

ENGINEERING PROGRAMMABLE NUCLEIC ACID ASSEMBLIES

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Abstract: Biological cells organize many of their components and reactions in time and space via self-assembling organelles that have dynamic responses. Our group is developing structural mimics of responsive cellular organelles using RNA and DNA, taking advantage of many parts (sensors and actuators) developed by nucleic acids nanotechnology. In this talk I will provide an overview of our work on building RNA filamentous assemblies resembling actin filaments and microtubules, and DNA and RNA amorphous condensates whose growth and dissolution can be controlled via chemical reactions. Our approach combines experiments and modeling, with the goal of identifying design principles and a synthesis pipeline for artificial biomaterials that can sense and respond to the environment, and operate as nanoreactors for separation and manufacture.

Bio note: Elisa Franco is an Associate Professor in Mechanical & Aerospace Engineering and Bioengineering at UCLA. She received a Ph.D. in Control and Dynamical Systems from the California Institute of Technology, as well as a Ph.D. in Automation and a Laurea degree in Power Systems Engineering from the University of Trieste, Italy. She is the recipient of an NSF CAREER award, the Hellman Fellowship, and the Rose Hill Innovator award. The Franco group research is in the areas of DNA/RNA nanotechnology and synthetic biology, with focus on design, modeling, and experimental demonstration of circuits and responsive materials using nucleic acids and proteins.