**CURRICULUM VITAE**

**Carrie A. Eckert**

Oak Ridge National Laboratory

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**PROFESSIONAL PREPARATION**

|  |  |  |  |
| --- | --- | --- | --- |
| Ph.D. | University of Colorado, Anschutz | Molecular Biology | 2006 |
| B.S. | University of South Dakota, Vermillion | Biology (Magna Cum Laude) | 1999 |

**Thesis**

*Implications and Dynamics of Pericentric Cohesin*

*Association During Mitosis in Saccharomyces cerevisiae*

University of Colorado, Anschutz

Advisor: Paul Megee

**APPOINTMENTS**

|  |  |  |  |
| --- | --- | --- | --- |
| 2021-Present | Synthetic Biology Group Leader | Biosciences Division | Oak Ridge National Laboratory |
| 2020-2021 | Interim co-Director | Renewable and Sustainable Energy Institute (RASEI) | University of Colorado, Boulder, National Renewable Energy Laboratory, Boulder, CO |
| 2019-2020 | Associate Director, Bioenergy Sciences  | Renewable and Sustainable Energy Institute (RASEI) | University of Colorado, Boulder, National Renewable Energy Laboratory, Boulder, CO |
| 2017-Present | Rapid Genetics Team Lead | Center for Bioenergy Innovation (CBI) | University of Colorado, Boulder, Oak Ridge National Laboratory (lead) |
| 2013-2021 | Research Associate | Renewable and Sustainable Energy Institute (RASEI) | University of Colorado, Boulder, National Renewable Energy Laboratory, Boulder, CO |
| 2011-2021 | Scientist V | Biosciences Center, Photobiology/Bioenergetics | National Renewable Energy Laboratory |
| 2008-2011 | Postdoctoral Fellow | Biosciences Center, Photobiology/Bioenergetics (Advisor: Pin-Ching Maness) | National Renewable Energy Laboratory |
| 2006-2008 | Postdoctoral Fellow | Howard Hughes Medical Institute (HHMI), Department of Pharmacology(Advisor: James Maller) | University of Colorado, Anschutz |

**HONORS AND AWARDS**

* NREL President’s Award, 2020.
* NREL President’s Award, 2015.
* NREL Outstanding Mentor Award, 2013.
* NREL President’s Award, 2011.
* NIH Training Grant, University of Colorado, Anschutz, Aurora, Molecular Biology Program, Dr. Paul Megee, Fall 2003-Spring 2005.
* Howard Hughes Medical Institute (HHMI) Undergraduate Training Grant, University of South Dakota, Vermillion, Dr. Zoran Ristic, Fall 1997-Spring 1999.

**PUBLICATIONS, PATENT APPLICATIONS (\*=corresponding author)**

**In Preparation:**

1. J. Fenster, A. Levitt, E. Prates, D. Jacobson, J. Cameron, and **C.A. Eckert\***. *CRISPR-Cas9/recombineering-mediated deep mutational scanning of the RND-efflux pump ttgB for increased tolerance to high lignin loading and antibiotics.* In Preparation.
2. A. Hren, J. Fenster, W. Alexander, J. Cameron, and **C.A. Eckert\***. *Genome wide gRNA toxicity assay for active guide cataloguing, gRNA design rules, and essential gene knockdown.* In Preparation.

**Under Review/Revision:**

1. J.M. Noshay, T. Walker, A. Cliff , J. Romero, E. Prates, **C. Eckert**, S. Irle, D. Kainer, and D.A. Jacobson. *Quantum biological insights into CRISPR-Cas9 sgRNA efficiency from explainable-AI driven feature engineering.* Nucleic Acids Research, In Review
2. C.H. Calvey, V. Sanchez i Nogue, C.M. Kneucker, S.P Woodworth, **C.A. Eckert**, C.W. Johnson. *Improving formate utilization by Cupriavidus necator H16 using adaptive laboratory evolution-informed engineering.* Metabolic Engineering, In Revision.

