Transforming Spider Silk Protein into Fibers (Yissum)

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Harnesses the self-assembly capabilities of cellulose binding domain (CBD)

Categories	Agriculture, Chemistry & Materials, Biomaterials, Fibers, Textiles
Development Stage	Proof of concept completed
Patent Status	PCT patent application filed

Highlights

- There is a great demand in the field of nano-biotechnology and material science for a reliable, highly stable building block that can self-assemble to form more complex structures.
- The translation of super strong spider silks into synthetic or bio-inspired materials for high-performance fibers has remained a challenge.
- Silk-like protein in solution has been produced from bacteria by recombinant DNA techniques, but a method to spin the protein into well-ordered fibers was not previously available.
- The cellulose binding domain (CBD), which enables the adhesion of water-soluble proteins onto the insoluble substrate surface of cellulose, has been utilized to turn silk protein into fibers.

Our Innovation

The fusion of CBD to spider dragline silk proteins to form silk fibers and silk-cellulose composites.

Key Features

- Enables the assembly of short-molecule silk proteins in liquid crystalline form into solid silk fiber
- Overcomes proteins' tendency to aggregate in vitro instead of folding
- Produces heat-stable protein fibers
- Strong, cost-effective silk-cellulose composites

Development Milestones

- Seeking strategic industrial partner to develop products

The Opportunity

- The high strength, elasticity and low weight of the silk protein make it suitable for applications in medicine, such as tissue reconstruction, cell growth scaffolds, and support for bone, ligament and tendon in implantable medical devices.
- Other possibilities in military and aviation applications, such as mini drones and personal armor

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