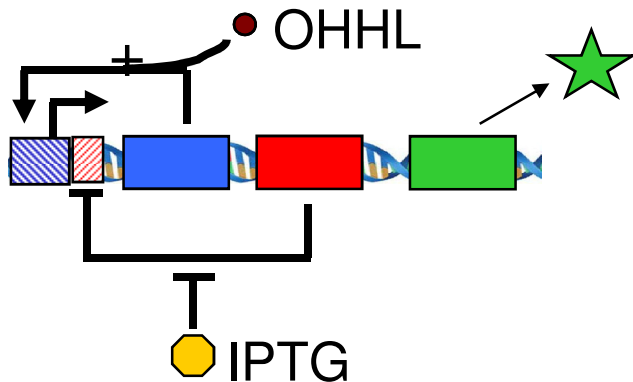


Construction and Evolution of Synthetic Cellular Systems

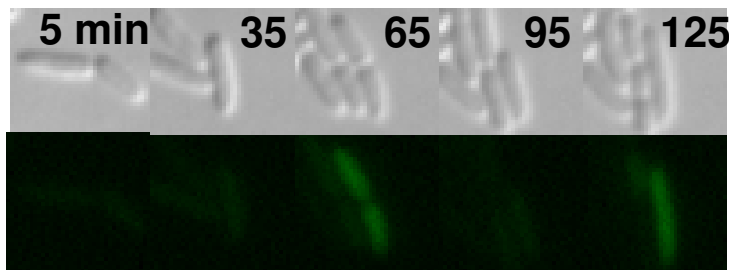
IGERT Associate Daniel J Sayut

PI: Prof. Sun (UMass Chemical Engineering)



Attempts to control cellular systems are often limited by the complexity of natural regulatory networks and cellular properties that have been evolutionarily optimized for behaviors that are not congruent with our desires. In overcoming these limitations, the *de novo* construction of genetic circuits from modular units that have defined interactions with each other and with the host cell increases our ability to reliably program cellular behavior.

Our research is particularly focused on the use of protein engineering techniques, such as directed evolution, to explore and optimize the properties of synthetic circuits. To demonstrate the usefulness of directed evolution for tuning the responses of synthetic circuits, we have constructed simple systems using components isolated from natural bacterial communication networks and optimized their desired properties using a library of evolved transcriptional regulators.



Genetic Relaxation Oscillator