Courtney Reichhardt, Ph.D.

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Education

B.S., Chemistry; Montana State University, 2010 *Highest honors*

Ph.D., Chemistry; Stanford University, 2016
Advisor: Lynette Cegelski
Thesis Title: *Atomistic insights into microbial biofilms*

Appointments

Postdoctoral researcher, Microbiology; University of Washington, 2016-*present*
Advisor: Matthew Parsek

Assistant Professor of Chemistry, Washington University in St. Louis, ***beginning summer 2021***

Awards and recognitions

2019-2024 K99/R00 "Pathway to Independence" Award, NIGMS
2019-2024 Postdoc-to-Faculty Transition Award, Cystic Fibrosis Foundation (CFF)
2019 Cystic Fibrosis Mentored Research Innovation Award, Vertex - *awarded but declined*
2017-2019 Carol Basbaum Memorial Research Fellowship, CFF - *named fellowship awarded to top ranked applicant*
2017 American Heart Association (AHA) Postdoctoral Fellowship - *awarded but declined*
2016-2017 Cystic Fibrosis Research Development Program Postdoctoral Fellowship
2013-2015 Althouse Family Stanford Graduate Fellowship
2010 Ralph A. Olsen Creativity Award, Montana State University
2009-2010 Beckman Scholar, Arnold and Mabel Beckman Foundation
2009-2010 Howard Hughes Medical Institute Scholar at Montana State University - *for science outreach*
2008 IDeA Network of Biomedical Research Excellence Scholar, INBRE, NIH
2007 Center for Bio-Inspired Nanomaterials (CBIN) Summer Research Fellowship

Research interests

We seek to answer: ***What are the fundamental biophysical principles of biofilm assembly?*** Since this question spans several scales—multicellular to atomic—we are developing multidisciplinary approaches that integrate microbiological methods with physical chemistry tools including microscopy and solid-state nuclear magnetic resonance (NMR). Our research is anticipated to lead to improved models to study biofilms, which will be useful in the development of anti-biofilm therapeutics. Additionally, the tools that we develop will be useful for studying other complex materials.

Publications

19. **Reichhardt C.**, Jacobs H.M., Matwichuk M., Wong C., Wozniak D.J., and M.R. Parsek, The versatile *Pseudomonas aeruginosa* biofilm matrix protein CdrA promotes aggregation through different extracellular EPS interactions. *Journal of Bacteriology* **2020**, *online ahead of print.*

18. **Reichhardt C.** and M.R. Parsek, Microscopy techniques for analysis of *Pseudomonas aeruginosa* biofilm architecture and matrix localization. *Frontiers Microbiology* **2019**, *10,* 677.

17. Passos da Silva D., Matwichuk M.L., Townsend D.O., **Reichhardt C.**, Lamba D., Wozniak D.J., and M.R. Parsek, The *Pseudomonas aeruginosa* lectin LecB binds to Psl and stabilizes the biofilm matrix. *Nature Communications* **2019,** *10,* 2183.

16. **Reichhardt C.,** Joubert L.-M., Clemons K.V., Stevens D.A., and L. Cegelski, Integration of electron microscopy and solid-state NMR analysis for new views and compositional parameters of *A. fumigatus* biofilms. *Medical Mycology* **2019,** *57*, S239–S244.

15. **Reichhardt C.**, Wong C., Passos da Silva D., Wozniak D.J., and M.R. Parsek, CdrA interactions within the *Pseudomonas aeruginosa* biofilm matrix safeguard it from proteolysis and promote cellular packing. *mBio* **2018,** *9*, e01376-18.

14. Tseng B.S.*, **Reichhardt C.***, Merrihew G.E., Harrison J.J., MacCoss M.J., and M.R. Parsek, A biofilm matrix-associated protease inhibitor protects *Pseudomonas aeruginosa* from proteolytic attack. *mBio* **2018**, *9*, e00543-18 [*co-first authors]

13. **Reichhardt C.**[#] and L. Cegelski[#], The Congo red derivative FSB binds to curli amyloid fibers and specifically stains curliated *E. coli*. *PLOS ONE* **2018,** *13*, e0203226. [[#]co-corresponding authors]

12. **Reichhardt C.,** Stevens, D.A., and L. Cegelski, Fungal biofilm composition and opportunities in drug discovery. *Future Medicinal Chemistry* **2016***, 8*, 1455-1468.