**In Press/Print:**

1. M. Prías-Blanco, T.M. Chappell, E.F. Freed, E. Illa-Berenguer, **C.A. Eckert**, and W.A. Parrott. *An Agrobacterium strain auxotrophic for methionine is useful for switchgrass transformation*. Plant Biotechnology Journal, Accepted.
2. J. Fenster, A.Z. Werner, J.W. Tay, M. Gillen, L. Schirokauer, N. Hill, A. Watson, C.W. Johnson, G.T. Beckham, J. Cameron, **C.A. Eckert\***. (2022) *Dynamic and single cell characterization of a CRISPR-interference toolset in Pseudomonas putida KT2440 for glucose-free β-ketoadipate production from p-coumarate.* Metabolic Engineering Communications. 15: e00204.
3. [M.M Hassan](https://onlinelibrary.wiley.com/action/doSearch?ContribAuthorRaw=Hassan%2C+Md+Mahmudul), G. Yuan, [Y. Liu](https://onlinelibrary.wiley.com/action/doSearch?ContribAuthorRaw=Liu%2C+Yang), [M. Alam](https://onlinelibrary.wiley.com/action/doSearch?ContribAuthorRaw=Alam%2C+Mobashwer), C.A. Eckert, G.A. Tuskan, J.F. Golz, [X. Yang](https://onlinelibrary.wiley.com/action/doSearch?ContribAuthorRaw=Yang%2C+Xiaohan). (2022) *Precision genome editing in plants using gene targeting and prime editing: existing and emerging strategies.* Biotechnology Journal. 2100673.
4. S.R. Kim, **C.A. Eckert**, R. Mazzoli. (2022) *Editorial: Microorganisms for Consolidated 2nd Generation Biorefining.* Frontiers in Microbiology. 13.
5. G. Pines, A. Pines and **C.A. Eckert\*.** (2022) *Highly Efficient Library Design for Saturation Mutagenesis.* Synthetic Biology. ysac006.
6. R. Liu, L. Liang, M. Habib, E.F. Freed, and **C. Eckert\***. (2022) *Advances and applications of CRISPR-Cas systems.* In V. Singh (ed.), New Frontiers and Applications of Synthetic Biology, Elsevier, 331-348.
7. R. Liu, L. Liang, M.P. Lacerda, E.F. Freed, and **C. Eckert\***. (2022) *Advances in protein engineering and its application in synthetic biology.* In V. Singh (ed.), New Frontiers and Applications of Synthetic Biology, Elsevier, 147-158.
8. N. Pearcy, A. M. W. Van Hagen,S. Vaud, R. Patel, M. Ehsaan, M. Jonczyk, R. Reddy Bommareddy, Y. Wang,T. Millat, P. B. Reitzer, A. Cudzich Madry, P.-Y. Colin, J. Twycross, S. Heeb, P. Dalby,N. Minton, **C.A. Eckert**,A. Conradie, and S.J. Bryan. (2021) *Engineering Improved Ethylene Production: Leveraging Systems Biology and Adaptive Laboratory Evolution.* Metabolic Engineering. 67: 308-320.
9. R. Liu, L. Liang, S. Stettner, E. Freed, and **C. Eckert\***. (2021) CRISPR based tools for microbial cell factories. In V. Singh (ed.), Microbial Cell Factories Engineering for Production of Biomolecules, Elsevier, 95-113.
10. J. Fenster, **C.A. Eckert\***. (2021) *High-Throughput Functional Genomics for Energy Production*. Current Opinion in Biotechnology. 67: 7-14.
11. R. Liu, L. Liang, E. Freed, **C.A. Eckert\***, and R.T. Gill. (2021) *Transcriptional regulatory networks involved in C3-C4 alcohol stress response and tolerance in yeast.* ACS Synthetic Biology.  10(1): 19–28.
12. M.P. Lacerda, E.J. Oh, **C. Eckert\***. (2020) *The Model System* *Saccharomyces cerevisiae Versus Emerging Non-Model Yeasts for the Production of Biofuels*. Life. 10, 299.
13. R. Liu, L. Liang, E. Freed, A. Choudhury, **C.A. Eckert**, and R.T. Gill. (2020) *Engineering regulatory networks for complex phenotypes in E. coli.* Nature Communications. 11: 4050.
14. S. Smolinski, E. Freed, and **C. Eckert\*.** (2020) Gene Editing Technologies for Biofuel Production in Thermophilic Microbes. In: Himmel M., Bomble Y. (eds) Metabolic Pathway Engineering. Methods in Molecular Biology, vol 2096. Humana, New York, NY.
15. E.J. Oh, R. Liu, L. Liang, E.F. Freed, **C.A. Eckert**, and R.T. Gill. (2020) *Multiplex evolution of antibody fragments utilizing a yeast surface display platform.* ACS Synthetic Biology. 9(8): 2197–2202.
16. L. Liang, R. Liu, E. Freed, **C.A. Eckert\***. (2020) *Synthetic biology and metabolic engineering employing Escherichia coli for C2-C6 bioalcohol production*. Frontiers in Bioengineering and Biotechnology. 8: 710.
17. G. Pines, R.G. Fankhauser, and **C.A. Eckert\***. (2020) *Predicting Drug Resistance Using Deep Mutational Scanning.* Molecules. 25: 2265.
18. J. Walker, A. Lanahan, T. Zheng, C. Taruno, L. Lynd, J. Cameron, D. Olson, and **C.A. Eckert\***. (2020) *Development of both type I-B and type II CRISPR/Cas genome editing systems in the cellulolytic bacterium Clostridium thermocellum.* Metabolic Engineering Communications. 10: e00116.
19. R. Liu, L. Liang, E. Freed, H. Chang, E. Oh, Z. Liu, A. Garst, **C. Eckert**, and R.T. Gill. (2019) *Synthetic chimeric nucleases function for efficient genome editing.* Nature Communications, 10: 5524.
20. J. Walker, **C.A. Eckert.** *Novel Recombineering Machinery to Increase Homology Directed Genome Editing in Thermophilic Microbes*. Provisional Patent Application No. 62/896,555, 9/5/2019.
