbH + Co., Greven; TVU Textilveredlungunion GmbH, Leutershausen; Faser Veredlung Tönisvorst GmbH (FVT), Tönisvorst; JBF Maschinenbau GmbH, Hohentengen; Dralon GmbH, Dormagen; IVV Fraunhofer, Freising

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Mission Statement

In order to achieve a "Green Economy", the Federal Ministry of Education and Research adopted the new third framework programme "Research for Sustainable Development FONA3". An essential component of this framework programme is the increase in raw material efficiency to conserve finite fossil raw material sources. An important contribution to increasing the efficiency of raw materials can be made by developing innovative recycling processes to close material cycles and enable a "circular economy".

The objective of the industrial RePAN project is to develop an industrially feasible, economical recycling process for textile waste containing polyacrylonitrile (PAN). PAN is a polymer obtained from fossil raw materials, which is mainly used as a fibre material and which we encounter in our daily lives, e.g. in blankets, pullovers or carpets. Approximately 172,000 tonnes of polyacrylonitrile (PAN) staple fibres [www18a] are produced annually in Germany, while in the EU the figure is around 215,000 tonnes [Her16]. For the production of one ton of PAN, 2.590 kg of CO₂ are emitted [Pat99]. By directly substituting primary PAN (polymer) with recycled PAN, these CO₂ emissions can be reduced proportionally. The quality of the recycled PAN fibres should be in the range of virgin material and is therefore available again for the entire application spectrum of virgin material. In order to close material cycles and to produce equivalent PAN products from

textile waste containing PAN neither on federal, nor on EU and international level, there no take-back system and no recycling process.

Approach

To overcome these shortcomings, an innovative solvent-based recycling process for the production of recycled PAN multifilament and staple fibre yarns from textile waste containing PAN is being developed. To illustrate the wide range of possible applications, these yarns will be processed to make living room blankets. Furthermore, environmentally friendly dyeing recipes for the recycled PAN fibres are being developed, as the colouring is a very important quality feature, especially in the field of clothing and house and home textiles. Accordingly, the technical feasibility is demonstrated along the entire process chain, from PAN polymer recovery and PAN fibre production to the finished product (living room blankets). The development is carried out on a technical and industrial scale and is thus available for industrial use after the project is completed. The secondary raw material sources in this project are production waste that is generated during the production of blankets and blanktes (rejects) themselves, representative for end-of-use waste. To illustrate this, Figure 1 shows the process chain of the intended recycling procedure using the example of residential blankets with all partners in the association. In addition to the technical feasibility of the new process, various solutions are being developed with the involvement of associations and the sales networks of the various consortium partners to make new sources of PAN-containing textile waste accessible for recycling. The main focus will be on the development of end-of-use waste, as this makes up the largest share in terms of volume. As an outlook for follow-up projects, an extension of the process to other polymer types is planned.

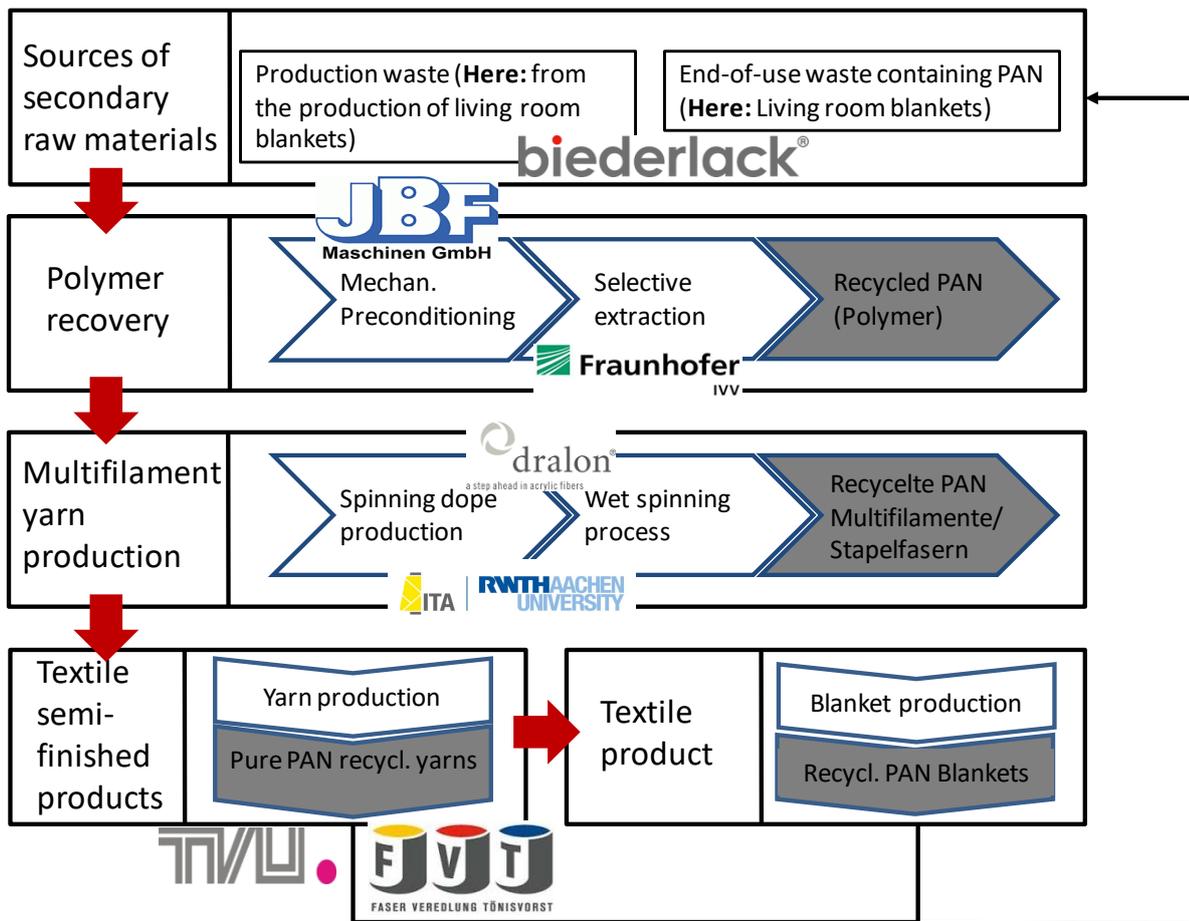


Figure 1: Process chain for the recycling of textile waste containing PAN using the example of the production of residential ceilings, with participating consortium partners for each sub-process step.

Acknowledgement

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