

Caroline Andrea Werlang

281 723 0951 • cwerlang@mit.edu

Education

2016 - present	Ph.D. Biological Engineering GPA: 5.0/5.0	<i>Massachusetts Institute of Technology</i>
2011 - 2015	B.S. Chemical Engineering Major GPA: 3.9/4.0 Overall GPA: 3.7/4.0	<i>California Institute of Technology</i>

Research

Jan 17 – present	NSF Graduate Research Fellow • Discovered that salivary mucin glycans shut down quorum sensing and horizontal gene transfer of <i>Streptococcal</i> species • Designed and evaluated mucin-mimetic polymers with collaborators	<i>Katharina Ribbeck, MIT</i>
Sep 15 – Aug 16	Fulbright Fellow • Measured protein-RNA binding interactions using PDMS microfluidics • Developed methods for <i>in vitro</i> real-time monitoring of RNA synthesis with the fluorescent RNA aptamer Spinach	<i>Sebastian Maerkl, ÉPFL</i>
Jan 14 – Jun 15	Amgen Scholar • Assisted in the implementation of an algorithm for guiding directed mutagenesis to aid in NAD(P)H cofactor switching • Engineered a pathway for extracellular electron transport using directed evolution of heterologously expressed proteins from <i>S. oneidensis</i>	<i>Frances Arnold, Caltech</i>
Jun 13 – Sep 13	Research Fellow • Evaluated the efficacy of statins delivered through polymer-microparticle scaffolds on bone tissue development	<i>Tony Mikos, Rice University</i>
Mar 12 – Sep 12	Research Fellow • Characterized and developed nanoparticle catalyst (Ni-Mo) for electrochemical hydrogen evolution	<i>Harry Gray and Nate Lewis, Caltech</i>

Publications

1. Werlang, C.; Chen, W.; Aoki, K.; Wheeler, K.; Tymm, C.; Milet, C.; Tiemeyer, M.; Ribbeck, K. "Mucin glycans suppress quorum sensing and associated virulence traits in *Streptococcus mutans*." *In review*
2. Werlang, C.; Cárcamo-Oyarce, G.; Ribbeck, K. "Engineering mucus to study and influence the microbiome." *Nature Materials Reviews* 2019
3. Schuergers, N.; Werlang, C.; Ajo-Franklin, C.; Boghossian, A. "A synthetic biology approach to engineering living photovoltaics." *Energy & Environmental Science* 2017
4. Cahn, J.; Werlang, C.; Baumschlager, A.; Brinkmann-Chen, S.; Mayo, S.; Arnold, F. "A general tool for engineering the NAD/NADP cofactor preference of oxidoreductases." *ACS Synthetic Biology* 2016

5. Shah, S.; Werlang, C.; Kasper, F.; Mikos, A., "Novel Applications of Statins for Bone Regeneration." *National Science Review* 2014
6. McKone, J.; Sadtler, B.; Werlang, C.; Lewis, N.; Gray, H., "Ni–Mo Nanopowders for Efficient Electrochemical Hydrogen Evolution." *ACS Catalysis* 2012

Awards and Fellowships

2019	Graduate Women of Excellence Award	<i>MIT Dean of Grad. Education</i>
2019	First Place Poster Award	<i>MIT Polymer Day</i>
2019	First Place Poster Award	<i>MIT-Harvard Microbiome Symposium</i>
2019	Travel Award	<i>MIT Graduate Student Council</i>
2018	Teaching Assistant Excellence Award	<i>MIT Biological Engineering</i>
2015	NSF Graduate Research Fellowship	
2015	Fulbright Fellowship, Switzerland	
2014	Caltech-Cambridge Scholars Program	<i>St. John's College, Cambridge, UK</i>
2014	Summer Research Fellowship	<i>Amgen Scholars Program</i>
2013	Summer Research Fellowship	<i>Monticello Foundation</i>
2013	Latinos on Fast Track Fellowship	<i>ExxonMobil</i>
2012	Summer Research Fellowship	<i>Caltech</i>

Teaching

Summer 19	Teaching Ambassador	<i>MIT J-WEL</i>
	• Coached visiting international professors on MIT-style course content during the Jameel World Education Lab Curriculum Design Workshop	
Spring 18	Teaching Assistant	<i>MIT BE</i>
	• Tissue Engineering and Applied Developmental Biology (Linda Griffith)	
Fall 17	Training: Teaching College-Level Science & Engineering	<i>MIT TLL</i>
	• Optional 25 hour course covering research-based teaching methods	
	Teaching Assistant	<i>Caltech</i>
Spring 15	• Dynamics and Control of Chemical Systems (John Seinfeld)	
Winter 15	• Chemical Reaction Engineering (Frances Arnold)	
Spring 13,14,15	• Principles of Biology (Dianne Newman)	
Fall 13	• Experimental Chemistry Laboratory (Jeff Mendez)	

Research Mentoring

Summer 19	Carly Tymm	<i>NSF Materials Research REU</i>
Summer 18	Cassidy Milet	<i>MIT Amgen Scholars Program</i>
Summer 18	Tooba Shahid	<i>MIT iGEM</i>
Spring 18	Evie Mayner	<i>MIT Undergrad Research Opportunities Program</i>