21. Y. Ding, J. Bertram**, C.A. Eckert,** R. Patel, R. Bommreddy, A. Conradie, S. Bryan, P. Nagpal. (2019) *Nanorg microbial factories: Light-driven renewable biofuel generation using bacteria-quantum dot nano-biohybrids.* Journal of the American Chemical Society, 1412610272-10282.
22. **Eckert C.A.\***, E. Freed, S. Smolinski, K. Wawrousek, J. Yu, and P.C. Maness. (2019) *Inactivation of the uptake hydrogenase in the purple non-sulfur photosynthetic bacterium Rubrivivax gelatinosus CBS enables a biological water-gas shift platform for H2 production*. Journal of Industrial Microbiology and Biotechnology, 46(7): 993-1002.
23. R. Liu, L. Liang, A. Choudhury, A.D. Garst, **C.A. Eckert**, and R.T. Gill. (2019) *Multiplex Navigation of Global Regulatory Networks (MINR) in Saccharomyces cerevisiae* *for Improved Ethanol Tolerance and Production.* Metabolic Engineering, 51: 50-58.
24. G. Pines, E.J. Oh, M.C. Bassalo, A. Choudhury, A.D. Garst, R.G. Fankhauser, **C.A. Eckert**, and R.T. Gill. (2018) *Genomic Deoxyxylulose Phosphate Reductisomerase (DXR) Mutations Conferring Resistance to the Antimalarial Drug Fosmidomycin in E. coli.* ACS Synthetic Biology, 7(12): 2824-2832.
25. K. Tarasava, E.J. Oh, **C.A. Eckert**, and R.T. Gill. (2018) *CRISPR-enabled tools for engineering microbial genomes and phenotypes.* Biotechnology Journal, 13(9): 1700586.
26. E. Freed, J. Fenster, S. Smolinski, C. Henard, R.T. Gill, and **C.A. Eckert\***. (2018) *Building a genome engineering toolbox in nonmodel prokaryotic microbes.* Biotechnology and Bioengineering, 115(8): 2120-2138.
27. B. Wang, **C.A. Eckert**, J. Yu, and P.C. Maness. (2018) *Analysis of natural and synthetic promoters for the expression of single genes and operons in Synechocystis sp*. PCC6803. ACS Synthetic Biology, 7(1): 276-286.
28. E. Freed, G. Pines, **C.A. Eckert**, and R.T. Gill. (2018) *Trackable Multiplex Recombineering (TRMR) and Next‐Generation Genome Design Technologies: Modifying Gene Expression in E. coli by Inserting Synthetic DNA Cassettes and Molecular Barcodes.* In C. Smolke (Ed.), Synthetic Biology, Wiley UK, p. 215 (8).
29. K. Wawrousek, **C. Eckert**, J. Yu, and P.C. Maness. *Biological Catalyst for Water Gas Shift Reaction.* Provisional Patent 17-05, 62/455,102, 2/5/2017.
30. S. Lynch, **C.A. Eckert**, J. Yu, R.T. Gill, and P.C. Maness. (2016) *Overcoming substrate limitations for improved production of ethylene in E. coli.* Biotechnology for Biofuels. 9: 3.
31. K. Wawrousek, J. Korlack, S. Noble, J. Chin, **C. Eckert**, J. Yu, and P.C. Maness. (2014) *Annotation of the genome of the purple non-sulfur photosynthetic bacteria Rubrivivax gelatinosus CBS reveals insight into its CO and H2 metabolism*. PLOS One 9(12): e114551.
32. N.J. Burroughs, M. Boehm, **C. Eckert**, E.M. Spence, J. Yu, P.J. Nixon, J. Appel, C.W. Mullineaux, and S.J. Bryan. (2014) *Solar powered biohydrogen production requires specific localization of the hydrogenase.* Energy and Environmental Science. 7: 3791-3800.
33. M.L. Ghirardi, P.W. King, D.W. Mulder, **C. Eckert**, A. Dubini, P.C. Maness and J. Yu. (2014) *Hydrogen production by water biophotolysis*, in Zannoni D. and DePhillipis R. (Eds.) Microbial BioEnergy, Springer Netherlands.
34. **C.A. Eckert,** W. Xu, W. Xiong, S. Lynch, J. Ungerer, L. Tao, R.T. Gill, P.C. Maness, and J. Yu. (2014) *Ethylene forming enzyme and bio-ethylene production. Biotechnology for Biofuels*. 7(1):33
35. **C. Eckert\***, M. Boehm, D. Carrieri, J. Yu, A. Dubini, P. Nixon, and P.C. Maness. (2012) *Genetic Analysis of the Hox Hydrogenase in the Cyanobacterium Synechocystis* *sp. PCC 6803 Reveals Subunit Roles in Association, Assembly, Maturation, and Function.* Journal of Biological Chemistry, 287(52):43502-15.
36. **C. Eckert**, A. Dubini, J. Yu, P. King, M. Ghirardi, M. Seibert, and P.C. Maness. (2012) *Hydrogenase Genes and Enzymes Involved in Solar Hydrogen Production*. In Levin, D. and N. Azbar (Eds.), State of the Art and Progress in Production of Biohydrogen, Bentham Science Publishers, p. 8-24 (17).
37. D. Carrieri, K. Wawrousek, **C.A. Eckert**, J. Yu, and P.C. Maness. (2011) *The role of the bidirectional hydrogenase in cyanobacteria.* Bioresource Technology. 102(18): p. 8368-77.
38. C.M. English, **C. Eckert**, K. Brown, M. Seibert, & P.W. King. (2009) *Recombinant and in vitro expression systems for hydrogenases: new frontiers in basic and applied studies for biological and synthetic H2 production*. Dalton Trans. (45):9970-8.
39. P.C. Maness, J. Yu, **C. Eckert**, and M.L. Ghirardi. (2009) *Photobiological Hydrogen Production – Processes and Challenges*. Microbe. 4(6): 275-80.
40. **C.A. Eckert**, D. Gravdahl, & P.C. Megee. (2007) *The enhancement of pericentric cohesin association by conserved kinetochore components promotes high fidelity chromosome segregation and is sensitive to microtubule-based tension*. Genes Dev. 21(3): 278-91.

