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Percolation is not the end of gelation PASHA TABATABAI, Georgetown University, Department of Physics, BENJAMIN PARTLOW, DAVID KAPLAN, Tufts University, Department of Biomedical Engineering, DANIEL BLAIR, Georgetown University, Department of Physics — We present an experimental investigation of how covalently crosslinked silk fibroin gels polymerize by quantifying the mechanical properties using bulk oscillatory rheology and fluorescence spectroscopy. Gelation of these biologically derived polypeptides are highly susceptible to the inherent complexities that result from secondary interactions. We will show that simple models, based on percolation, do not capture the essential physics. Our results indicate that percolation guides the initial gel formation, but molecular weight moderates the existence of a secondary mode of modulus growth. We speculate that this additional growth mode originates from hydrogen bonding near covalent crosslinks but is sterically inhibited at low molecular weights.

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