Biophysical Journal, Volume *110*

Supplemental Information

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Supporting Material

Imaging Extracellular Matrix Remodeling In Vitro by Diffusion-Sensitive Optical Coherence Tomography

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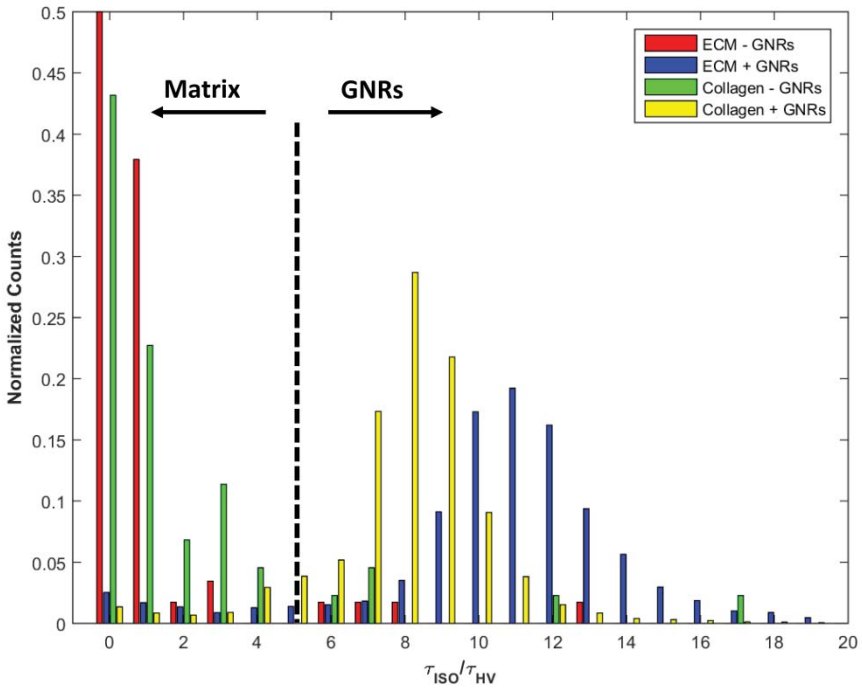

Figure S1 – Histogram of the ratio of isotropic (τ_{ISO}) and cross-polarized (τ_{HV}) decay times in artificial ECM (no cells) and collagen (2 mg/mL) with and without GNRs. With GNRs, the two OCT output signal decorrelation rates are different, owing to faster GNR rotational diffusion dominating the HV channel, yielding $\tau_{ISO}/\tau_{HV} > 5$ (Eqn. 3). However, in matrices without GNRs, the two output signals fluctuate at the same rate, yielding $\tau_{ISO}/\tau_{HV} \approx 1$. This property was used to identify regions containing GNRs in all samples, providing contrast against GNR-void cells in RMF cultures.

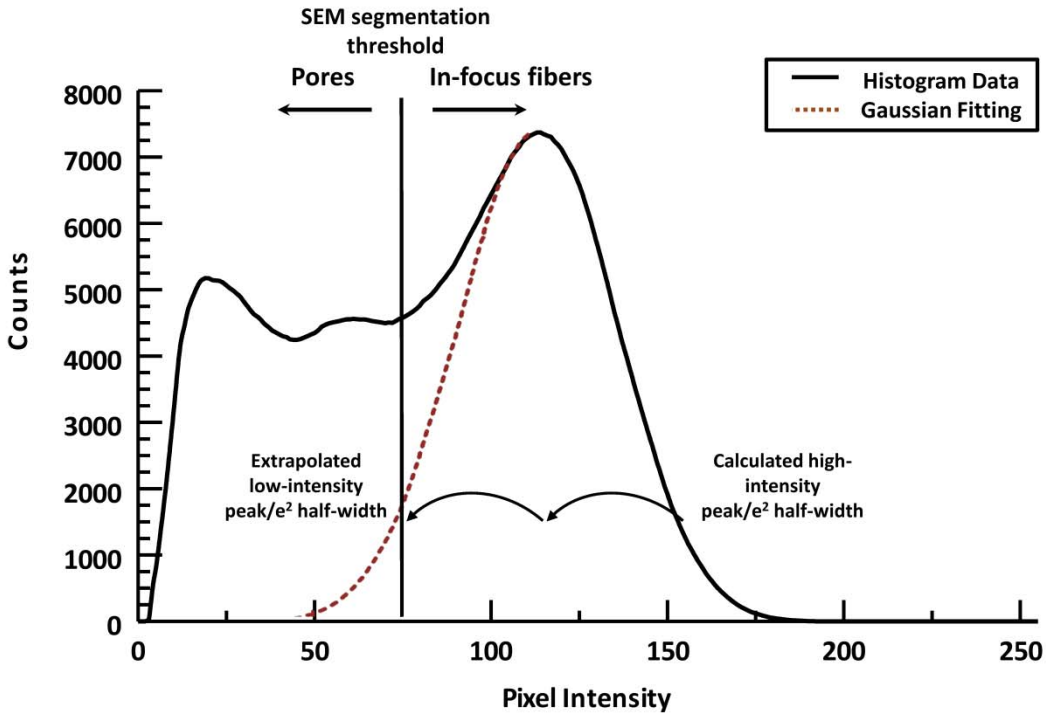

Figure S2 – Representative histogram of pixel intensities from SEM images of collagen showing the method for determining the location of the segmentation threshold to separate in-focus fibers from pores.