**PROFESSIONAL MEMBERSHIPS**

* Society for Biological Engineering (2014-Present)
* American Chemical Society Member (2013-present)
* Society for Industrial Microbiology and Biotechnology member (2013-present)

**NATIONAL MEETING COORDINATION ACTIVITIES**

* Society for Industrial Microbiology and Biotechnology 45th Symposium on Biotechnology for Fuels and Chemicals, chair (2023)
* Society for Industrial Microbiology and Biotechnology Annual meeting Session Chair, Metabolic Engineering for Fuels and Chemicals II (specialty chemicals) (2022)
* Society for Industrial Microbiology and Biotechnology 44th Symposium on Biotechnology for Fuels and Chemicals, co-chair (2022)
* American Chemical Society Biotechnology (BIOT) Division Annual Meeting, Session Chair, Systems Biology & Omics: Tools and Applications (2022)
* CRISPR 2021 Session Chair (2021)
* American Chemical Society Biotechnology (BIOT) Division Annual Meeting, Session Chair, Synthetic Biology and Emerging Technology Development (2020)
* Society for Industrial Microbiology and Biotechnology Annual Meeting Session Chair, Genome Editing & Genetic tools for Non-Model Microorganisms (2019)
* American Chemical Society Biotechnology (BIOT) Division Annual Meeting, Area Coordinator, Frontiers in Biotechnology, Session Chair, Synthetic Biology and Metabolic Engineering (2019)
* Society for Industrial Microbiology and Biotechnology Annual Meeting Session Chair, Genome Editing and Engineering (2018)
* Natural Sciences and Engineering Research Council of Canada Collaborative R & D proposal reviewer (2018)
* Society for Industrial Microbiology and Biotechnology Annual meeting Session Chair, Synthetic Biology Tools and Applications (2017)
* American Chemical Society Biotechnology (BIOT) Division Annual Meeting, Area Coordinator, Bio-products (2017)
* American Chemical Society Biotechnology (BIOT) Division Annual Meeting, Session Chair, Synthetic Biology for Biofuels (2016)
* American Chemical Society Biotechnology (BIOT) Division Annual Meeting, Area Coordinator, Biofuels (2013-2015)

**INVITED SPONSOR ACTIVITIES**

* Participant, Speaker, Synthesis Advisory Committee, Joint genome Institute, August 2022
* 2022 DOE Biological and Environmental Research Bioenergy Research Centers proposal defense, Center for Bioenergy Innovation Team (Gerald Tuskan, PI)
* Participant, EMSL/PNNL Microbial Phenotyping Workshop September 21-22, 2021
* Panel member, Department of Energy Office of Biological and Environmental Research Biological Systems Science Division Committee of Visitors, July 27-29, 2021
* Participant, SynBio Scientific Advisory Board Meeting, Joint Genome Institute, August 2020
* Participant, Inter-Bioenergy Research Center Plant transformation Workshop, February 13-14, 2020
* Participant, Accelerating the bioeconomy: transformation of engineering biology through public

Biofoundries, NSF/DOE workshop, February 13-14, 2020

* Participant/Speaker, Inter-Bioenergy Research Center Lignin Workshop, October 21-22, 2019
* Participant/Speaker/Breakout Session lead, SynBio Scientific Advisory Board Meeting, Joint Genome Institute, April 1, 2019
* Participant/Speaker, Workshop on biological science opportunities provided by the APS Upgrade, Argonne National Laboratory, August 20-21, 2018
* 2018, 2019 DOE Biological and Environmental Research Bioenergy Research Centers Project Review Presenter, Center for Bioenergy Innovation Team (Gerald Tuskan, PI)
* 2017 DOE Biological and Environmental Research Bioenergy Research Centers Coordination and Research Assessment Meeting (CRAM), Center for Bioenergy Innovation Team (Gerald Tuskan, PI)
* 2017 DOE Biological and Environmental Research Bioenergy Research Centers proposal defense, Center for Bioenergy Innovation Team (Gerald Tuskan, PI)

**REFERREE ACTIVITIES**

**Manuscripts/books**

* PLoS One Journal reviewer (2020-present)
* BioDesign Research Journal Associate Editor (2019-Present)
* Current Opinion in Biotechnology Journal Reviewer (2018-Present)
* ACS Synthetic Biology Journal Reviewer (2018-Present)
* Applied and Environmental Microbiology Journal reviewer (2018-present)
* Applied Microbiology and Biotechnology Journal reviewer (2017-present)
* Journal of Industrial Microbiology & Biotechnology reviewer (2017-present)
* Biomass and Bioenergy Journal Reviewer (2017-present)
* Editor, Elsevier Book, *Biotechnologies for Biofuel Production and Optimization* (published 2016)
* Metabolic Engineering Journal Reviewer (2015-present)
* Biotechnology for Biofuels Journal Reviewer (2015-present)
* Biotechnology and Bioengineering Journal Reviewer (2013-present)
* Journal of Biological Chemistry Reviewer (2013-Present)

