PRINCETON
Mechanical & Aerospace Engineering

Friday, September 30, 2016
Bowen Hall Rm 222
3:30 PM

Self-assembly of DNA Nanomechanical Devices

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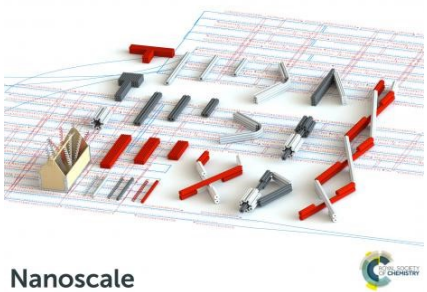
Structural DNA nanotechnology is a rapidly emerging field with great potential for applications such as single molecule sensing, drug delivery, and manipulating molecular components. However, the functional scope of DNA nanotechnology is limited by an inability to design dynamic mechanical behavior such as complex motion, conformational dynamics, or force generation. A major focus of our lab is to develop nanomechanical devices by adapting methods used in macroscopic machine design and assembly. I will discuss our development DNA nanostructures with programmable 1D, 2D, and 3D motion as well as dynamic nanostructures with controlled conformational dynamics. We aim to develop devices where nanoscale dynamic behavior (i.e. motion, conformational distributions, and kinetics) can be exploited to probe physical properties or manipulate nanoscale components or molecular interactions in real time. I will present our recent work on implementing a DNA nanocalipers to study the structure and structural dynamics of nucleosomes, the fundamental packaging unit for genomic DNA in cell nuclei, which consist of DNA wrapped around a protein core.



Professor Castro received his Bachelor's and Master's degrees in Mechanical Engineering both in 2005 from The Ohio State University and his PhD in Mechanical Engineering from the Massachusetts Institute of Technology in 2009. He then spent 1.5 years as an Alexander von Humboldt post-doctoral fellow at the Technische Universität München working in the field of DNA nanotechnology. Dr. Castro returned to The Ohio State University in 2011 as an Assistant Professor in the Department of Mechanical and Aerospace Engineering. His laboratory focuses on the self-assembly of DNA nanomechanical devices to probe biophysical function of molecular and cellular systems. He recently received an NSF CAREER award, and his lab has published pioneering work in the design of DNA nanomachines with complex motion and mechanical behavior.

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Social Period outside of Bowen Rm 222, following the seminar

ALL VISITORS ARE WELCOME