

# Systems Biology Research Symposium

## Oral Presentation Session

Grand Ballroom  
Tuesday, June 5th  
7:00-8:30pm

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Advancing Synthetic Metabolic Network Design Through Embedded Sensing-Actuation Devices

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Efforts in metabolic pathway engineering are providing diverse production hosts for a broad range of natural and unnatural chemicals and materials. Advances in synthetic biology are providing new molecular tools that can be applied to metabolic networks to allow the regulation of enzyme levels and activity, and thus energy and precursor usage and metabolic flux. In particular, recent advances in RNA synthetic biology are providing platforms for constructing cellular information processing and control devices. These RNA-based regulatory systems process and transmit small molecule inputs to regulated gene expression events, and are characterized by flexibility in programming the input responsiveness and quantitative regulatory properties of the device. I will discuss recent efforts in engineering the yeast *Saccharomyces cerevisiae* as a production host for alkaloid molecules. I will also discuss efforts in integrating synthetic RNA-based regulatory systems as exogenous and embedded control systems in metabolic networks. The integration of RNA devices as open- and closed-loop control systems in engineered metabolic pathways will allow for the development of high-throughput screens and selections, titratable regulatory systems, and more efficient use of cellular resources. Ultimately, the integration of synthetic biology tools with metabolic pathway design will allow for the construction of more efficient, autonomously regulated engineered production hosts transforming how we approach applications in biosynthesis.