**Microbiomes that metabolize lignin fragments obtained by chemical pretreatment of biomass**

Mee-Rye Park[1,2] (mrpark@lbl.gov), Jipeng Yan[2,3], Jeffrey G. Pelton[4], Ning Sun[2,3], Blake A. Simmons[1,2], Steven W. Singer[1,2], **Jay Keasling**[1,2,5]

[1]Joint BioEnergy Institute, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA [2]Biological Systems and Engineering Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA. [3]Advanced Biofuels Process Demonstration Unit, Emeryville, CA 94608; [4]QB3 Institute, University of California-Berkeley, Berkeley, CA 94720; [5]Department of Chemical and Biomolecular Engineering, Department of Bioengineering, University of California, Berkeley, CA, USA

http://jbei.org

**Project Goals**: Establish the scientific knowledge and new technologies to transform the maximum amount of carbon available in bioenergy crops into biofuels and bioproducts.

**Abstract**
Overcoming the recalcitrance of lignin and developing conversion strategies for aromatics are key goals to maximize conversion of carbon in plant biomass. While monoaromatics are metabolized by a variety of bacteria, the metabolism of aromatic oligomers remains largely undescribed. Several Sphingomonad are known to depolymerize dimeric lignin model compounds. Beyond the dimeric model compounds, using HMW lignin directly extracted from lignocellulosic biomass would be beneficial to explore diverse lignin-degrading microbes and their enzymes. Here we generated aromatic mixtures of monomers and oligomers from IL pretreatment (referred to BCD liquor) then enriched microbiomes originated from diverse soils on the BCD liquor. Chemical analysis (GPC and 2D HSQC NMR) demonstrated lignin depolymerization by cleavage of $\beta$-O-4 linkage during 2-week incubation. Time series metatranscriptomics revealed that predominant microbes produce enzymes involved in lignin depolymerization to aromatic catabolism and ring cleavage.

**Reference**
Park, Mee-Rye, et al. "Response of *Pseudomonas putida* to Complex, Aromatic-Rich Fractions from Biomass." ChemSusChem 13.17 (2020): 4455-4467.

**Funding statement**: Office of Science, Office of Biological and Environmental Research, of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.