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Supporting Material

Diffusion of Particles in the Extracellular Matrix: the Effect of Repulsive Electrostatic Interactions

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Supplementary Material

for the article:

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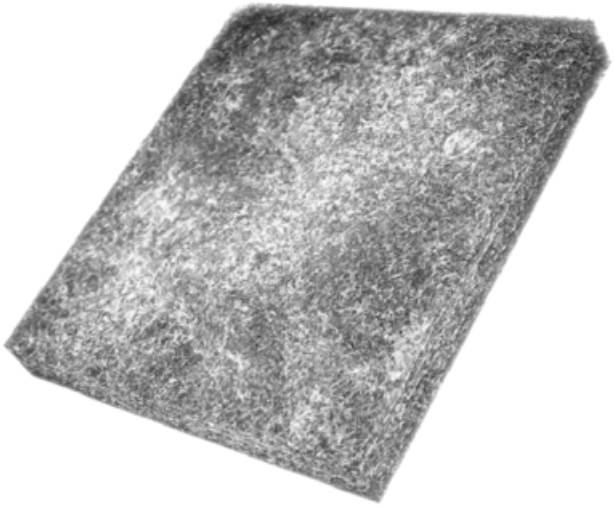
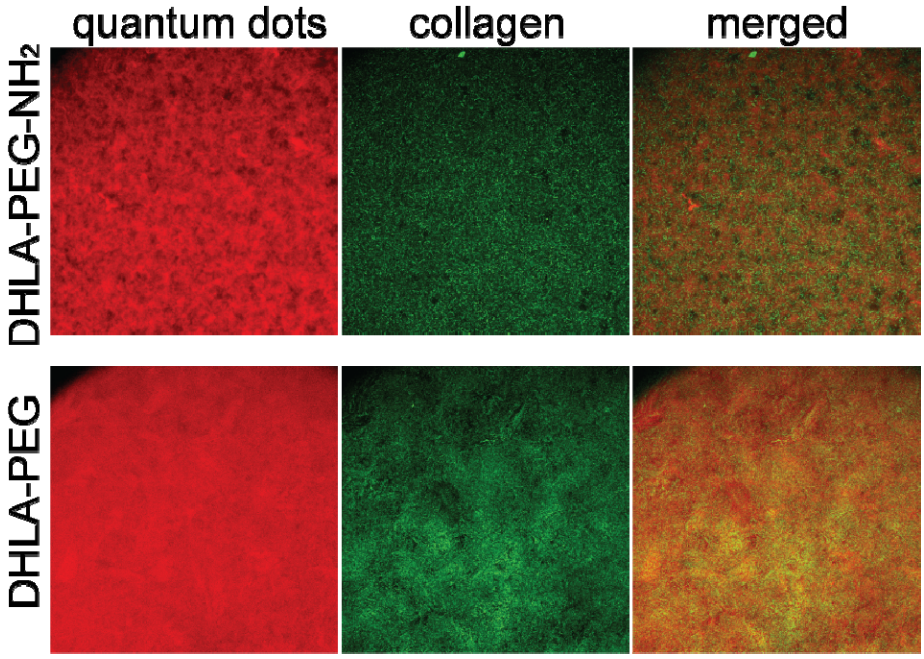
by T. Stylianopoulos, M-Z Poh, N. Insin, M. Bawendi, D. Fukumura, L. L. Munn, and R. K. Jain

