BIOENGINEERING, BIOMEDICAL, MANUFACTURING, MATERIALS & SENSORS FRONTIERS

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Publications

1. Wang, Z., Doshi, A., Chowdhury, R., Wang, Y., Maranas, C., Cirino, P., 2020, Engineering sensitivity and specificity of AraC-based biosensors responsive to triacetic acid lactone and orsellinic acid. PEDS

2. Qian, S., Li, Y., Cirino, P., 2019, Biosensor-guided improvements in salicylate production by recombinant Escherichia coli. Microb Cell Fact. 18: 18 doi: 10.1186/s12934-019-1069-1

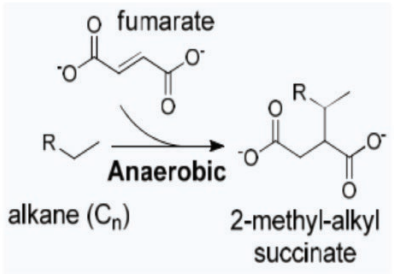
3. Tang, S-Y., Qian, S., Akinterinwa, O., Frei, C., Gredell, J., Cirino, P., 2013, Screening for enhanced triacetic acid lactone production by recombinant Escherichia coli expressing a designed triacetic acid lactone reporter. J. Am. Chem. Soc. 135: 27, 10099

Dr. Cirino received his PhD in chemical engineering from The California Institute of Technology where he worked on enzyme directed evolution with Nobel Laureate, Dr. Frances Arnold. As a post-doctoral research associate at the University of Florida, Dr. Cirino worked with the metabolic engineering pioneer, Dr. Lonnie Ingram. At the Cullen College of Engineering, Dr. Cirino is the Principal Investigator of the Biocatalysis laboratory where his group incorporates evolution and synthetic biology to design protein-based biosensors, and to engineer biocatalysts and biosynthesis pathways for the production of natural products and bio-functionalization of hydrocarbons.

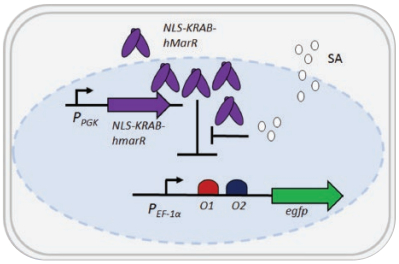
PROTEIN AND METABOLIC ENGINEERING

The Cirino group uses combinatorial (evolutionary) as well as rational (structure-based) protein design techniques to engineer transcriptional regulatory proteins that serve as customized biosensors. These novel biosensors are engineered to recognize specific non-native molecules of interest (“effectors”) and report the presence and concentration of these effectors by regulating the expression of a reporter gene. These biosensors have applications in synthetic biology and biocatalyst development. The Cirino group uses recombinant DNA technology to modify microbial metabolism to carry out new or improved bioconversions for the production of various secondary metabolites. This modification requires expression foreign genes in an amenable microbial host (for e.g. E.coli) and involves several stages of genetic optimization to improve efficiency and productivity.

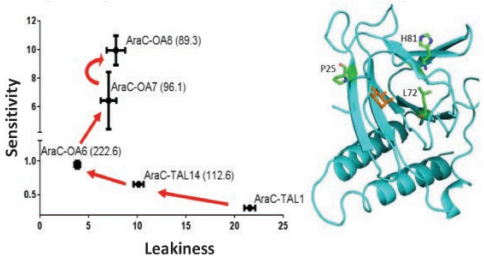
Biosynthesis & metabolism of alkylsuccinates



Inducible gene expression in mammalian cells



Design of gene switches & molecular reporters



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