**Grant Review Panels**

* Joint Genome Institute Synthetic Biology Proposal Review Panel (2018-2020, 2022)
* National Science Foundation Proposal Review Panel Member (2015, 2017, 2022)
* Biotechnology Risk Assessment Grant (BRAG) Review Panel (USDA) (2020)
* Department of Energy Environmental Molecular Sciences Laboratory (EMSL) Annual Proposal Review Panel member (2017-2021)
* DOE Office of Science Early Career Proposal Review Panel (2018)
* Department of Energy Biomass Energy Technologies Office (BETO) Small Business Innovative Research (SBIR) Biofuels/Bioproducts from Gaseous Waste Streams Proposal Review Panel member (2017)

**ORAL PRESENTATIONS (\*=invited)**

1. **C.A. Eckert\***. Genetic engineering of DOE relevant non-model microbes. Seminar, University of South Dakota, September 2022.
2. **C.A. Eckert\***. Development of synthetic biology toolkits for genotype to phenotype evaluation in non-model microbes. Lake Arrowhead Conference September 2022.
3. **C.A. Eckert\***. Developing high throughput CRISPR-based toolkits for non-model microbes, University of Tennessee BCMB Colloquium, September 20, 2021.
4. **C.A. Eckert\***. Utilizing CRISPR-Cas toolkits for genotype-phenotype discovery and engineering of non-model microbes. ACS Fall Meeting, BIOT Division, August 2021, Keynote.
5. **C. Eckert\*.** High throughput gene-to-trait discovery in Pseudomonas putida KT2440 to improve growth on lignin. Annual Society of Industrial Microbiology and Biotechnology (SIMB) Meeting and Exposition, August 2021.
6. **C. Eckert\*.** Understanding and Engineering Regulatory Networks to Improve Microbial Bioproduction Systems. 2021 DOE Genomic Sciences meeting. February 23, 2021.
7. **C.A. Eckert\*.** Development of Next Generation Synthetic Biology Toolkits for Non-Model Prokaryotes. AIChE November 2020.
8. **C.A. Eckert\*.** High-throughput tools for microbial gene-to-trait analysis. University of Texas Austin, Metabolic Engineering virtual seminar series, November 2020.
9. **C.A. Eckert\*.** Development of genetic tools for advanced engineering of non-model microbial systems. University of Colorado, ChBE Seminar, September 2020.
10. **C.A. Eckert\*.** Development of genetic tools for advanced engineering of non-model microbial systems. University of Illinois, MBMB graduate seminar, September 2020.
11. **C.A. Eckert\*.** Development of next generation synthetic biology toolkits for non-model microbes. Metabolic Engineering 13. Cancelled due to COVID-19
12. **C.A. Eckert\*.** 2019. Development of next generation synthetic biology toolkits for non-model microbes. University of Wyoming.
13. **C.A. Eckert\*.** 2019. Development of next generation synthetic biology toolkits for non-model microbes. Colorado State University.
14. **C.A. Eckert\*.** 2019. Developing next generation tools to accelerate gene-to-trait discovery in non-model microbes for metabolic engineering. AIChE Rocky Mountain Chapter Dinner and Discover.
15. **C.A. Eckert\*.** 2018. Development of Synthetic Biology Toolkits for Non-Model Microbes. Donald Danforth Plant Center 19th Annual Fall Symposium.
16. J. Fenster, J. Walker, R. Liu, L. Liang, E.J. Oh, A. Nagarajan, S. Smolinski, W. Alexander, E. Freed, R.T. Gill, and **C.A. Eckert\***. 2018. Genetic toolkits to enable engineering of novel microbes. Annual Society of Industrial Microbiology and Biotechnology (SIMB) Meeting and Exposition.
17. S. Smolinski, P.C. Maness, S. Davis-Lopez, J. Reed, G. Rudenko, and **C.A. Eckert\***. 2016. Development and analysis of novel microbial platforms for Syngas to biofuels and high value chemicals. Annual SIMB Meeting and Exposition.
18. **C.A. Eckert.** 2016. Analysis of a novel CO-linked, O2-tolerant hydrogenase from *Rubrivivax gelatinosus* CBS and it’s engineering in *Synechocystis* sp. PCC6803. 25th Western Photosynthesis Conference.
19. S. Noble, K. Wawrousek, **C.A. Eckert**, J. Yu, and P.C. Maness. 2014. Genetic engineering in *Synechocystis* sp. PCC 6803 for solar hydrogen production. ACS 247th National Meeting, BIOT Division, Biofuels and Sustainable Energy.
20. S. Lynch, **C.A. Eckert**, J. Yu, P.C. Maness, and R.T. Gill. 2013. A strategy for genome design, redesign, and optimization of ethylene production in *E. coli*. Annual SIMB Meeting and Exposition.
21. **C.A. Eckert**, R. Sullivan, C. Johnson, J. Yu, and P.C. Maness. 2013. Targeted enhancement of H2 and CO2 uptake for autotrophic production of biodiesel in the lithoautotrophic bacterium *Ralstonia eutropha*. ACS 245th National Meeting, BIOT Division, Biofuels and Sustainable Energy.
22. **C.A. Eckert**. Metabolic engineering for optimizing biofuel production in diverse microorganisms. Colorado Center for Biorefining and Biofuels (C2B2) 2013 Semi-annual Meeting.
23. **C.A. Eckert**, J. Yu, and P.C. Maness. 2011. Molecular analysis of the bidirectional Hox hydrogenase in the unicellular cyanobacterium, *Synechocystis* sp. PCC 6803. 19th Western Photosynthesis Conference.
24. **C.A. Eckert**, J. Yu, and P.C. Maness. 2010. Analysis of the bidirectional Hox hydrogenase in the unicellular cyanobacterium, *Synechocystis* sp. PCC 6803. 10th Cyanobacterial Molecular Biology Workshop.
25. **C.A. Eckert**, J. Yu, and P.C. Maness. 2009. Photobiological H2 production in the cyanobacteria *Synechocystis* sp. PCC 6803. 18th Western Photosynthesis Conference.
26. **C.A. Eckert.** 2006. Kinetochore-microtubule attachments alter pericentric cohesin binding in budding yeast. CSHL Cell Cycle Meeting.