Supplementary figure 1



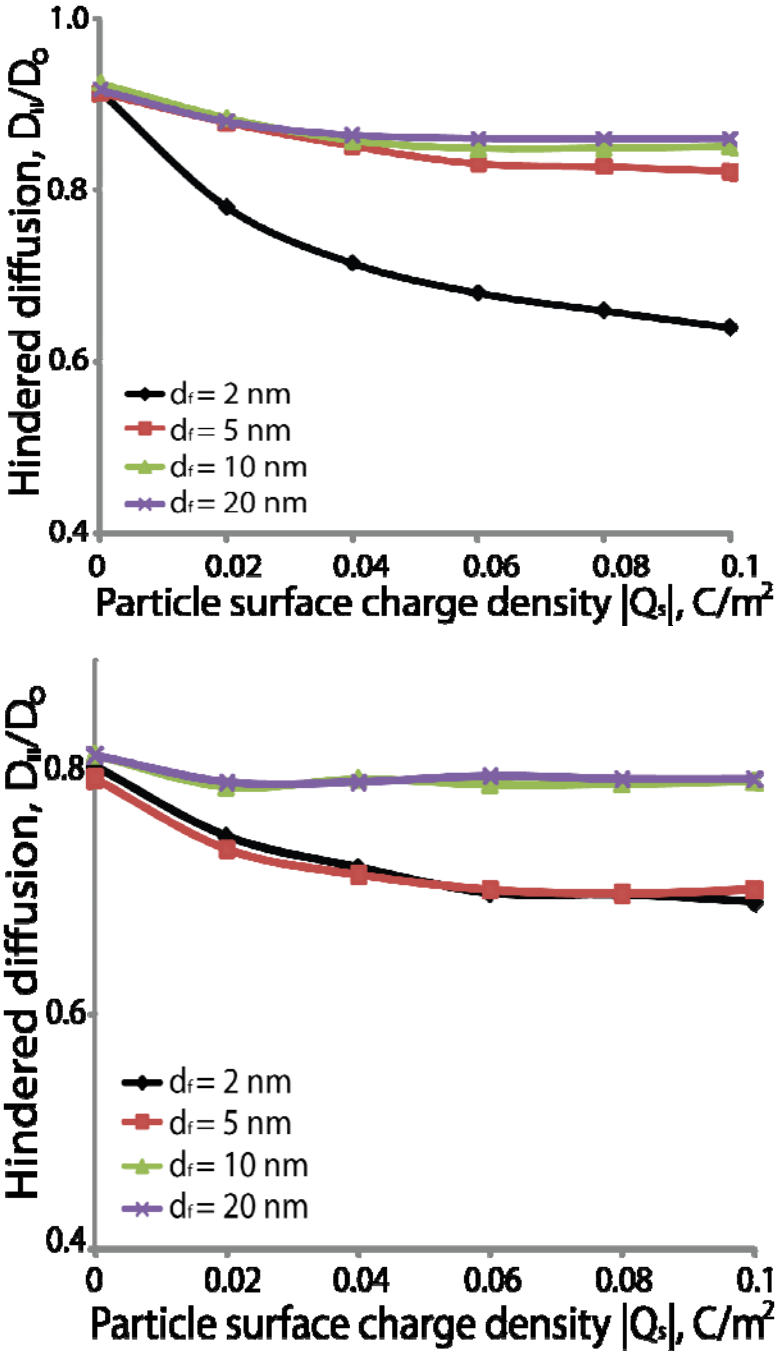
Three-dimensional rendering of collagen gel. 86 Second Harmonic Generation images were reconstructed, revealing three-dimensional nature of collagen organization. Dimensions are 223 x 223 x 25 μm.

