



## **The processing and hetero-structuring of silk with few cycle fs pulses**

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The spider silk is an excellent biomaterial that is light weight, elastic, yet tougher than steel. A great deal of research has been performed to understand its functions, new properties [1,2], structure-function relation and its scope of applications has been very wide. There are two key difficulties, first, it is difficult to process silk with nanometer scale precision while preserving its excellent properties, and, second, it is also difficult to combine silk with other materials such as metals, glass, polymers etc.

In this talk, I will discuss, how we can use few-cycle fs pulses to process silk in air with nanoscale precision exploiting its non-linear multiphoton interaction with light [3]. We shall also show our attempts to successfully weld silk with metal, Kevlar and polymers to combine their favourable properties. This allows silk-based novel topological structures and devices such as radiation-pressure force sensors capable of operating in air, on water surface and in high vacuum. The short fs-pulses may be the key tool to process other biomaterials for diverse applications.

### Reference:

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