

AMSilk®-Silkfilms – general description

AMSilk's **Spidersilk®** is a unique monodisperse protein biopolymer. Films made from **Spidersilk** combine promising mechanical properties with biocompatibility and no inherent immunogenicity. **Spidersilk Films** are biodegradable and do not contain any petrochemicals nor do they compete with food production. AMSilk can use different **Spidersilk** proteins with varying physico-chemical properties to determine the properties of the resulting films.

There is continuous transition between a coating and a film made from this high performance material. Film thickness can be adjusted from below 10 microns to 100 microns and more. The resulting films are homogeneous and transparent. The mechanical properties can be specifically tailored depending on the need of the application.



Spidersilk Films may be employed in medical devices or technical products.

Properties of Spidersilk films

Mechanical properties

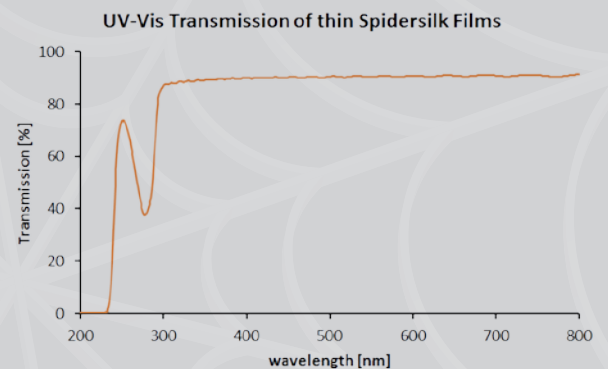
Depending on the specific **Spidersilk** proteins used or the film production method applied, **Spidersilk Films** range from very elastic and extensible to rigid and strong. Although the mechanical properties are not as good as those found in the silk thread, silk films are suitable for many applications.

Selected **Spidersilk Films** show mechanical properties comparable to well-established

polymeric films and foils made from nylon66, polylactic acid or polyethylene, among others. The maximal strain >500% of some **Spidersilk Films** strongly depends on process and additives.

Transmission & specific adsorption

The silk films show a high brilliance and are transparent in the visible range. The UV/Vis transmission through a thin silk film is about 90% from 300 to 800 nm (quartz glass approx. 88%). There is a specific UV adsorption at 260 nm.



Thermal Properties and Stability of Spidersilk Films

Common proteins are very sensitive to high temperature. They denature, lose their function or form new aggregates. **Spidersilk Films**, however, can be heated to above 200°C without alteration of the mechanical properties. This high temperature stability allows flexibility with processing steps for final products using **Spidersilk**. The films are not soluble in water (including most acids and bases) or many organic solvents.

Biocompatibility of Spidersilk Films

As **Spidersilk** itself is biocompatible, silk foils are also biocompatible. They can be used for different medical applications such as lenses, drug loading films, coverage.

Functionalization of Spidersilk Films

Spidersilk can be functionalized through chemical modifications (direct linkage of functional molecule), genetic modification (hybrid/fusion **Spidersilk** proteins with bioactive peptides), or through mixing with the dope prior to film preparation. Films can also be joint to form sandwiches or other shapes, enclosing functions in a separate phase.

Literature:

Hardy et al.; Polymer 49 (2008) 4309–4327
Huemmerich et al.; Appl. Phys. A 82 (2006) 219–222

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