

Abstract Submitted
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A model for structural changes of reconstituted fibroin gels during deformation¹ PEIRAN JIN, PETER OLMSTED, Georgetown University, GEORGETOWN UNIVERSITY, PHYSICS DEPARTMENT TEAM — Silk from silkworms has been used in the textile industry for thousands of years. Recently, a physical electrogel(e-gel) was made by reconstituting Bombyx mori silk into stable aqueous solutions and then applying small DC electric field [Tabatabai et al, Soft Matter 11 (2015) 756]. The e-gels exhibit distinctive strain hardening and are partially recoverable from strain. To explain these phenomena, we build a coarse grained model of fibroin protein polymers, which comprise crystallizable domains and amorphous domains. We find that the kinetics of unfolding and folding of crystalline domains changes the number and functionality of crosslinks in the physical network, and thus contributes to the strain hardening of the gel and the non-recoverable strain.

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