# MIT Biophysics Special Seminar

## DNA origami: The bridge from bottom to top

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Conventional top-down nanofabrication, over the last six decades, has enabled almost all the complex electronic, optical and micro-fluidic devices that form the foundation of our society. Parallel efforts, exploring bottom-up self-assembly processes, have also enabled design and synthesis of structures like quantum dots, carbon nanotubes and unique bio-molecules that possess technologically relevant proper- ties unachievable top-down. While both these approaches have independently matured, ongoing efforts to create "hybrid nanostructures" combining both strategies, has been fraught with technical challenges. The main roadblock is the absence of a scalable method to deterministically organize components built bottom-up within top-down nanofabricated structures.

In this talk, I will first introduce a directed self-assembly technique that utilizes DNA origami[1] as a molecular adaptor to modularly position, and orient, bottom-up nano-components (like quantum dots, light emitters and proteins) within top-down nanofabricated devices.[2] I will then present experimental results demonstrating the utility of the technique to achieved absolute, arbitrarily scalable, control over the integration of discrete emitters inside optical devices.[3,4] Finally, I conclude by presenting my vision of how DNA origami assisted modular bridge between top-down and bottom-up nanofabrication can enable a range of highly transformative, functional, devices. Specifically, I will discuss unpublished data demonstrating arrays of single-photon sources, platform for studying bio-chemical networks with discrete components and designs for using this technology for real-time highly-multiplexed protein quantification.

**Host:** Mark Bathe
**Date & Time:** Monday, November 20 @3:00pm
**Room: Duboc Room 4-331**

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