**Sustainable Production of Biofuels and Bioproducts from Microalgae**

Annaliese K. Franz

*Department of Chemistry, University of California, Davis, 95618, USA*

[*akfranz@ucdavis.edu*](mailto:akfranz@ucdavis.edu)

Microalgae is a promising feedstock for sustainable production of biofuels and biochemicals; however, production of fuel feedstocks from microalgae remains prohibitively expensive despite significant advances in the field. The high costs of nutrients needed for cultivation is a challenge for large-scale production. To address these challenges, we have investigated the use of nutrient-rich wastewaters as well as the co-production of value added chemicals from microalgae-based biofuel production systems. We have investigated the production of one class of valuable co-product; bioactive lipids that can regulate diverse biological functions and are important to human health. Bioactive lipids are expensive to produce using synthetic means or enzymatically by fermentation so this provides a valuable opportunity to access these molecules while also using a co-product strategy to reduce the cost of fuel feedstocks. We describe the development of analytical methods to measure various lipids in microalgae, including bioactive lipids, and make the first report of treatment conditions that induce the production of bioactive lipids. Several industrially relevant microalgae strains have been investigated in this study to compare the production of bioactive lipids under treatment conditions. Treatment of one strain of microalgae with a chemical trigger under environmental nutrient stress increased the accumulation of a class of bioactive lipids by up to 400%. The synergistic approach of utilizing a chemical trigger to enrich the content of bioactive lipids in microalgae biomass uses methods congruent with current industrial cultivation practices. This system provides a foundation for studying the mechanisms of formation for bioactive lipids in microalgae and the development of a biological production route for specific classes of bioactive lipids.

**Biography**

Annaliese Franz is an associate Professor in the Department of Chemistry, and Faculty Director of the Undergraduate Research Center at UC Davis. She received her B.S. degree in Chemistry from Trinity University in San Antonio, TX, and her Ph.D. in Organic Chemistry at UC Irvine in 2002 (Advisor: Keith Woerpel). Then, she moved to Harvard University where she was awarded an NIH Postdoctoral Fellowship (2002-2005) working under the guidance of Prof. Stuart Schreiber and then continued her research at the Broad Institute of Harvard and MIT from 2005-2007. In 2007, Annaliese started as an Assistant Professor in the Chemistry Department at UC Davis and established a research program focused on organic synthesis, catalysis, bioanalytical chemistry and production of biofuels and bioactive lipids from microalgae. She has received several awards, including an NSF CAREER award, the American Chemical Society WCC Rising Star Award, the Outstanding Mentor Award from the Consortium for Women & Research at UC Davis and an ADVANCE Scholar at UC Davis.