**ACADEMIC ACTIVITIES**

**Undergraduate Mentorship:**

* Liaison, Chemical Engineering Senior Capstone Design Project, University of Colorado, Boulder (Spring 2018, 2019, 2020, 2021)
* Mentor, Science Undergraduate Laboratory Internship (SULI) Program (2012-2016)
	+ Sarah Stahl (2012)
	+ Logan Thompson (2013)
	+ Bradley Prythero (2015-2016)
* Mentor, National Renewable Energy Laboratory Teacher Internship Program (2010)

**Graduate/Postdoctoral Mentorship:**

* Thesis committee member, Jay Huenemann (University of Tennessee, Bredesen Center, Ph. D. candidate) (2022-Present)
* Thesis committee member, Zach Baumer (University of Colorado, Boulder, Chemical and Biological Engineering Department, Ph. D. candidate) (2021-Present)
* Thesis committee member, Kathyrn Mains (University of Colorado, Boulder, Chemical and Biological Engineering Department, Ph. D. candidate) (2021-Present)
* Thesis committee member, Patrick Thomas (University of Colorado, Boulder, Biochemistry Department, Ph. D. candidate) (2020-2021)
* Thesis Committee Member, Anna Corts (University of Colorado, Boulder, Chemical and Biological Engineering Department, Ph. D. candidate) (2015-2019)
* Thesis Committee Member, Joshua Stepanek (University of Colorado, Boulder, Ecology and Evolutionary Biology Department, Ph.D. candidate) (2012-2016)
* Mentor, Oak Ridge National Laboratory (2021-Present)
	+ Ilenne Del Valle (Postdoctoral Fellow, 2021-Present)
	+ Margaret Spangler (Graduate Student, University of Tennessee, Genome Science and Technology Program, 2021-Present)
	+ Cole Sawyer (Graduate Student, University of Tennessee, Genome Science and Technology Program, 2021-Present)
* Mentor, CBI and other University of Colorado, Boulder Funded Research (2017-Present)
	+ Andrew Hren, Chemical and Biological Engineering Ph.D. Student (co-mentor Jerome Fox, 2020-present)
	+ Maria-Priscila Lacerda (Postdoctoral Fellow, 2019-present)
	+ Sean Stettner (Postdoctoral Fellow, 2019-present)
	+ Emily Freed (Senior Scientist, 2017-Present)
	+ Jacob Fenster, Chemical and Biological Engineering Ph.D. Student (co-mentor Jeff Cameron, 2017-present)
	+ Margaret Habib (Senior Scientist, 2019-Present)
	+ Julie Walker (Postdoctoral Fellow, 2018-2019)
	+ William Alexander (Postdoctoral Fellow, 2018)
* Co-Mentor with Ryan Gill (University of Colorado, Boulder) (2016-present)
	+ Marcelo Bassalo, Molecular and Cellular Development Program Ph.D. Student
	+ Alaksh Choudhury, Chemical and Biological Engineering Ph.D. Student
	+ Anna Corts, Chemical and Biological Engineering Ph.D. Student
	+ Kenny Felsenstein, Anschutz Medical Scientist Training Program M.D./Ph.D. Student
	+ William Grau, Chemistry Ph.D. Student
	+ Katia Tarasava, iQBio Program Ph.D. Student
	+ Gur Pines, Postdoctoral Fellow
	+ Rongming Liu, Postdoctoral Fellow
	+ Liya Liang, Postdoctoral Fellow
	+ Aparna Nagarajan, Postdoctoral Fellow
	+ Eun Joong Oh, Postdoctoral Fellow
* Mentor, National Renewable Energy Laboratory (2015-2021)
	+ Emily Freed (Postdoctoral Fellow, 2015-2017)
* Co-Mentor, National Renewable Energy Laboratory (various Postdoctoral Fellows as Senior Scientist/co-PI) (2011-2017)
	+ Grant Balzer (Postdoctoral Fellow, 2011-2012)
	+ Ryan Sullivan (Postdoctoral Fellow, 2011-2013)
	+ Chris Johnson (Postdoctoral Fellow, 2012-2013)
	+ Sean Lynch (Postdoctoral Fellow, 2012-2015)
* Aparna Nagarajan (Postdoctoral Fellow, 2016-2017)
	+ Joan Marcano (Postdoctoral Fellow, 2018-2019)
* Allyson Malloy (Undergraduate Intern, 2020)
* Mentor, Women In Science and Engineering (WiSE), University of Colorado, Boulder (2015-2020)

**Teaching:**

* Guest lecturer, Bioenergy Short Course, University of Colorado, Boulder, ChBE Department, Summer 2020.

