LYNETTE CEGELSKI

ASSOCIATE PROFESSOR OF CHEMISTRY
STANFORD UNIVERSITY
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ACADEMIC HISTORY

SUNY Binghamton, Binghamton, New York B.S. Chemistry, *summa cum laude* and Phi Beta Kappa	1998
Washington University, St. Louis, Missouri Ph.D. Biophysical Chemistry – Laboratory of Prof. Jacob Schaefer	2004
Washington University School of Medicine, St. Louis, Missouri Postdoctoral Fellow; Molecular Microbiology – Laboratory of Prof. Scott Hultgren	2004-2008

FELLOWSHIPS AND HONORS

Phi Beta Kappa	1997
B.S. Chemistry *summa cum laude*	1998
American Chemical Society Senior of the Year Award, Binghamton University	1998
Honorable Mention: National Science Foundation Predoctoral Fellowship	1998
Dean's Graduate Student Academic Fellowship, Washington University	1998 - 1999
NIH Chemistry Biology Interface Pathway Fellow Washington University, Department of Chemistry	2000 - 2002
GRASP NMR Symposium 2006 Best Poster Presentation Award Poster: REDOR NMR for the Macromolecular Structural Biologist	2006
NIH NRSA Institutional Research Training Grant, Infectious Disease Division, Department of Internal Medicine, Washington University	2006 - 2007
Burroughs Wellcome Fund Career Award at the Scientific Interface	2008 – 2013
Terman Fellowship, Stanford University	2008
2010 NIH Director's New Innovator Award	2010 - 2015
Terman Fellowship, Stanford University	2011
Hellman Faculty Scholar Award	2012
NSF CAREER Award	2015

EMPLOYMENT HISTORY

Postdoctoral Fellow, Washington University School of Medicine, St. Louis, Missouri; Department of Molecular Microbiology	2004 - 2008
Acting Assistant Professor, Stanford University, Stanford, California; Dept. of Chemistry	2008 - 2009
Assistant Professor, Stanford University, Stanford, California; Dept. of Chemistry	2009 - 2017
Associate Professor, Stanford University, Stanford, California; Dept. of Chemistry	2017 - present

PROFESSIONAL ASSOCIATIONS

Member, American Chemical Society

Member, Biophysical Society

Member, American Society of Microbiology

PROFESSIONAL SERVICE

Journal Reviewer: Applied and Environmental Microbiology; Biochemistry; Biophysical Journal; Chemical Science; FEMS Microbiology Letters; Infection and Immunity; Journal of the American Chemical Society (JACS); Journal of Magnetic Resonance; Journal of Physical Chemistry B; Magnetic Resonance in Chemistry; Nature; Nature Methods; PLoS One; PLoS Pathogens; PNAS; Science; Solid-State Nuclear Magnetic Resonance.

Guest Editor: Special Issue on “NMR Spectroscopy for Atomistic Views of Biomembranes and Cell Surfaces” in Biophysica et Biochimica Acta (2014).

TEACHING

Introduction to Biochemistry, CHEM 181/CHEMENG 181/281

Biochemistry Laboratory, CHEM 184

Exploring Chemical Research at Stanford, CHEM 111

Introduction to NMR, CHEM 291

PUBLICATIONS

All publications are in peer-reviewed journals; * indicates corresponding author.

