

## The New Road to Silk: Bio-based Production of Silk-like Materials



Biological materials are a fascinating study area for two main reasons: (1) biological materials provide a route towards a sustainable use of raw materials and overall reduced environmental burden, (2) in addition to being environmental friendly, biological materials often show very impressive functional properties. The ultimate goal is to combine these two concepts, leading to sustainable materials with impressive functional properties.

One such type of natural material that could find widespread use is the silk-like material produced by spiders. It has impressive properties because it is an extremely tough and elastic but also light material. Furthermore, different types of silk have different properties depending on their molecular level compositions. Unfortunately, we cannot expect to be able to use spiders for a large-scale production of this type of material. One of the most attractive promises of biotechnology is that this obstacle could be overcome by producing spider silk by microbes at a very large scale in reactors in factories. Because silk is a protein based material this approach is feasible, but it requires that the genetic information coding silk proteins are transferred to microbes, and that these are optimized for efficient production. Currently, a significant challenge is to turn the silk proteins that have been produced by microbes into the right form so that they can be used as a material. In order to achieve these goals, the NEWSILK project combines the knowledge of production of silk proteins with skills in polymer processing. Also, it involves a designers' creative perspective to explore new uses of such materials and to efficiently communicate the research results and process. It can be expected, that in the future we will be able to make new types of materials as inspired by how spiders make their silk, enabling sustainable use and consumption and with properties that surpass what we currently are able to achieve.

Contact information: Markus Linder, [markus.linder@aalto.fi](mailto:markus.linder@aalto.fi)