**FUNDING RECORD**

**In Prep/Review:**

* Towards mapping sequence-activity relationships of an entire microbial proteome. ORNL LDRD Strategic Hire Proposal (7/22-9/23)
	+ PI, ORNL
	+ $700,000
* Better bioenergy microbes with programmable molecular switches. Biological and Environmental Research (BER) Biosystems Design Program, PI: Ian Wheeldon (University of California, Riverside) (9/22-8/27)
	+ Co-PI, ORNL
	+ $15,000,000; ($3,750,000 ORNL)
* Combinatorial and Evolutionary Engineering to Optimize Lignocellulose Bioconversion in Diverse Hosts. Biological and Environmental Research (BER) Biosystems Design Program, PI: Adam Feist (University of San Diego) (9/22-8/27)
	+ Co-PI, ORNL
	+ $7,000,000; ($3,379,240 ORNL)
* Microbial community engineering tools for enhancing polyolefin degradation and valorization. Biological and Environmental Research (BER) Biosystems Design Program, PI: Mark Blenner (University of Delaware) (9/22-8/27)
	+ Co-PI, ORNL
	+ $15,000,000; ($4,000,000 ORNL)
* Streamlining Microbial Chassis for Rapid Prototyping and Industrialization of Metabolic Pathways. Biological and Environmental Research (BER) Biosystems Design Program, PI: Brian Pfleger (University of Wisconsin, Madison) (9/22-8/27)
	+ Co-PI, ORNL
	+ $20,000,000; ($7,500,000 ORNL)
* Center for BioEnergy Innovation (CBI), Department of Energy Office of Science, Biological and Environmental Research (BER) Bioenergy Research Center, PI: Gerald Tuskan (Oak Ridge National Laboratory, Tennessee) (10/22-9/27)
	+ Co-PI and Rapid Genetics Team Lead, ORNL
	+ $130,000,000 total ($2,125,000)

**Current Funding:**

* Secure Ecosystem Engineering and Design, DOE National lab Science Focus Area for Secure Biosystems Design, PI: Paul Abraham (ORNL) (10/2020-9/2023)
	+ PI, University of Colorado, Boulder
	+ $9,000,000 total ($900,000 University of Colorado, Boulder)
* Dynamic control of metabolism using redesigned proteins, National Science Foundation, PI: Tim Whitehead (University of Colorado, Boulder) (9/2020-8/2022)
	+ Co-PI, University of Colorado, Boulder
	+ $238,752 total
* Center for BioEnergy Innovation (CBI), Department of Energy Office of Science, Biological and Environmental Research (BER) Bioenergy Research Center, PI: Gerald Tuskan (Oak Ridge National Laboratory, Tennessee) (10/17-9/22)
	+ Co-PI and Rapid Genetics Team Lead, University of Colorado, Boulder lead
	+ $120,000,000 total ($3,320,000 University of Colorado, Boulder)
* Design and Engineering of Synthetic Control Architectures, Department of Energy Office of Science Biological and Environmental Research (BER) Biosystems Design Program, PI: Ryan Gill (University of Colorado, Boulder) (9/17-8/23)
	+ Co-PI, University of Colorado, Boulder
	+ $11,905,849; ($8,230,850 University of Colorado, Boulder)

**Previous Funding:**

* Improving Formate Upgrading by *Cupriavidus necator*, Department of Energy Biomass Energy Technologies Office (BETO) National Renewable Energy Laboratory Annual Operating Plan Award, PI: Chris Johnson (NREL) (10/18-9/21)
	+ Co-PI, NREL
	+ $960,000 total
* Progress towards a New Model Chemolithoautotrophic Host, Department of Energy Biomass Energy Technologies Office (BETO) Agile BioFoundry, PI: John Reed (Kiverdi, Inc., Berkeley, CA) (1/19-12/20)
	+ Co-PI, NREL lead
	+ $1,285,700 total ($308,600 NREL)
* Production of High-Value Chemicals from Renewable Feedstocks, Department of Energy Biomass Energy Technologies Office (BETO) Agile BioFoundry, PI: Brian Lee (Visolis Inc., Berkeley, CA) (3/18-2/20)
	+ Co-PI, NREL lead
	+ $714,300 total ($383,000 NREL)
* High Throughput Platform for the Discovery of Thermophilic Enzymes and Pathways, Center for BioEnergy Innovation (CBI), Department of Energy Office of Science, Biological and Environmental Research (BER) Bioenergy Research Center High Risk High Reward Supplement, PI: Jan Westpheling (10/18-12/19)
	+ Co-PI, University of Colorado, Boulder Lead
	+ $280,000 total ($80,000 University of Colorado, Boulder)
* Controlling Energy Transport in Microbial Electrosynthesis, NREL Laboratory Directed Research and Development, Bioenergetics Seed, PI: Kate Brown (NREL) (4/18-9/18)
	+ Co-PI, NREL
	+ $100,000 total
* Biological Conversion of Syngas to Terpenes in a Thermophilic Microbial Platform, BETO Incubator (PI: Kiverdi, Inc., Berkeley, CA) (10/15-12/17)
	+ Co-PI, NREL lead
	+ $2,000,000 total ($713,000 NREL)
* Colorado Foundry for Rational Engineering (FORGE), Defense Advanced Research Projects Agency (DARPA) 1000 molecules, PI: Ryan Gill (2014)
	+ Proposal and Project Team member, University of Colorado, Boulder/NREL
	+ TA1 funding for full proposal development, TA2 not awarded
* Genome scale design of biofuel production strains in *E. coli,* DOE BER Biosystems Design, PI: Ryan Gill (CU Boulder) (9/12-9/17)
	+ Co-PI, NREL
	+ $9,200,000 total ($1,363,000 NREL)
* Improvement of H2 and CO2 uptake in *Cupriavidus necator* for Autotrophic Production of Fatty Acids, ARPA-E Electrofuels Program, PI: Mike Lynch (OPX Biotechnologies, Boulder, CO) (10/10-9/13)
	+ Proposal and Project team member, NREL mentor
	+ $6,000,000 total ($2,250,000 NREL)