1. Li Y, Poliks B, Cegelski L, Poliks M, Gryczynski Z, Piszczek G, Jagtap PG, Studelska DR, Kingston DGI, Schaefer J, Bane S*. Conformation of Microtubule-Bound Paclitaxel Determined by Fluorescence Spectroscopy and REDOR NMR. Biochemistry (2000) 39, 281-291.
2. Kim SJ, Cegelski L, Studelska DR, O'Connor RD, Mehta AK, Schaefer J*. REDOR Characterization of Vancomycin Binding Sites in *S. aureus*. Biochemistry (2002) 41, 6967-6977.
3. Cegelski L, Hing AW, Kim SJ, Studelska DR, O'Connor RD, Mehta AK, Schaefer J*. REDOR Characterization of Vancomycin Mode of Action in *S. aureus*. Biochemistry (2002) 41, 13053-13058.
4. Mehta AK, Cegelski L, O'Connor RD, Schaefer J*. REDOR with a Relative Full-Echo Reference. Journal of Magnetic Resonance (2003) 163, 182-187.
5. Cegelski L, Rice CV, O'Connor RD, Caruano AL, Tochtrop GP, Cai ZY, Covey DF*, Schaefer J*. Mapping the Locations of Estradiol and Potent Neuroprotective Analogues in Phospholipid Bilayers by REDOR. Drug Development Research (2005) 66, 93-102.
6. Cegelski L and Schaefer J*. Glycine Metabolism in Intact Leaves by *in vivo* $^{13}CO_2$ and ^{15}N Labeling. Journal of Biological Chemistry (2005) 280, 39238-39245.
7. Cegelski L and Schaefer J*. Photorespiration in Intact Leaves by *in vivo* $^{13}CO_2$ Labeling. Journal of Magnetic Resonance (2006) 178, 1-10. *From the cover*.
8. Toke O, Cegelski L, Schaefer J*. Peptide Antibiotics in Action: Investigation of Polypeptide Chains in Insoluble Environments by REDOR. Review: *Biochimica et Biophysica Acta* (2006) 1758, 1314-1329.
9. Cegelski L, Steuber D, Mehta AK, Kulp DW, Axelsen PH, Schaefer J*. Conformational and Quantitative Characterization of Oritavancin–Peptidoglycan Complexes in Whole Cells of *Staphylococcus aureus* by *in vivo* ^{13}C and ^{15}N Labeling. Journal of Molecular Biology (2006) 357, 1253-62.
10. Kim SJ, Cegelski L, Preobrazhenskaya MN, Schaefer J*. Structures of *Staphylococcus aureus* Cell-Wall Complexes with Vancomycin, Eremomycin, and Oritavancin Analogues by $^{13}C\{^{19}F\}$ and $^{15}N\{^{19}F\}$ Rotational-Echo Double Resonance. Biochemistry (2006) 45, 5235-5250.
11. Bann JG, Cegelski L, Hultgren SJ*. LRP6 Holds the Key for the Entry of Anthrax Toxin. Cell (2006) 124, 3-5.
12. Paik Y, Yang C, Metaferia B, Tang S, Bane S, Ravindra R, Shanker N, Alcaraz AA, Johnson SA, Schaefer J, O'Connor RD, Cegelski L, Snyder JP, Kingston DGI*. REDOR NMR Distance Measurements for the Tubulin-Bound Paclitaxel Conformation. Journal of the American Chemical Society (2007) 129, 361-370.
13. Kim SJ, Cegelski L, Stueber D, Singh M, Dietrich E, Tanaka KS, Parr TR, Farand AR, Schaefer J*. Oritavancin Exhibits Dual Mode of Action to Inhibit *S. aureus* Peptidoglycan Biosynthesis. Journal of Molecular Biology (2008) 377, 281-293.
14. Cegelski L, Marshall GR, Eldridge GR, Hultgren SJ*. The Biology and Future Prospects of Anti-Virulence Therapies. Nature Reviews Microbiology (2008) 6, 17-27.

