Caroline Andrea Werlang

281 723 0951 • cwerlang@mit.edu

Education

2016 - present **Ph.D. Biological Engineering** *Massachusetts Institute of Technology*
GPA: 5.0/5.0

2011 - 2015 **B.S. Chemical Engineering** *California Institute of Technology*
Major GPA: 3.9/4.0 Overall GPA: 3.7/4.0

Research

Jan 17 – present **NSF Graduate Research Fellow** *Katharina Ribbeck, MIT*
• Discovered that salivary mucin glycans prevent quorum sensing and horizontal gene transfer of Streptococcal species
• Analyzed role of glycans in reducing pathogenicity in bacterial vaginosis
• Designed and evaluated mucin-mimetic polymers with collaborators

Sep 15 – Aug 16 **Fulbright Fellow** *Sebastian Maerkl, ÉPFL*
• Measured protein-RNA binding interactions using PDMS microfluidics
• Developed methods for *in vitro* real-time monitoring of RNA synthesis with the fluorescent RNA aptamer Spinach

Jan 14 – Jun 15 **Amgen Scholar** *Frances Arnold, Caltech*
• 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 *S. oneidensis*

Jun 13 – Sep 13 **Research Fellow** *Tony Mikos, Rice University*
• Evaluated the efficacy of statins delivered through polymer-microparticle scaffolds on bone tissue development

Mar 12 – Sep 12 **Research Fellow** *Harry Gray and Nate Lewis, Caltech*
• Characterized and developed nanoparticle catalyst (Ni-Mo) for electrochemical hydrogen evolution

Publications

1. Werlang, C.; Chen, W.; Aoki, K.; Wheeler, K.; Tymm, C.; Mileti, C.; Tiemeyer, M.; Ribbeck, K. “Mucin glycans suppress quorum sensing and associated virulence traits in *Streptococcus mutans.” In revision*
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

2020	**Siebel Scholarship**	*Siebel Foundation*
2019	**Graduate Women of Excellence Award**	*MIT Dean of Grad. Education*
2019	First Place Poster Award	*MIT Polymer Day*
2019	First Place Poster Award	*MIT-Harvard Microbiome Symposium*
2019	Travel Award	*MIT Graduate Student Council*
2018	**Teaching Assistant Excellence Award**	*MIT Biological Engineering*
2015	**NSF Graduate Research Fellowship**	
2015	**Fulbright Fellowship, Switzerland**	
2014	Caltech-Cambridge Scholars Program	*St. John's College, Cambridge, UK*
2014	Summer Research Fellowship	*Amgen Scholars Program*
2013	Summer Research Fellowship	*Monticello Foundation*
2013	Latinos on Fast Track Fellowship	*ExxonMobil*
2012	Summer Research Fellowship	*Caltech*

Teaching

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

Research Mentoring

Summer 19	Carly Tymm (Dartmouth)	*NSF Materials Research REU*
Summer 18	Cassidy Mileti (Cornell)	*MIT Amgen Scholars Program*
Summer 18	Tooba Shahid (MIT)	*MIT iGEM*
Spring 18	Evie Mayner (MIT)	*MIT Undergrad Research Opportunities Program*

University Service

Aug 17 – present	**Peer Conflict Management Coach & Advocate**	*MIT BE REFS*
	• 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**	*MIT Glycobio Club*
	• 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**	*MIT IDHR*
	• Designed outreach campaigns & bystander training for student leaders	
Sep 19 – present	**Graduate Student Advisory Group**	*MIT Dean of Engineering*
	• Piloted Advising Philosophy Statement program to improve mentor/ee fit	
Sep 19 – present	**Advising & Mentoring Subcommittee**	*MIT Graduate Student Council*
	• Helped develop an “Advisor Fit” workshop for graduate orientation	
Aug 18 – present	**Coordinator for Boston Events**	*Caltech Alumni Association*
	• Organized monthly networking events for Massachusetts Alumni	
Sep 16 – Sep 19	**Secretary**	*MIT BE Graduate Student Board*
	• Led a student initiative to rewrite and digitize the BE Graduate Handbook	
Sep 17 – May 19	**Executive Committee**	*MIT Eastgate Residence*
Sep 20	**Discussion Section Leader**	*Virtual Streptococcal Trainee Symposium*
Feb 20	**Application Review Committee**	*MIT Summer Research Program*
Jun 19	**Discussion Section Leader**	*Carbohydrates Gordon Research Seminar*
May 19	**Travel Award Judge**	*MIT Graduate Student Council*
Mar 19	**Biopolymers Session Chair**	*American Physical Society*
Nov 18, 19	**Graduate Admissions Panellist**	*MIT Living Machines Program*

Outreach

Fall 16, 17, 18, 19, 20	**MIT BE Application Assistance Program** • 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** • Trained volunteers, developed and prepared demo, and led a session on building solar cells for high school girls	*MIT NSF MSRP*
Aug 17, 18, 19	**Mucus Outreach Demo Presenter**	*Boston Museum of Science*
Apr 19	**Mucus Activity Volunteer**	*Cambridge Science Fair*
Apr 18, 19	**Vaccine Activity Coordinator and Volunteer**	*Cambridge Science Fair*
Nov 17, 18, 19	**Volunteer for Biological Engineering Demo**	*MIT Girl’s Day*
Jun 18 – Aug 18	**Volunteer English Night Tutor for MIT employees**	*MIT ESL*
Aug 12 – Jun 15	**URM Recruitment Assistant** • Coordinated mentors and activities for overnight recruitment visits	*Caltech Admissions*

Presentations

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

Posters

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