11. **Reichhardt C.**, McCrate O.A., Zhou X., Lee J., and L. Cegelski, Influence of the amyloid dye Congo red on curli, cellulose, and the extracellular matrix in *E. coli* during growth and matrix purification. *Analytical and Bioanalytical Chemistry* **2016,** *408*, 7709-7717.

10. **Reichhardt C.*,** Jacobson A.*, Maher M., Uang J., McCrate O.A., Eckart M., and L. Cegelski, Congo red interactions with curli-producing *E. coli* and native curli amyloid fibers. *PLOS ONE* **2015***, 10,* e0140388. [*co-first authors]

9. **Reichhardt C.*,** Ferreira J.A.G.*, Joubert L.M., Clemons K.V., Stevens D.A., and L. Cegelski, Analysis of the *Aspergillus fumigatus* biofilm extracellular matrix by solid-state nuclear magnetic resonance. *Eukaryotic Cell* **2015***, 14***,** 1064-1072. [*co-first authors]

8. **Reichhardt C.,** Fong J. N., Yildiz F., and L. Cegelski, Characterization of the *Vibrio cholerae* extracellular matrix: a top-down solid-state NMR approach. *Biochimica Biophysica Acta-Biomembranes* **2015,** *1848*, 378-383.

7. **Reichhardt C.** and L. Cegelski, Solid-state NMR for bacterial biofilms. *Molecular Physics* **2014,** *112*, 887-894.

6. McCrate O.A., Zhou X., **Reichhardt C.,** and L. Cegelski, Sum of the parts: composition and architecture of the bacterial extracellular matrix. *Journal of Molecular Biology* **2013**, *425*, 4286-4294.

5. Jolley C., Lucon J., Uchida M., **Reichhardt C.,** Vaughn M., LaFrance B., and T. Douglas, Structure, dynamics, and solvation in a disordered metal-organic coordination polymer: a multiscale study. *Journal of Coordination Chemistry* **2011**, *64*, 4301-4317.

4. **Reichhardt C.,** Uchida M., O'Neil A., Li R., Previlege P., and T. Douglas, Templated assembly of organic-inorganic materials using the core shell structure of the P22 bacteriophage. *Chemical Communications* **2011**, *47*, 6326-6328.

3. O'Neil A., **Reichhardt C.,** Johnson B., Previlege P., and T. Douglas, Genetically programmed in vivo packaging of protein cargo and its controlled release from bacteriophage P22. *Angewandte Chemie International Edition* **2011**, *50*, 7425-7428.

2. Jolley C., Uchida M., **Reichhardt C.,** Harrington R., Kang S., Klem M., Parise J., and T. Douglas, Size and crystallinity in protein-templated inorganic nanoparticles. *Chemistry of Materials* **2010**, *22*, 4612–4618.

1. Uchida M., Kang S., **Reichhardt C.,** Harlen K., and T. Douglas, The ferritin superfamily: Supramolecular templates for materials synthesis, *Biochimica Biophysica Acta-General Subjects* **2010**, *1800*, 834-845.

Presentations

"Untangling the function of the *Pseudomonas aeruginosa* biofilm matrix protein CdrA," The Social Biofilm Network, Virtual Biofilm Meeting, June 2, 2020.

"Dynamics of biofilm matrix assembly in the model organism *Pseudomonas aeruginosa*," 63rd Annual Wind River Conference on Prokaryotic Biology, Estes Park, CO, June 8, 2019.

"Interesting new features and functions of the *Pseudomonas aeruginosa* matrix protein CdrA," University of Washington Department of Microbiology Annual Retreat, Leavenworth, WA September 19, 2018.

"Regulation of *Pseudomonas aeruginosa* biofilm structural integrity by the matrix protein CdrA," Cystic Fibrosis Annual Retreat, Seattle, WA, September 27, 2017.

"Curli: Functional bacterial amyloid fibers," 249th American Chemical Society (ACS) Meeting, Denver, CO, March 24, 2015.

"Structure and function of bacterial extracellular matrix," Biophysics Seminar, Stanford University, May 9, 2014.