15. Justice SJ, Hunstad DH, Cegelski L, Hultgren SJ*. Morphological Plasticity as a Bacterial Survival Strategy. Nature Reviews Microbiology (2008) 6, 162-168.
16. Cegelski L, Pinkner JS, Hammer ND, Cusumano CK, Hung CS, Chorell E, Åberg V, Walker JN, Seed PC, Almqvist F, Chapman MR, Hultgren SJ*. Small Molecule Inhibitors Target *E. coli* Amyloid Biogenesis and Biofilm Formation. Nature Chemical Biology (2009) 5, 913-919.
17. Cegelski L, Smith CL, Hultgren SJ*. Adhesion, Microbial. *In* The Encyclopedia of Microbiology, 3rd Edition, edited by Moselio Schaechter, Elsevier (2009) 2-10.
18. Cegelski L*, O'Connor RD, Stueber D, Singh M, Poliks B, Schaefer J. Plant Cell-Wall Cross-Links by REDOR NMR Spectroscopy. Journal of the American Chemical Society (2010) 132, 16052-16057.
19. Toke O and Cegelski L*. REDOR Applications in Biology: an Overview. *In* Solid-State NMR Studies of Biopolymers (2010). McDermott, AE and Polenova, T (eds). John Wiley & Sons Ltd, Chichester, UK, pp 473-490.
20. Lim JY, May J, Cegelski L*. DMSO and Ethanol Elicit Increased Amyloid Biogenesis and Amyloid-Integrated Biofilm Formation in *E. coli*. Journal of Applied and Environmental Microbiology (2012) 78, 3369-3378.
21. Wu C, Lim JY, Fuller G, Cegelski L*. Quantitative Analysis of Amyloid-Integrated Biofilms Formed by Uropathogenic *E. coli* at the Air-Liquid Interface. Biophysical Journal (2012) 103, 464-471.
22. Zhou X and Cegelski L*. Nutrient-Dependent Structural Changes in *S. aureus* Peptidoglycan
Revealed by Solid-State NMR Spectroscopy. Biochemistry (2012) 51, 8143-8153.
23. Wu C, Lim JY, Fuller G*, Cegelski L*. Disruption of *E. coli* Amyloid-Integrated Biofilm Formation at the Air-Liquid Interface by a Polysorbate Surfactant. Langmuir (2013) 29, 920–926.
24. McCrate OA, Zhou X, Cegelski L*. Curcumin as an Amyloid-Specific Dye. Chemical Communications (2013) 49, 4193-4195.
25. McCrate OA, Zhou X, Reichhardt C, Cegelski L*. Sum of the Parts: Composition and Architecture of the Bacterial Extracellular Matrix. Journal of Molecular Biology (2013) 425: 4286-4294.
26. Cegelski L*. REDOR NMR for Drug Discovery. Bioorganic & Medicinal Chemistry Letters (2013) 23, 5767-5775.
27. Lim JY, Pinkner J, Cegelski L*. Community Behavior and Amyloid-Associated Phenotypes, among a Panel of Uropathogenic *E. coli*. Biochemical and Biophysical Research Communications (2014) 443, 345-350.
28. Reichhardt C and Cegelski L*. Solid-State NMR for Bacterial Biofilms. Molecular Physics (2014) 112, 887-894. *From the cover*.
29. Saggu M, Carter B, Zhou X, Faries K, Cegelski L, Holten D, Boxer SG, Kirmaier C*. Putative Hydrogen Bond to Tyrosine M208 in Photosynthetic Reaction Centers from *Rhodobacter capsulatus* Significantly Slows Primary Charge Separation. Journal of Physical Chemistry B (2014) 118, 6721-6732.
30. Hollenbeck E, Fong JCN, Lim JY, Yildiz F, Fuller GG, Cegelski L*. Molecular Determinants of Mechanical Properties of *V. cholerae* Biofilms at the Air-Liquid Interface. Biophysical Journal (2014) 107, 2245-2252. *From the cover*.

