



Engineering, processing and applications of structural proteins: The tale of spider silk

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Melbourne Centre for Nanofabrication

151 Wellington Road, Clayton, 3168

Zoom link: [click here](#)

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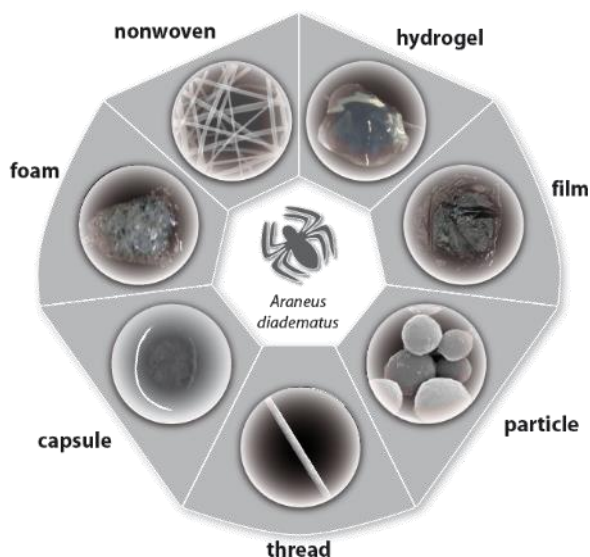
W: <https://fiberlab.de/>



Abstract:

Proteins reflect one fascinating class of natural polymers with huge potential for technical as well as biomedical applications. One well-known example is spider silk, a protein fiber with excellent mechanical properties such as strength and toughness. During 400 million years of evolution spiders became outstanding silk producers. Most spider silks are used for building the web, which reflects an optimized trap for flying prey. We have developed biotechnological methods using bacteria as production hosts, which produce structural proteins mimicking the natural ones. Besides the recombinant protein fabrication, we analyzed the natural assembly processes and we have developed spinning techniques to produce protein threads closely resembling natural silk fibers. Importantly, we can employ the bio-inspired proteins also in other application forms such as hydrogels, particles, non-woven mats, foams or films, and we have been able to use spider silk proteins as novel bioinks for biofabrication. Our bio-inspired approach serves as a basis for new materials in a variety of medical, biological, or technical applications.

Keywords: Spider silk, Protein fibers, Hydrogels, Bioink, Biofabrication, medical and textile applications



Dr. Thomas Scheibel is a full professor for Biomaterials as well as Vice President for research and junior scholars at the University of Bayreuth. Since 2014 he is a member of the German National Academy of Science and Engineering (acatech). He initiated and chairs the topical committee on “Bioinspired and interactive materials” at the German Materials Society (DGM), is chairman of the Bavarian Excellence Network “Cellular Hybrids”, co-chairman of the TranregioSFB TRR225 “Biofabrication”, Member of the review board “biomaterials” of the DFG, co-founder, shareholder and consultant of AMSilk GmbH (Germany), advisory board member of Humble Bee Ltd. (New Zealand), group leader of the Neue Materialien Bayreuth GmbH (NMB), an member of the editorial boards of PLOS One, Scientific Reports, BioNanoScience, Biopolymers, and International Journal of Bioprinting.