

Translating Silk from the Lab to Patients – challenges and opportunities

David L. Kaplan

*Professor & Chair, Department of Biomedical Engineering, Tufts University, Medford,
Massachusetts, USA 02155*

Abstract

A range of novel biomaterial systems and devices have been generated from silk proteins. These proteins provide useful features in a medical context, such as water-based processing, robust and tailorable mechanical properties, biocompatibility, tunable degradability and versatility in material format. We exploit control of structure, morphology and chemistry of these protein systems to optimize biomaterial features, cell interactions and tissue related outcomes. Fundamental insight into the rules that govern some of these protein-based materials will be discussed. This insight leads to examples of how to utilize such systems for biomedical devices and in a broad range of new advanced materials. These insights and applications have led to a series of technologies as well as start-up companies that exploit the novel properties of silk biomaterials, from mechanics to stabilization and many other useful features. Examples of such systems will be described, from new FDA-approved silk-based products to future perspectives for the field.

Biography

David Kaplan is the Stern Family Endowed Professor of Engineering at Tufts University and a Distinguished University Professor. He is Professor and Chair of the Department of Biomedical Engineering, with a joint appointment at Tufts Medical School and in the Department of Chemistry. His research focus is on biopolymer engineering to understand structure-function relationships for biomaterials, tissue engineering and regenerative medicine. Since 2004, he has directed the NIH P41 Tissue Engineering Resource Center (TERC) that involves Tufts University and Columbia University. He has published over 900 peer reviewed papers. He is the editor-in-chief of *ACS Biomaterials Science and Engineering* and serves on many editorial boards and programs for journals and universities. His lab has been responsible for over 100 patents issued or allowed, and numerous start-up companies. He has also received a number of awards for his research and teaching.