31. Reichhardt C, Fong JCN, Yildiz F, Cegelski L*. Characterization of the Vibrio cholerae Extracellular Matrix: A Top-Down Solid-State NMR Approach. *Biochimica et Biophysica Acta* - Special Issue on "NMR Spectroscopy for Atomistic Views of Biomembranes and Cell Surfaces" (2015) 1848, 378-383.
32. Cegelski L* and Weliky D*. NMR Spectroscopy for Atomistic Views of Biomembranes and Cell Surfaces. *Biochimica et Biophysica Acta* (2015) 1848, 201-202.
33. Loy BA, Lesser AB, Staveness D, Billingsley KL, Cegelski L, Wender PA*. Toward a Biorelevant Structure of Protein Kinase C Bound Modulators: Design, Synthesis, and Evaluation of Labeled Bryostatin Analogues for Analysis with Rotational Echo Double Resonance NMR Spectroscopy. Journal of the American Chemical Society (2015) 137, 3678-3685.
34. Cegelski L*. Bottom-Up and Top-Down Solid-State NMR Approaches for Bacterial Biofilm Matrix Composition. Journal of Magnetic Resonance (2015) 253, 91-97.
35. Nygaard R, Romaniuk JAH, Rice DM, Cegelski L*. Spectral Snapshots of Bacterial Cell-Wall Composition and the Influence of Antibiotics by Whole-Cell NMR. Biophysical Journal (2015) 108, 1380-1389. *Highlighted as a "New and Notable" contribution.*
36. Reichhardt C, Ferreira JAG, Joubert L, Clemons KV, Stevens DA, Cegelski L*. Analysis of the *Aspergillus fumigatus* Biofilm Extracellular Matrix by Solid-State Nuclear Magnetic Resonance Spectroscopy. Eukaryotic Cell (2015) 14, 1064-1072. *From the cover*.
37. Jones C, Utada A, Davis KR, Thongsomboon W, Sanchez DZ, Banakar V, Cegelski L, Wong GCL, Yildiz FH*. Cyclic-di-GMP Regulates Motile to Sessile Transition by Modulating MshA Pili Biogenesis and Near-Surface Motility Behavior in *Vibrio cholerae*. PLoS Pathogens (2015) 11, e1005068.
38. Romaniuk JAH and Cegelski L*. Bacterial Cell Wall Composition and the Influence of Antibiotics by Cell-Wall and Whole-Cell NMR. Philosophical Transactions of the Royal Society (2015) 370:20150024.
39. Maher MC, Lim JY, Gunawan C, Cegelski L*. Cell-Based High-Throughput Screening Identifies Rifapentine as an Inhibitor of Amyloid and Biofilm Formation in *E. coli*. ACS Infectious Diseases (2015) 1, 460-468.
40. Rice DM, Romaniuk JAH, Cegelski L*. Frequency-Selective REDOR and Spin-Diffusion Relays in Uniformly Labeled Whole Cells. Solid-state Nuclear Magnetic Resonance (2015) 72, 132-139.
41. Reichhardt C, Jacobson AN, Maher MC, Uang J, McCrate OA, Eckart M, Cegelski L*. Congo Red Interactions with Curli-Producing *E. coli* and Native Curli Amyloid Fibers. PLoS One (2015) DOI: 10.1371/journal.pone.0140388.
42. Mechanical Behavior of a *Bacillus subtilis* Pellicle. Hollenbeck E, Douarche C, Allain J, Roger P, Regeard C, Cegelski L, Fuller GG, Respaud E*. Journal of Physical Chemistry B (2016) 120, 6080-6088.
43. Reichhardt C, Stevens DA, Cegelski L*. Fungal Biofilm Composition and Opportunities in Drug Discovery. Future Medicinal Chemistry (2016) 8, 1455-1468.
44. Reichhardt C, McCrate OA, Zhou X, Lee J, Thongsomboon W, Cegelski L*. 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)

DOI:10.1007/s00216-016-9868-2.