University Service

Aug 17 – present	Peer Advocate & Conflict Management Coach	<i>MIT BE REFS</i>
	<ul style="list-style-type: none"> • Held one-on-one conflict coaching sessions; developed resources and led seminars to help peers navigate graduate school challenges • Underwent a four day training course in conflict management 	
Feb 19 – present	President and Co-founder	<i>MIT Glycobio Club</i>
	<ul style="list-style-type: none"> • Gained funding for and organized a literature analysis group that provides a monthly meeting for interdisciplinary trainees in glycobiology 	
Sep 19 - present	Title IX Student Advisory Committee	<i>MIT IDHR</i>
	<ul style="list-style-type: none"> • Designed outreach campaigns & bystander training for student leaders 	
Sep 19 – present	Graduate Student Advisory Group	<i>MIT Dean of Engineering</i>
	<ul style="list-style-type: none"> • Piloted Advising Philosophy Statement program to improve mentor/ee fit 	
Sep 19 – present	Advising & Mentoring Subcommittee	<i>MIT Graduate Student Council</i>
	<ul style="list-style-type: none"> • Helped develop an “Advisor Fit” workshop for graduate orientation 	
Sep 19 – present	Student Wellbeing Advisory Group	<i>MIT Division of Student Life</i>
Aug 18 – present	Coordinator for Boston Events	<i>Caltech Alumni Association</i>
	<ul style="list-style-type: none"> • Organized monthly networking events for Massachusetts Alumni 	
Sep 16 – Sep 19	Secretary, Welcome Chair	<i>MIT BE Graduate Student Board</i>
	<ul style="list-style-type: none"> • Led a student initiative to rewrite and digitize the BE Graduate Handbook 	
Sep 17 – May 19	Executive Committee	<i>MIT Eastgate Residence</i>
Feb 20	Application Review Committee	<i>MIT Summer Research Program</i>
Jun 19	Discussion Section Leader	<i>Carbohydrates Gordon Research Seminar</i>
May 19	Travel Award Judge	<i>MIT Graduate Student Council</i>
Mar 19	Biopolymers Session Chair	<i>American Physical Society</i>
Nov 18, 19	Graduate Admissions Panellist	<i>MIT Living Machines Program</i>

Outreach

Fall 16, 17, 18, 19	MIT BE Application Assistance Program	
	<ul style="list-style-type: none"> • Helped 4 applicants from underrepresented groups improve their essays and CVs for graduate admissions and the NSF GRFP 	
Apr 19	Outreach Demo Leader and Presenter	<i>MIT NSF MSRP</i>
	<ul style="list-style-type: none"> • Trained volunteers, developed and prepared demo, and led a session on building solar cells for high school girls 	
Aug 17, 18, 19	Mucus Outreach Demo Presenter	<i>Boston Museum of Science</i>
Apr 19	Mucus Activity Volunteer	<i>Cambridge Science Fair</i>
Apr 18, 19	Vaccine Activity Coordinator and Volunteer	<i>Cambridge Science Fair</i>
Nov 17, 18, 19	Volunteer for Biological Engineering Demo	<i>MIT Girl's Day</i>
Jun 18 – Aug 18	Volunteer English Night Tutor for MIT employees	<i>MIT ESL</i>
Aug 12 – Jun 15	URM Recruitment Assistant	<i>Caltech Admissions</i>
	<ul style="list-style-type: none"> • Coordinated mentors and activities for overnight recruitment visits 	

Presentations

1. “Flash talk: Mucin glycans suppress quorum sensing and genetic transformation in *Streptococcus mutans*”. *Boston Bacterial Meeting, Cambridge, MA*. July 2020
2. “Saliva and mucin glycans reduce virulence of *Streptococcal* species”. *MIT Bioengineering and Toxicology Seminar, Cambridge, MA*. February 2020
3. “Salivary mucins reduce genetic transfer and virulence of *Streptococcus mutans*.” *MIT Department of Biological Engineering Annual Retreat, Boston, MA*. October 2019
4. “Flash talk: Salivary mucin glycopolymers reduce virulence of *Streptococcus mutans*.” *Carbohydrates Gordon Research Conference, Hong Kong*. June 2019
5. “Salivary mucin glycopolymers reduce virulence traits of cavity-causing *Streptococcus mutans*.” *American Physical Society March Meeting, Boston, MA*. March 2019
6. “A Mucin-Specific Protease Enables Molecular and Functional Analysis of Human Cancer-Associated Mucins – by Malaker *et. al.*” *MIT Glycobio Club, Cambridge, MA*. January 2019
7. “Mucin’s influence on bacterial phenotypes: a look at the oral niche.” *Boston Microbiome Meetup, Boston, MA*. November 2018
8. “Salivary Mucins Suppress Virulence Traits of Cavity-causing *Streptococcus mutans*.” *MIT Bioengineering and Toxicology Seminar, Cambridge, MA*. September 2018
9. “Teaching analytical skills to bioengineers: a case study in course development.” *The Abdul Latif Jameel World Education Lab, Cambridge, MA*. July 2018
10. “Improving Extracellular Electron Transport by Directed Evolution.” *Caltech Seminar Day, Pasadena, CA*. August 2014
11. “Assessing the Role of Molybdenum in Nickel-Molybdenum Alloy Electrocatalysts.” *Caltech Seminar Day, Pasadena, CA*. October 2012

Posters

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| Jun 19 | • Carbohydrates Gordon Research Conference, <i>Hong Kong</i> |
| May 19 | • Harvard Chan Center for the Microbiome in Public Health Symposium, <i>Boston</i> |
| Mar 19 | • MIT-Harvard Microbiome Symposium, <i>Cambridge</i> |
| Oct 18, 19 | • MIT Materials Day, <i>Cambridge</i> |
| Apr 18, 19 | • MIT Polymer Day, <i>Cambridge</i> |
| Apr 18, 19 | • MIT Center for Environmental Health Sciences Poster Session, <i>Cambridge</i> |
| Oct 17, 18, 19 | • MIT Biological Engineering Department Retreat, <i>Cambridge</i> |
| Mar 17, 19, 20 | • MIT Biological Engineering Interview Weekend, <i>Cambridge</i> |