

Special Issue

New Mechanisms and Insights into Insect Silk Gland Biology and Silk Production

Message from the Guest Editor

Insect silk—a natural marvel of strength, elasticity, and biocompatibility—holds transformative potential for biomedicine, sustainable textiles, and advanced composites. Despite this promise, reproducing its properties synthetically remains elusive. Critical knowledge gaps persist in two interconnected domains: Silk Gland Development and Silk Protein Synthesis and Processing. Understanding these mechanisms is essential to bridge the performance gap between natural and artificial silk.

This Special Issue targets unresolved questions in the interface between biology and materials science, such as Organ Development, Protein Synthesis Mechanics, Secretion and Storage, and Fiber Spinning Triggers.

This research collection will establish foundational knowledge for designing bioinspired silk systems and advance fields such as regenerative medicine (smart scaffolds) and the effective implementation of a materials circular economy. Insights into organ development and protein synthetic machinery will accelerate breakthroughs in synthetic biology and precision biomaterial engineering.

Guest Editor

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