45. Joubert L*, Ferreira JAG, Stevens DA, Cegelski L. Visualization of *Aspergillus fumigatus* Biofilms with Scanning Electron Microscopy and Variable Pressure-Scanning Electron Microscopy: a Comparison of Processing Techniques. Journal of Microbiological Methods (2017) 132, 46-55.
46. Cegelski L*. Disentangling Nanonets: Human α-Defensin 6 Targets *C. albicans* Virulence. Biochemistry (2017) DOI: 10.1021/acs.biochem.7b00062.
47. Chen Z, Mercer JAM, Zhu X, Romaniuk JAH, Pfattner R, Cegelski L, Martinez TJ*, Burns NZ*, Xia Y*. Mechanochemical Unzipping of Insulating Polyladderene to Semiconducting Polyacetylene. Science (2017) 357, 475-479.
48. Nygaard R, Romaniuk JAH, Rice DM, Cegelski L*. Whole Ribosome NMR and Ribosome Contributions to Whole-Cell Spectra. Journal of Physical Chemistry B (2017) *In press.*
49. Thongsomboon W, Serra DO, Possling A, Hadjineophytou C, Hengge R*, and Lynette Cegelski*. Phosphoethanolamine Cellulose: a Naturally Produced Chemically Modified Cellulose. *In review.*
50. Nazik H, Joubert LM, Secor PR, Sweere JM, Bollyky PL, Sass G, Cegelski L, Stevens DA*. *Pseudomonas* Phage Inhibition of *Candida albicans*. Microbiology (2017) *In press*.

PATENTS AND PATENT APPLICATIONS

1. "Methods for Microbial Biofilm Destruction." Cegelski, L.; Lim, J. U.S. Patent No: 9,271,493 (2016).
2. "Production and Use of Phosphoethanolamine Cellulose and Derivatives." Cegelski, L.; Thongsomboon, W. S16-300 PCT Patent Application (2017).

INVITED LECTURES (2009 – PRESENT)

Santa Clara Valley/Northern California Meeting of the American Chemical Society. S. San Francisco, CA. 9/23/10.

Department of Chemistry and Biochemistry, San Francisco State University, 4/29/11.

Department of Chemistry. Portland State University. 5/13/11.

Department of Chemistry and Biochemistry. University of California Santa Cruz. 5/18/11.

Department of Urology. Stanford University. 9/26/11.

Department of Chemistry. Wichita State University. 2/15/12.

Department of Chemistry. San Jose State University. 3/13/12.

Samuel I. Weissman Lecture and Symposium. Washington University. St. Louis, MO. 5/11/12.

Rocky Mountain Conference on Analytical Chemistry. Copper Mountain, CO. 7/17/12.

Frontiers of NMR in Biology-Keystone Symposium. Snowbird, UT. 1/15/13.

Biophysical Society Meeting. Philadelphia, PA. 2/8/13.

Sixth International Conference on Advanced Materials and Nanotechnology (AMN-6). Auckland, New Zealand. 2/14/13.

Annual Symposium of the Stanford University Center for Molecular Analysis and Design. Stanford, CA. 5/3/13.

Atomic View of Biomolecular Function Symposium. University of Michigan. Ann Arbor, MI.

7/12/13.

Gordon Research Conference: Microbial Adhesion and Signal Transduction. Salve Regina. Newport, RI. 7/22/13.

International Symposium on Advancing the Chemical Sciences 11: Challenges in Chemical Biology Conference. MIT. Boston, MA. 7/24/13.

ACS National Meeting. Indianapolis, IN. 9/8/13.

Western Regional ACS Meeting. Santa Clara, CA. 10/3/13. Session organizer and speaker.

Southwest Regional ACS Meeting. Waco, TX. 11/19/13.

Department of Chemistry. University of the Pacific. 1/21/14.

Castro Valley Educational Foundation Lecture. Castro Valley Center for the Arts. Castro Valley, CA. 01/29/14.

Department of Biochemistry. Washington University School of Medicine. 4/4/14.

Experimental NMR Conference. Boston, MA. 3/24/14.

Science at the Edge Seminar Series. Michigan State University. East Lansing, MI. 4/18/14.

Department of Chemistry. UC Santa Barbara. Santa Barbara, CA. 4/30/14.

