Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Frequency-dependent micromechanics of cellularized biopolymer networks CHRIS JONES, JIHAN KIM, DAVID MCINTYRE, BO SUN, Oregon State University — Mechanical interactions between cells and the extracellular matrix (ECM) influence many cellular behaviors such as growth, differentiation, and migration. These are dynamic processes in which the cells actively remodel the ECM. Reconstituted collagen gel is a common model ECM for studying cell-ECM interactions *in vitro* because collagen is the most abundant component of mammalian ECM and gives the ECM its material stiffness. We embed micron-sized particles in collagen and use holographic optical tweezers to apply forces to the particles in multiple directions and over a range of frequencies up to 10 Hz. We calculate the local compliance and show that it is dependent on both the direction and frequency of the applied force. Performing the same measurement on many particles allows us to characterize the spatial inhomogeneity of the mechanical properties and shows that the compliance decreases at higher frequencies. Performing these measurements on cell-populated collagen gels shows that cellular remodeling of the ECM changes the mechanical properties of the collagen and we investigate whether this change is dependent on the local strain and distance from nearby cells.

Chris Jones
Oregon State University

Date submitted: 06 Nov 2015 Electronic form version 1.4