

Abstract Submitted  
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**Double network physical gels from elastin-like polypeptide block copolymers: nanoscale control of thermoresponsive reinforcement**  
MATTHEW GLASSMAN, BRADLEY OLSEN, Massachusetts Institute of Technology — Triblock copolymers with associative protein midblocks and thermoresponsive endblocks form shear thinning hydrogels with a low yield stress at low temperatures, but can be reinforced by a self-assembled network of the endblock aggregates. Here, we compare the use of bioengineered elastin-like polypeptides (ELPs) to synthetic poly(N-isopropylacrylamide) (PNIPAM) as endblocks to control the self-assembly of the reinforcing network. The temperature dependence of the mechanics of these hydrogels is a strong function of the domain size and morphology in the endblock network. Despite the architectural similarities, triblock ELP fusions and PNIPAM bioconjugates exhibit distinct reinforcement maxima at fixed block composition and polymer concentration, and these differences can be attributed to the nanostructural features of the two systems. Furthermore, in ELP fusions, the amino acid sequence can be readily modified to manipulate the solvation kinetics of the endblock domains. Finally, various endblocks have been combined to form triblock terpolymer hydrogels, demonstrating how the choice of thermoresponsive blocks can be used to tune the reinforcement of shear thinning hydrogels.

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