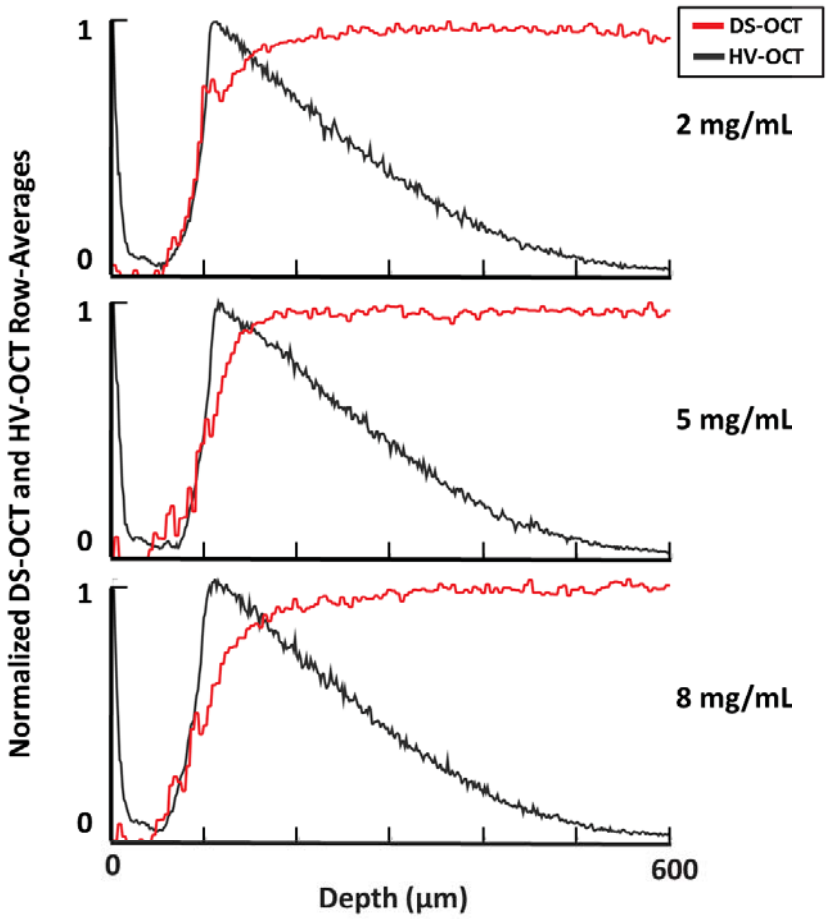

Figure S3 – Normalized averages of pixel values across each row of HV- and DS-OCT images shown in Fig. 1 for 2, 5, and 8 mg/mL collagen. These plots demonstrate the stability of the DS-OCT signal for the entire depth of each image, despite the intensity values at those depths reaching the noise floor.

