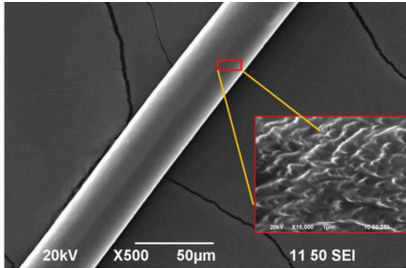


# Super-Tough Artificial Spider Silk

Manufacturing

Nanotechnology and New Materials



Materials	Toughness (MJ·m <sup>-3</sup> )
Dragline silk	180
Aciniform silk	376
<b>Our product</b>	<b>387</b>

**Remarks**  
 1. International Exhibition of Inventions of Geneva (IEIG) 2024 - Gold Medals

**IP Status**  
 Patent filed

## Opportunity

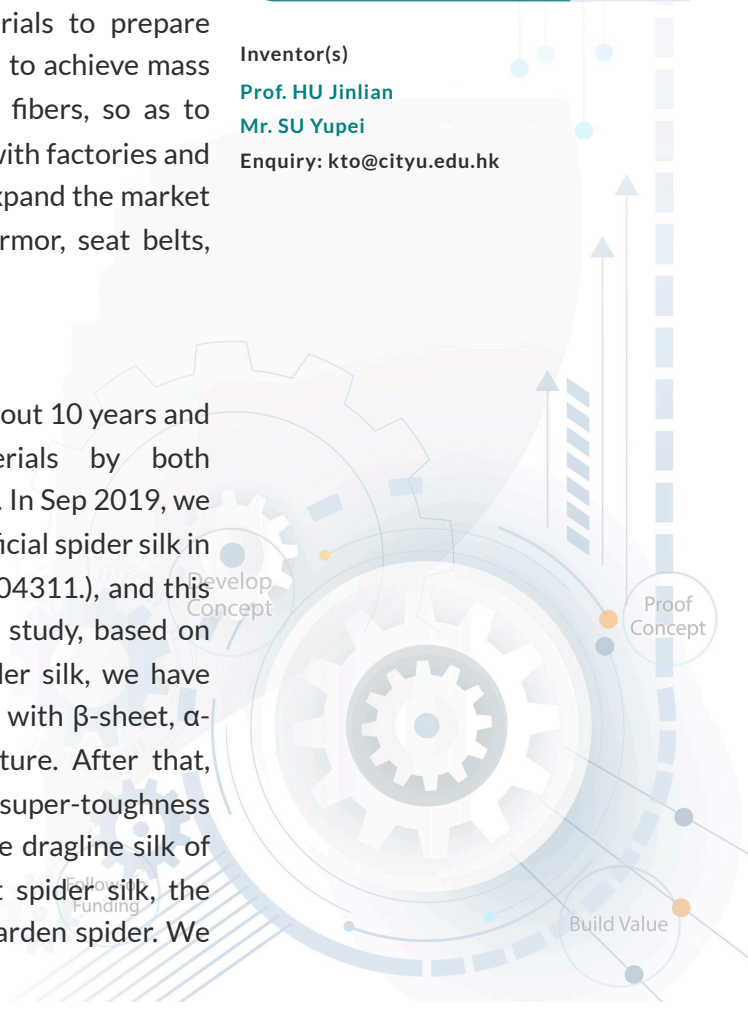
Natural spider silk is well known for its high toughness with both high strength and elongation, which makes it an excellent material for many applications in the clothing, automotive, defense and aerospace industries. However, due to the unique living habits of spiders and the low yield of spider silk, it is difficult to achieve the mass production of natural spider silk, so artificial spider silk has been the dream of many scientists and various industries. Our company uses amino acids as raw materials to prepare polypeptides, and then synthesizing polyurethane/polyurea to achieve mass production and spinning of artificial protein-like polymer fibers, so as to make high performance artificial spider silk. We cooperate with factories and enterprises to develop high-end customized business and expand the market of artificial spider silk products in sports apparel, body armor, seat belts, parachutes, etc.

## Technology

Our research team focused on the study of spider silk for about 10 years and has successfully developed spider-silk-inspired materials by both transgenic engineering and chemically synthetic methods. In Sep 2019, we published a paper on chemical synthesis of super-tough artificial spider silk in *Advanced Materials* (*Advanced Materials*, 2019, 31.48: 1904311.), and this article was selected as a cover page by the editor. In that study, based on years of research on the structure and properties of spider silk, we have proposed and efficiently realized a pseudoprotein polymer with β-sheet, α-helix and random coil structures in the spider silk structure. After that, super-tough fibers are spun through dry spinning. The super-toughness (~387 MJ/m<sup>3</sup>) is more than twice the reported value of the dragline silk of common spiders and comparable to that of the toughest spider silk, the aciniform silk from the *Argiope trifasciata* or the banded garden spider. We have two patents for this work and later development.

Technology Readiness Level (TRL) 6

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## Advantages

- Super-tough artificial spider silk that rivals natural spider silk
- Innovative mass-production design
- Good wet stability
- Low cost

## Applications

- Sportswear
- Body armor
- Seat belt
- Parachute
- Tow rope

