



School of Natural Sciences Chemistry Seminar Series

UCMERCED

Light-Driven P450 Enzymes

Date:

Friday,
09/23/16

Time:

3:00 PM

Location:

COB 267

For More
Information
Contact:

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By Dr. Lionel Cheruzel

Chemistry Department San
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Abstract:

Cytochrome P450s are unique heme thiolate enzymes that catalyze the regio and stereoselective functionalization of unactivated C-H bonds in a wide range of substrates, using molecular dioxygen, two protons, and two electrons provided by a reductase domain. As an alternative approach to deliver the necessary electrons and perform P450 reactions upon visible light excitation, we have developed hybrid P450 enzymes contain a Ru(II)-diimine photosensitizer covalently attached to strategically positioned non-native cysteine residues of P450 heme domains. High photocatalytic activity (i.e. high total turnover numbers and initial reaction rates) could be achieved in the hydroxylation of natural long-chain fatty acid substrates. The crystal structure of an efficient hybrid enzyme reveals that the photosensitizer is ideally positioned to deliver electrons to the active site utilizing the natural electron transfer pathway. A combination of rational and directed evolution approaches has been used to develop the next generation of hybrid enzymes showing enhanced photocatalytic activity towards a wide range of non-natural substrates.

Bio:

Dr. Cheruzel grew up in the South of France. After earning an engineer diploma from the Ecole Nationale Supérieure de Chimie de Montpellier, he moved to the University of Louisville, KY to pursue his graduate studies. In 2006, he joined the research group of Prof. Harry Gray at Caltech as a postdoctoral fellow. He started at San Jose State University in Fall 2009 and he is currently an associate professor in the Department of Chemistry. Dr. Cheruzel received the early career young investigator award from SJSU (2012) and from the Journal of Biological Chemistry (2013). His research group, primarily composed of undergraduate students, is currently funded by NIH and NSF grants.