Chemical and Biological Engineering

Seminar Announcement

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“On how to convince baker’s yeast to be a less picky eater”

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Over the past two decades, there has been significant interest in engineering microbes to convert low-value and/or abundant resources to produce higher value products like fuels, chemicals, plastics, drugs, etc. Despite extensive efforts, success in engineering microbes to use substrates they did not naturally evolve to utilize (i.e., non-native substrates) have been not as profound as everyone had hoped. Outcomes so far have indicated that microbes are generally picky-eaters and unwilling to consume unfamiliar substrates. For example, pentose (viz. xylose, arabinose), C$_1$ (CO$_2$, methanol), C$_n$ (cellulose, cellobiose) metabolism in the baker’s yeast, *Saccharomyces cerevisiae*, is non-optimal, compared to that of native C$_6$ sugar substrates like glucose and galactose, even after extensive engineering efforts over ~20 years. Thus, there is significant need in the metabolic engineering and synthetic biology communities to answer the following questions:

1) Why has the current engineering paradigm not had greater success in developing strain of this yeast capable of rapid growth on non-native substrates?

2) How do we engineer this yeast (and other microbes) to better assimilate substrates they did not naturally evolve to utilize?

In this talk, I will present results from our attempt to answer these questions using non-native pentoses (C$_5$) xylose and arabinose as test cases.