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Engineering microbes for production of chemicals and fuels

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Author

Keasling, Jay

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Engineering Microbes for Production of Chemicals and Fuels

Jay Keasling

Departments of Chemical Engineering and Bioengineering, University of California, Berkeley, CA 94720

Synthetic Biology Department, Physical Biosciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720

Joint BioEnergy Institute, Emeryville, CA 94608

Microbial metabolism can be harnessed to convert sugars and other carbonaceous feedstocks into a variety of chemicals (commodity and specialty), fuels, and drugs. We have engineered the industrial workhorse microorganisms *Escherichia coli* and *Saccharomyces cerevisiae* to produce a variety of molecules, including the antimalarial drug artemisinin and advanced biofuels and chemicals that might otherwise be produced from petroleum. Unlike ethanol, the advanced biofuels have the full fuel value of petroleum-based biofuels, will be transportable using existing infrastructure, and can be used in existing automobiles and airplanes. Similarly, the microbially sourced chemicals can be dropped into existing processes used to produce existing materials. These chemicals will be produced from natural biosynthetic pathways that exist in plants and a variety of microorganisms as well as from pathways that have no representation in the natural world. Large-scale production of these chemicals and fuels will reduce our dependence on petroleum and reduce the amount of carbon dioxide released into the atmosphere, while allowing us to take advantage of our current transportation infrastructure and products supply chains.