

Engineering Conferences International

## ECI Digital Archives

---

Microbial Engineering II

Proceedings

---

4-5-2022

## Metabolic Engineering

Kristala L. J. Prather

Follow this and additional works at: [https://dc.engconfintl.org/microbial\\_ii](https://dc.engconfintl.org/microbial_ii)

---

## **DYNAMIC METABOLIC ENGINEERING**

Kristala L. J. Prather, Massachusetts Institute of Technology, USA  
[kljp@mit.edu](mailto:kljp@mit.edu)

Key Words: synthetic biology, dynamic control, metabolite valve, quorum-sensing

Microbial systems offer the opportunity to produce a wide variety of chemical compounds in a sustainable fashion. Economical production, however, requires processes that operate with high titer, productivity, and yield. One challenge towards maximizing yields is the need to use substrate for biomass, resulting in a competing pathway that cannot merely be eliminated. Productivities may also be significantly influenced by the timing of expression of genes in the production pathway. Dynamic metabolic engineering has emerged as a means to address these and other impediments in strain performance. Ideally, the triggers for dynamic control would be autonomous, that is, independent of any external intervention by the operator. We have developed such autonomous devices by utilizing pathway-independent quorum-sensing circuits and demonstrated their utility for control of multiple metabolic nodes. In this talk, I will describe our approach for development of these Metabolite Valves and results to date from their implementation.