Industrial Partnership for Research in Interfacial and Materials Engineering (IPRIME) Annual Meeting. University of Minnesota. Minneapolis, MN. 5/27/14.

Department of Chemistry. University of Minnesota. Minneapolis, MN. 5/28/14.

Canadian Society for Chemistry Annual Meeting. Vancouver, B.C. 6/2/14.

Gordon Research Conference: Bacterial Cell Surfaces. Mount Snow, Vermont. 6/23/14.

International Conference on Magnetic Resonance in Biological Systems. Dallas, Texas. 8/25/14.

Department of Chemistry. Emory University. Atlanta, Georgia. 10/6/14.

Magnetic Resonance Seminar Series. UC Berkeley. Berkeley, CA. 10/10/14.

Department of Biochemistry. University of Oregon. Eugene, OR. 10/17/14.

Department of Chemistry. MIT. Boston, MA. 10/27/14.

Department of Chemistry. Brandeis University. Boston, MA. 10/28/14.

Department of Biochemistry. University of Illinois Urbana-Champaign. Urbana, IL. 5/1/15.

Department of Chemistry. University of Toronto. Toronto, Canada. 5/14/15.

Department of Chemistry. Caltech. Pasadena, CA. 5/27/15.

Center for Biofilm Engineering. Montana State University. Bozeman, MT. 10/15/15.

7th American Society for Microbiology Conference on Biofilms. Chicago, IL. 10/27/15.

Department of Chemistry. University of Washington. Seattle, WA. 12/2/15.

Advances in Biological Solid-State NMR. Pacifichem. Honolulu, HI. 12/15/15.

Department of Chemistry. UC Davis. Davis, CA. 5/17/16.

Seed Grant Awards Symposium. Stanford Institute for Immunity, Transplantation and Infection. Stanford, CA. 6/1/16.

Clinical and Scientific Advances in Urinary Tract Infection. Columbus, OH. 8/27/16.

Precourt Institute for Energy Seed Projects Annual Workshop. Stanford. Stanford, CA. 9/28/16.

Professor Jacob Schaefer Honorary Symposium. Washington University. St. Louis, MO. 1/6/17.

Advanced Isotopic Labeling Methods for Integrated Structural Biology. Grenoble, FRANCE. 3/6/17.

Cellulose Structure and Biosynthesis Symposium. CELL Division of the ACS Meeting. San Francisco, CA. 4/2/17.

Chemical Biophysics Symposium. University of Toronto. Toronto, CANADA. 5/4/17.

Biofilms: Stuck On You, Biofilm Symposium. University of Minnesota. Minnesota, MN. 5/19/17.

International Society of Magnetic Resonance (ISMAR) Conference. Quebec City, Canada. 07/25/17.

Transformative Measurements and Experimental Approaches for Bacterial Biofilms. Co-organizer. Okinawa Institute of Science and Technology. Okinawa, Japan. 8/29/17.

FUNDING SUMMARY

Active Awards

NSF CAREER (2015-2020)
"CAREER: Form and Function of Bacterial Amyloid Fibers"

Precourt Institute for Energy Seed Grant Award (2015-2017)
"Biosynthetic Modification of Cellulose for Improved Cellulose-to-Ethanol Conversion: Inspiration from the Bacterial Extracellular Matrix"

NIH R01 (2016-2020)
"Bacterial Cell-Wall Composition and the Influence of Antibiotics"

Completed Awards

Burroughs Wellcome Career Award at the Scientific Interface (2008-2013)
"Mapping the Structural and Functional Landscape of the Microbial Extracellular Matrix"

NIH Director's New Innovator Award (2010-2015)
"Structure, Function, and Disruption of Microbial Amyloid Assembly and Biofilm Formation"

Stanford Terman Award (2011)
"Macromolecular and Whole-Cell Solid-State NMR at the Chemistry-Biology Interface"

Hellman Faculty Scholar Award (2012)
"Translating New Discoveries from Chemistry into New Strategies for Treating Infectious Diseases"