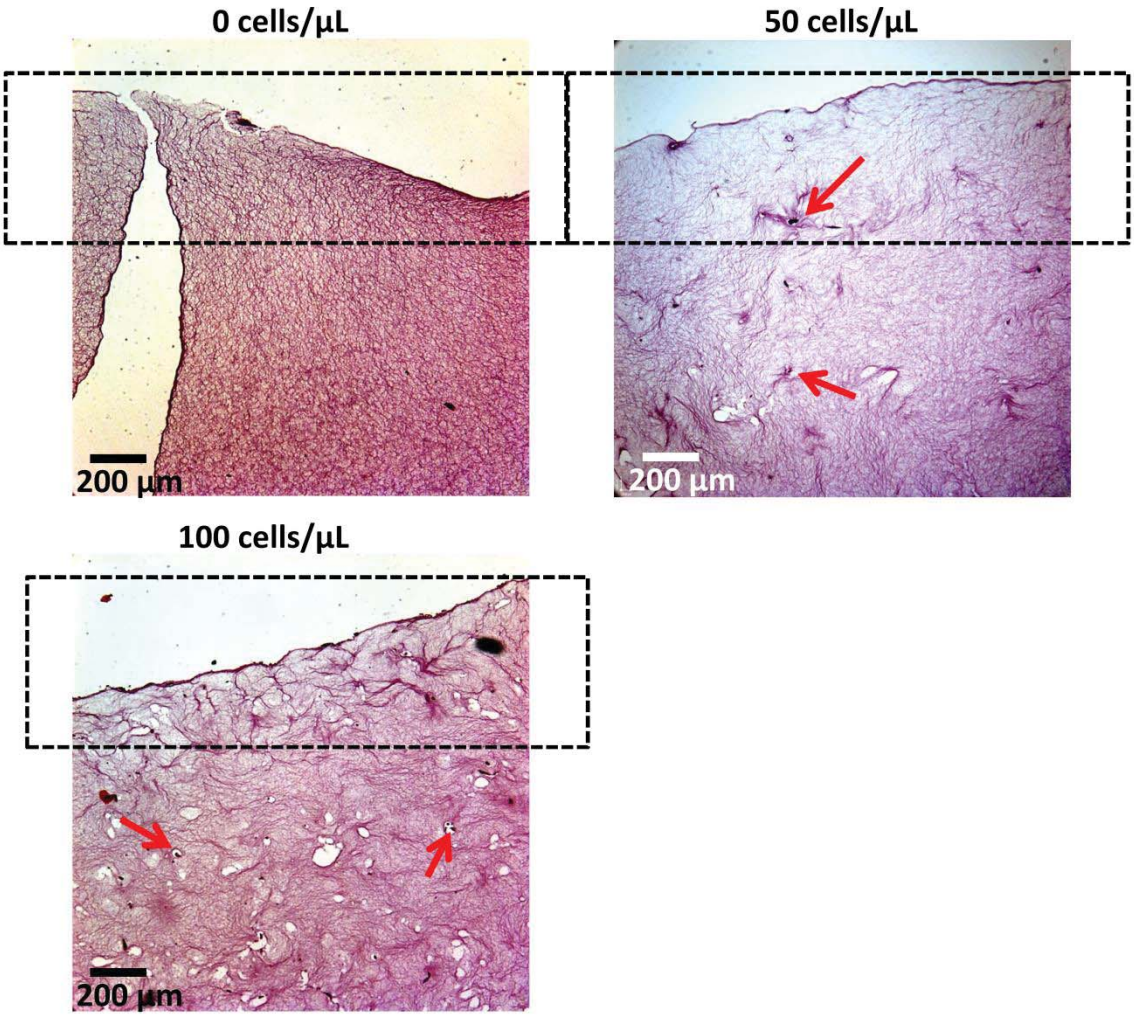

Figure S4 - Histology of cultures with the same conditions as those reported in Fig. 5. Red arrows: locations of RMF cells within tissue. Dotted box: The size of a DS-OCT imaging window on this size scale.

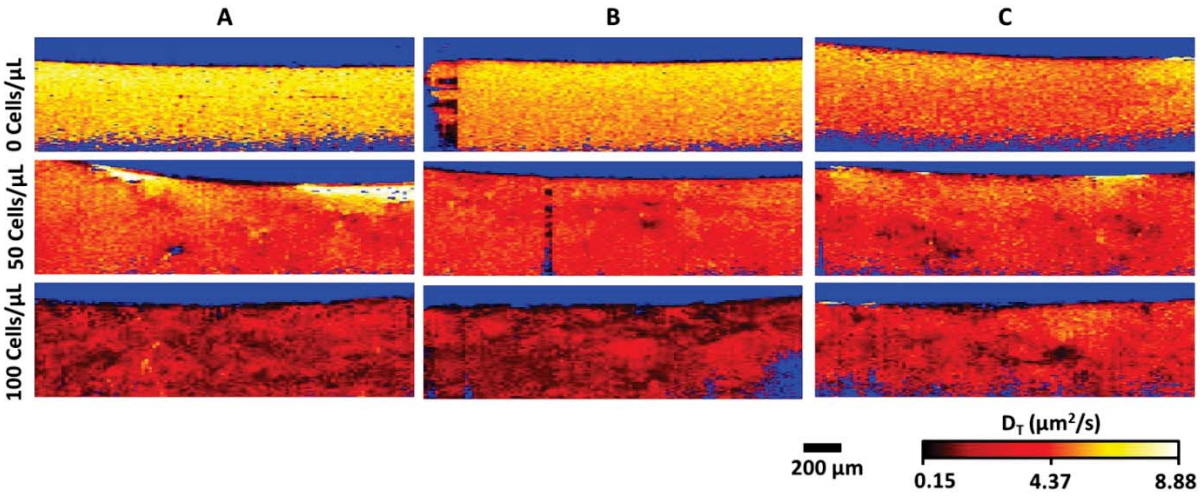

Figure S5 – Repeated experiments showing the consistency in DS-OCT measurements in artificial ECM heterogeneity. A: Data presented in manuscript (Figure 5) for 0, 50, and 100 cell/µL seed densities at 11 days of incubation. B: A replicate of A, with the same seed densities and incubation time. C: A comparison to A, with the same seed densities but only 7 days of incubation.