

Characterize the mechanical microenvironment of a 3-D hybrid biomatrix by laser trap

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Hydrogel physical properties were tuned by modulating the type of gelatin and the PEGdA to gel-PEG-Cys concentrations. Bulk viscoelastic properties were highly dependent on PEGdA concentration and total water content; while gel-PEG-Cys concentration was more important to the swelling profiles. Soft materials including the sIPN are viscoelastic in nature. The viscoelastic properties of the material (i.e., the microenvironment) is crucial for understanding the biomaterial-cell interactions at the cellular scale, which may provide insight into the behavior of cells that are entrapped in a 3-D matrix (i.e., sIPN). In this study, we measured the microrheology of a 3-D matrix by laser trap system. We entrapped commercially available polystyrene beads (size: $\sim 1 \mu\text{m}$) in the Gel-PEG-Cys and PEGdA 3400. While trapped by laser trap, the bead position was recorded

by a QPD sensor, which has resolution down to nano-meter. The position data was analyzed in frequency domain. The local viscosity was deduced from the corner frequency of the position spectrum. For sample 1 and sample 2 we did see the locational dependent viscosity, especially in the case of sample 2. In sample 3 and sample 4, the viscosity is too high to allow the bead performing measurable Brownian motion.

Biography

Ian C. Hsu received his PhD from the University of Wisconsin-Madison, USA, 1989. He then joined Stanford Linear Accelerator Center, Stanford University as research scientist. He then joined National Tsing Hua University in Taiwan as associated professor in the Department of Biomedical Engineering at 1991, and became full professor and chairman of the department in 1998. He has been a visiting professor of Department of Genetics, Stanford University in 1999 and a visiting professor of Department of Biochemistry, Stanford University in 2007. Dr. Hsu's research was in the beam physics and later in single molecule research as well as in biochip development and its biomedical applications. He has published numerous papers and holds several patents.

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