Faculty Candidate Seminar

Tara L. Deans, PhD

Postdoctoral Fellow
Johns Hopkins University

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Ira A. Fulton Schools of Engineering
ARIZONA STATE UNIVERSITY

Bio-Sketch

Dr. Deans is a postdoctoral fellow in the department of biomedical engineering at Johns Hopkins University. She received her PhD in biomedical engineering in Jim Collins' lab at Boston University. Dr. Deans' doctoral work included engineering a genetic switch that regulates gene expression in mammalian cells. Her work as a postdoctoral fellow focuses on interfacing synthetic biology with biomaterials for spatially and temporally controlling gene expression in vitro and in vivo. Dr. Deans has received multiple awards for her work including a patent for her genetic switch, she was a finalist for the Collegiate Inventors Competition, and she received a TEDCO Maryland Stem Cell award to support her work as a postdoctoral fellow.

Abstract

Engineering Biomaterials and Tissues to Control Synthetic Gene Networks

The rapidly emerging field of synthetic biology originated in simple model organisms such as yeast and bacteria. However, as synthetic biology has expanded into mammalian systems, it is increasingly more important to consider the complex environments in which these cells are grown. Biomaterials will play an important role in advancing synthetic biology to mammalian systems because they provide a three-dimensional (3D) environment where cells can behave as they do in vivo, in addition to organizing and delivering therapeutic cells to locations of interest in vivo. In this talk I will present a multidisciplinary approach interfacing synthetic biology and biomaterials to activate and control genetic circuits in 3D scaffolds. Using this approach, it is possible to locally and systemically induce synthetic circuits for the spatial and temporal control of gene expression by engineering new materials for the passive and controlled release of genetic inducers. Furthermore, I will demonstrate how interfacing synthetic biology and biomaterials can be used to engineer synthetic tissues, which are tissues programmed with alternative functions. Together, this approach offers a unique platform for mimicking cellular microenvironments, in addition to providing mechanisms for translating synthetic biology for clinical applications.