

Engineering an expanded chemical palette in cells

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Abstract

An industrial biotechnology revolution is approaching. Recent technical advances are leading to a rapid transformation of the chemical palette available in cells making it conceivable to produce nearly any organic molecule of interest—from biofuels to biopolymers to pharmaceuticals. However, these feats require the ability to “hijack” native cellular machinery and metabolism and navigate the complexity inherent in cellular regulation. In this vein, this talk will describe recent advances in engineering various yeasts for the production of important products, such as organic acids and oleochemicals, with a focus on the synthetic biology tools and paradigms required along the way. Collectively, these case studies demonstrate the power and utility of using yeasts as a production host for chemicals.

Biosketch



Dr. Hal Alper is an Associate Professor and Fellow of the Paul D. & Betty Robertson Meek Centennial Professorship in Chemical Engineering at The University of Texas at Austin. He earned his Ph.D. in Chemical Engineering from the Massachusetts Institute of Technology in 2006 and was a postdoctoral research associate at the Whitehead Institute for Biomedical Research from 2006-2008, and at Shire Human Genetic Therapies from 2007-2008. Dr. Alper also serves on the Graduate Studies Committee for the Cell and Molecular Biology Department and the Biochemistry Department. He is currently the Principal Investigator of the Laboratory for Cellular and Metabolic Engineering at The University of Texas at Austin where his lab focuses on metabolic and cellular engineering in the context of biofuel, biochemical, and biopharmaceutical production in an array of model host organisms. His research focuses on applying and extending the approaches of related fields such as synthetic biology, systems biology, and protein engineering. Dr. Alper has published over 75 articles and 8 book chapters that have been cited over 5600 times and has an h-index of 34. Dr. Alper is the recipient of the Camille and Henry Dreyfus New Faculty Award in 2008, the Texas Exes Teaching Award in 2009, the DuPont Young Investigator Award in 2010, the Office of Naval Research Young Investigator Award in 2011, the UT Regents’ Outstanding Teaching Award in 2012, the 2013 *Biotechnology and Bioengineering* Daniel I.C. Wang Award, the Jay Bailey Young Investigator Award in Metabolic Engineering in 2014, the 2014 Camille Dreyfus Teacher-Scholar Award, 2015 Society for Industrial Microbiology and Biotechnology Young Investigator Award, and 2016 ACS BIOT Young Investigator Award.