

BayPAT

# Plastics: Polymeric Spider Silk Fibers

Reference No: B78127

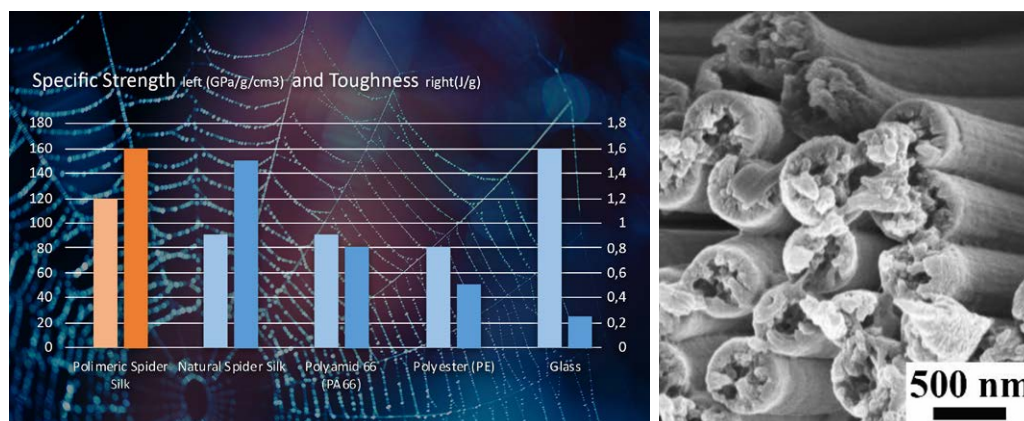
## CHALLENGE

Spider silk has outstanding material properties: very high tensile strength combined with high toughness and unrivalled elongation. It is well suited for lightweight functional products as wearables, technical parts in the aerospace or automotive industries, for medical and also for building applications. Natural protein-based spider-silk can be manufactured artificially only at high costs and was shown not to be durable when exposed against several environmental influences. The challenge for the inventors of the University of Bayreuth was to develop a non-protein-based silk that is suitable for high tech applications as well as affordable for lifestyle products.

## INNOVATION

The present invention includes a process for the production of a polymer-based yarn using technical spinning. Fibers of the existing polymer Polyacrylnitril (PAN) have been processed by electrospinning - an established hightech process. Curing at high temperatures and crosslinking of the single ultra-fine yarn fibers results in material properties exceeding natural spider silk with a higher resistance against environmental influences. Due to the use of polymers, the material can be produced at much lower cost than protein-based spider silk.

- High tensile strength
- Strong toughness (energy absorption)
- Unrivalled elasticity
- High durability / low fatigue
- Lightweight



## COMMERCIAL OPPORTUNITIES

Material with outstanding physical properties for the synthetic fiber market: such as textile, leisure, automotive, aerospace medical industry or others.

## DEVELOPMENT STATUS

Production of prototypes and testing samples. Proof-of-concept accomplished: Yarns with a toughness of  $166.5 \pm 11.04$  J/g and a tensile strength of  $1236 \pm 40.4$  MPa were manufactured successfully.

## REFERENCES:

- 1 AAAScience-Paper: <https://science.sciencemag.org/content/366/6471/1314.abstract>
- 2 Video: <https://youtu.be/m9khlspNmUo>



Technology from  
UNIVERSITY OF  
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### IP rights:

EP filed in 2019  
PCT filed in 2020

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