Supplementary figure 2



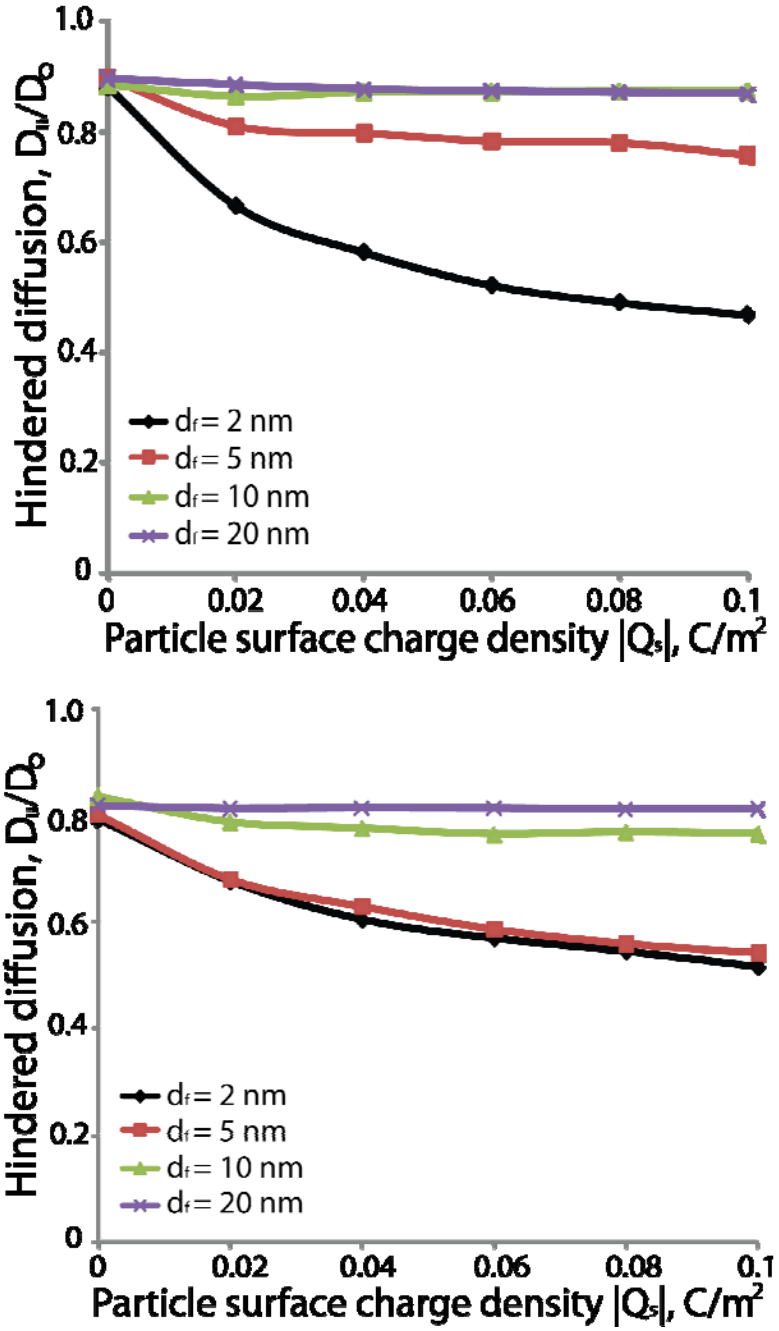
Multi-photon microscopy of the near neutral and positively charged quantum dots with second harmonic generation for imaging the collagen. The distribution of the near neutral nanoparticles is more homogeneous in the gel compared to the positively charged ones.

