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Michelle is an assistant professor at UC Berkeley in the Departments of Chemistry and Molecular and Cell Biology. She received her Ph.D. from MIT, working with JoAnne Stubbe and Daniel Nocera, and her postdoctoral training with Jay Keasling at UC Berkeley. Her research group works at the interface of enzymology and synthetic biology, with a focus on studying biological fluorine chemistry, formation of mixed-valent nanomaterials by directional-sensing bacteria, and processes involved in developing synthetic biofuel pathways. She has received the Dreyfus New Faculty Award, TR35 Award, Beckman Young Investigator Award, NSF CAREER Award, and Agilent Early Career Award.

**Title:** Engineering E. coli for new chemical function

**Abstract:** Living systems have evolved the capacity to carry out many chemical transformations of interest to synthetic chemistry if they could be redesigned for targeted purposes. However, our ability to mix and match enzymes to construct de novo pathways for the cellular production of small molecule targets is limited by insufficient understanding how chemistry works inside a living cell. Our group is interested in using synthetic biology as a platform to understand the molecular principles needed to design high-flux synthetic pathways. Towards these goals, we have built a robust pathway for the production of n-butanol from individual enzyme components and explore how enzyme mechanism can be used as a kinetic control element to push a reversible pathway to high yielding production of second-generation biofuels (> 8 g/L).