Abstract Submitted
for the NWS14 Meeting of
The American Physical Society

Characterizing the effect of temperature on gelation and inhomogeneity of type I collagen gels CHRISTOPHER JONES, BO SUN, Oregon State Univ — Type I collagen gels are commonly used as the substrate for experiments on cell mechanotransduction because collagen is the most abundant protein in the ECM of most animals. The gels are commonly approximated as homogeneous elastic materials; however, on smaller length scales, the inhomogeneity of the collagen fiber network becomes very apparent. During gelation, collagen fibers can group together to form larger fiber bundles, with the size, shape, and distribution of these bundles depending on the conditions during gelation. We study how the collagen concentration and temperature during gelation affect the inhomogeneity of collagen fiber networks. Confocal reflection microscopy is used to image the collagen as it polymerizes, and the collagen matrix is characterized by analyzing variations in fiber density and orientation. Gel homogeneity is quantified by calculating the spatial correlation of fiber orientation and density for various temperatures and collagen concentrations. We find that collagen gels formed at room temperature are inhomogeneous and show many fiber bundles, while gels formed at 37°C are very homogeneous. We explore this transition by varying gelation temperatures from 23°C to 37°C for several different collagen concentrations.

Christopher Jones
Oregon State Univ

Date submitted: 22 Mar 2014 Electronic form version 1.4