Supplementary figure 3



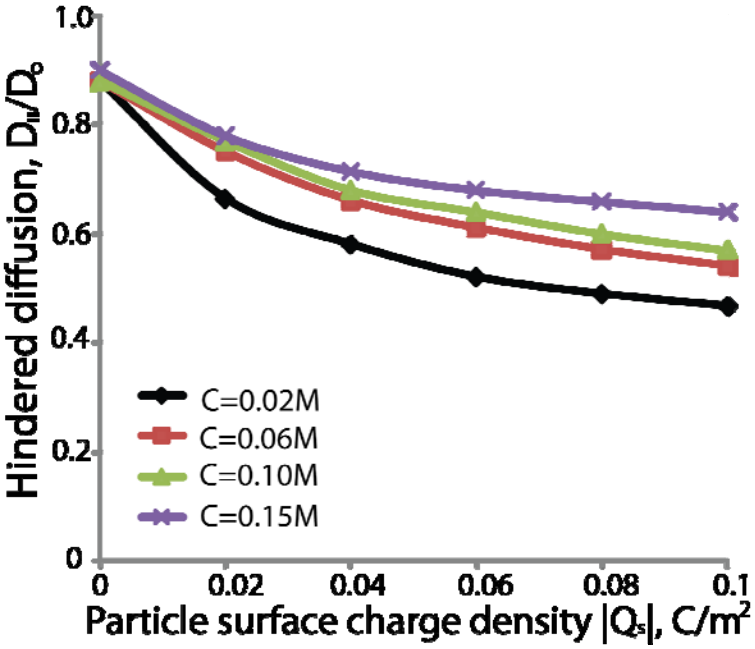
Effect of electrostatic interactions to the hindered diffusion of nanoparticles parallel to the preferred fiber direction. The fiber surface charge density was taken to be -0.05 *C/m*^{2}, the ionic strength of the solution was set to 0.15M and λ was 0.5. The fiber volume fractions were 0.03 (top) and 0.06 (bottom). Hindered diffusion is the ratio of the overall diffusion coefficient in the fibrous medium parallel to the fiber direction, $D_{||}$, over the diffusion coefficient in solution, D_o.

Supplementary figure 4



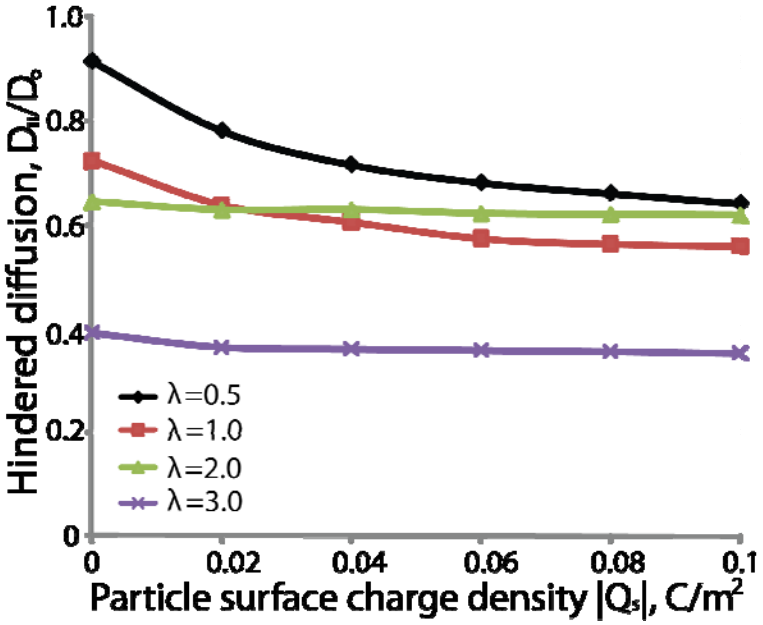
Effect of electrostatic interactions to the hindered diffusion of nanoparticles parallel to the preferred fiber direction. The fiber surface charge density was taken to be -0.05 C/m^2, the ionic strength of the solution was set to 0.02M and λ was 0.5. The fiber volume fractions were 0.03 (top) and 0.06 (bottom). Hindered diffusion is the ratio of the overall diffusion coefficient in the fibrous medium parallel to the fiber direction, $D_{\|}$, over the diffusion coefficient in solution, D_o.

Supplementary figure 5



Effect of ionic strength on the hindered diffusion of nanoparticles parallel to the preferred fiber direction. The fiber volume fraction, φ, was set to 0.03, the fiber diameter, d_f, and surface charge density, Q_f, were 2*nm*, and -0.05 C/m^2, and the ratio of particle size to fiber size, λ, was 0.5.

Supplementary figure 6



Effect of particle size on the hindered diffusion of nanoparticles parallel to the preferred fiber direction. The fiber volume fraction, φ, was set to 0.03, the fiber diameter, d_f, and surface charge density, Q_f, were 2*nm*, and -0.1 C/m^2, and the ionic strength was 0.15M.