**Unfunded Proposals:**

* Systems Biology Studies to Enable Transporter Engineering, Department of Energy Office of Science Biological and Environmental Research (BER), PI: Brian Pfleger (University of Wisconsin), co-PI: Costas Maranas (Penn State) (10/01/2021-09/30/2024)
	+ co-PI, Oak Ridge National Laboratory
	+ $1,500,000 total
* Center for Hybrid Approaches towards Carbon Negative Engineering (CHANGE), National Science Foundation Energy Research Center Program, PI: Alissa Park (Columbia University) (09/01/2021-08/31/2026)
	+ PI, University of Colorado, Boulder
	+ $14,000,000 total
* EFRI-DCheM: Distributed Modular Electro-Bio Reactor Systems for Nutrition Production (ModularEBRS), National Science Foundation, PI: Ah-Hyung Park (Columbia University – Lead organization); co-PIs: Scott Banta (Columbia University), Julio Friedmann (Columbia University), Carrie Eckert (University of Colorado Boulder), Wilson Smith (University of Colorado Boulder), Feng Jiao (University of Delaware) (9/2020-8/2024)
	+ PI, University of Colorado, Boulder
	+ $2,000,000 total ($792,470 University of Colorado, Boulder)
* Synthetic biology approaches for biocontainment of engineered bacteriophages, National Institutes of Health, PI: Tim Whitehead (CU) (8/20-7/22, Under Review)
	+ Co-PI, University of Colorado, Boulder
	+ $275,000 total
* Deep mutational scanning of thermophilic enzymes for improved cellulosic biofuel production, National Science Foundation, PI: Dan Olson (Dartmouth) (5/20-4/23, Not funded)
	+ Co-PI, University of Colorado, Boulder Lead
	+ $600,000 total ($215, 000, University of Colorado, Boulder)
* Living quantum dot-cell nano-biohybrid organisms to improve human performance, Air Force Office of Scientific Research, PI: Prashant Nagpal (University of Colorado, Boulder) (1/19-12/21)
	+ Co-PI, University of Colorado, Boulder
* Optimization of Spirulina Palatability and Production for Spaceflight, NASA Translational Research Institute for Space Health (TRISH) Biomedical Research Advances for Space Health
(BRASH) 1801, PI: Pioneer Astronautics (1/19-12/20)
	+ Co-PI, University of Colorado, Boulder Lead
* Artificial Quantum Dot-*Cupriavidus necator* Nanobiohybrid Organisms for Waste biomass Conversion into High-value Fuels and Bioplastics, Department of Energy Biomass Energy Technologies Office (BETO) BioEnergy Engineering for Products Synthesis, PI: Prashant Nagpal (University of Colorado Boulder) (10/18-9/21)
	+ Co-PI, University of Colorado, Boulder
* Using Living Quantum Dot-Cell Biohybrid Nano-Organisms to Improve Photon-to-Hydrocarbon Conversion Efficiency and Throughput, Department of Energy Biomass Energy Technologies Office (BETO) BioEnergy Engineering for Products Synthesis, PI: Prashant Nagpal (University of Colorado Boulder) (10/18-9/21)
	+ Co-PI, University of Colorado, Boulder
* Using Deep Sequencing to Investigate the Mutational Landscape of the AdhE protein in *Clostridium thermocellum*, National Science Foundation, PI: Dan Olson (Dartmouth) (9/18-8/21)
	+ Co-PI, University of Colorado, Boulder Lead
* Ethanol Production from Lignocellulosic Biomass Using Engineered Thermophilic Bacteria, Department of Energy Biomass Energy Technologies Office (BETO) and United States Department of Agriculture (USDA) Biomass Research and Development Initiative (BRDI), PI: Dan Olson (Dartmouth) (9/18-9/20)
	+ Co-PI, University of Colorado, Boulder Lead
* Systems Biology Driven Biofuels Pathway Engineering and Optimization, DOE Office of Science Biological and Environmental Research (2014)
	+ PI, University of Colorado, Boulder
* A Platform for Genome-Scale Optimization of Photosynthetic Microalgae for Advance Biofuel Production, OE Office of Science Early Career Research Program (2013)
	+ PI, NREL
* High Throughput Improvement of Photosynthetic Microalgae for Advanced Biofuel Production Using Genome Scale Metabolic Engineering Methods, DOE Office of Science Early Career Research Program (2012)
	+ PI, NREL