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Massachusetts Institute of Technology
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RESEARCH OVERVIEW

The sub-cellular biological world is full of phenomena that challenge physical intuition: single-molecule machines, self-assembling architectures and spontaneous information processing. These phenomena derive from the physical character of biological macromolecules, which have passed through the evolutionary design process and acquired the character of a technology.

Biological science has provided a qualitative understanding of many macromolecular technological wonders, at least in their biological context, but we are far from having the sort of profound understanding that would enable us to rationally design similar macromolecular devices or interactions, with or without biological relevance. In many cases, even an empirical basis for quantitative, predictive modeling is lacking. Elucidation of the physical principles that define and constrain macromolecular technology abstracted from biological systems is the underlying theme of research in Fygenson Lab.

Group Website: nanobio.physics.ucsb.edu/

Selected Publications

Mohammed AM, Velazquez L, Chisenhall A, Schiffels D, Fygenson DK, and Schulman R. Self-assembly of precisely defined DNA nanotube superstructures using DNA origami seeds. *Nanoscale* 9:522-26, 2017.

Del Bonis-O'Donnel JT, Vong D, Pennathur S, and Fygenson DK. A universal design for DNA probe providing ratiometric fluorescence detection by generation of silver nanoclusters. *Nanoscale* 8: 14489-96, 2016.

Park CY, Fygenson DK, and Saleh OA. Electrostatics and depletion determine competition between 2D nematic and 3D bundled phases of rod-like nanotubes. *Soft Matter* 12:5089-95, 2016.

Del Bonis-O'Donnel JT, Pennathur S, and Fygenson DK. Changes in spectra and conformation of hairpin DNA-stabilized silver nanoclusters induced by stem sequence perturbations. *Langmuir* 32: 569-76, 2016.

Del Bonis-O'Donnell JT, Fygenson DK and Pennathur S. Fluorescent silver nanocluster DNA probes for multiplexed detection using microfluidic capillary electrophoresis. *Analyst* 140:1609-1615, 2015.