

Alexander C. Reis – Curriculum Vitae

Postdoctoral Researcher, Synthetic Biology
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Education

2020 Ph.D., Chemical Engineering, Pennsylvania State University
2014 B.S., Chemical and Biomolecular Engineering, Rice University

Professional Experience

2020 – Post-doctoral Researcher, Synthetic Biology, Penn State
Proposed and developed a T7-RNAP plasmid test system to characterize large libraries of engineered 5'UTR variants (ribosome binding sites) using NGS. Currently testing this platform to then develop RBS Calculator v3.0.

2014 – 2020 Doctoral Student, Chemical Engineering/Synthetic Biology, Penn State
Advisor: Howard M. Salis
Developed an improved biophysical model of translation initiation in bacteria (RBS Calculator v2.1). Developed an Automated Model Test System for systematic improvement of sequence-function models in synthetic biology. Designed and used non-repetitive DNA parts to improve genetic stability of engineered systems. Built extra-long sgRNA arrays (ELSAs), leveraging non-repetitive sgRNA handles, for scalable multiplex CRISPR interference in bacteria. Demonstrated ELSAs through 3 application E. coli strains with many gene knockdown: succinic acid overproduction, antibiotic susceptibility, and multi-auxotrophy for biocontainment.

2016 – 2019 Analyst, Synergistic Discovery & Design (SD2), DARPA-I2O
Supported highly collaborative research by developing algorithms, proposing and conducting informative experiments to drive machine-learning efforts from data collected at the petabyte scale.

2012 – 2013 Research Intern, Glycos Biotechnologies, Inc., Houston, TX
Studied conversion of glycerol and Palm Fatty-Acid Distillate (PFAD) to isoprene using engineered E. coli strains and bench-scale fermentation experiments. Developed a flux balance analysis (FBA) model of engineered strains and used this model to study the effects of knockouts to improve isoprene productivity.

Honors, Awards, and Service

- 2015 – 2020 Undergraduate Research Mentor, Pennsylvania State University
- 2014 Mentor, iGEM (Internationally Genetically Engineered Machine) Competition
- 2014 Best Energy-Related Engineering Design Award, Rice University
- 2014 Duncan College Masters Award, Rice University
- 2012 – 2014 Duncan College Academics Committee, Founder & Chair
- 2011 – 2013 Peer Academic Advisor, Rice University
- 2010 Lab Courier, Dell Children's Medical Center of Central Texas

Publications

4. Reis, A. C., & Salis, H. M. (2020). An automated model test system for systematic development and improvement of gene expression models. *ACS Synthetic Biology*. <https://doi.org/10.1021/acssynbio.0c00394>
3. Reis, A. C., Hossain, S. A., & Salis, H. M. (2020). A massively parallel COVID-19 diagnostic assay for simultaneous testing of 19200 patient samples. Google Docs, Mar.
2. Hossain, A., Lopez, E., Halper, S. M., Cetnar, D. P., Reis, A. C., Strickland, D., ... & Salis, H. M. (2020). Automated design of thousands of nonrepetitive parts for engineering stable genetic systems. *Nature biotechnology*, 1-10.
1. Reis, A. C., Halper, S. M., Vezeau, G. E., Cetnar, D. P., Hossain, A., Clauer, P. R., & Salis, H. M. (2019). Simultaneous repression of multiple bacterial genes using nonrepetitive extra-long sgRNA arrays. *Nature biotechnology*, 37(11), 1294-1301.

Presentations

- 2018 Engineering Biology Research Consortium (EBRC), Fort Collins, CO
- 2018 Annual AIChE Meeting, Pittsburgh, PA
- 2017 AIChE CRISPR Technologies Conference, Raleigh, NC
- 2017 SD2 Data Analysis Hackathon and Integration Workshop, Arlington, VA
- 2017 International Workshop on Biodesign Automation (IWBD), Pittsburgh, PA

Selected Poster Presentations

- 2019 Synthetic Biology: Engineering, Evolution & Design (SEED), New York, NY
- 2016 Annual AIChE Meeting, San Francisco, CA
- 2016 Synberc Spring Retreat, Berkeley, CA

Patent Applications

1. Salis, H., Reis, A. C., Halper, S. M., Vezeau, G. E., Cetnar, D. P., Hossain, A., Clauer, P. R. Engineered CRISPR/Cas9 Systems for Simultaneous Long-term Regulation of Multiple Targets. 206032-0112-00WO.

Education and Teaching

Guest Lecturer at Pennsylvania State University

Chemical Engineering 340, Introduction to Biomolecular Engineering, FA15, SP17

Teaching at Rice University

Student Taught Course COLL 110, Virtual Design and Architecture, FA11

References

Howard M. Salis	Phillip Savage
Ag. Bio. Engineering	Chemical Engineering
Chemical Engineering	Head & Walter L. Robb Chair
Penn State University	Penn State University
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