W. Benjamin Rogers

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Education

2012 Ph.D., Chemical & Biomolecular Engineering, University of Pennsylvania
Advisor: John Crocker

2007 M.S., Chemical & Biomolecular Engineering, University of Pennsylvania

2005 B.S., Chemical Engineering, University of Delaware, Honors Degree with Distinction; *magna cum laude*

Professional Positions

2023–present Associate Professor, Department of Physics, Brandeis University

2016–2022 Assistant Professor, Department of Physics, Brandeis University

2014–2015 Research Associate, Applied Physics, Harvard University

2012–2014 Postdoctoral Fellow, Applied Physics, Harvard University
Mentor: Vinothan Manoharan

Awards and Honors

2020 Visiting Professor, Chaire Total, ESPCI (postponed due to COVID)

2017 Smith Family Award for Excellence in Biomedical Research, Smith Family Foundation

2016 Teaching Innovation Award, Brandeis University

2005 3M Graduate Research Fellowship, 3M

2005 H. Ted Davis Fellowship, University of Minnesota Foundation

2005 Industrial Sponsors Undergraduate Research Award, University of Delaware

2004 National Starch and Chemical Company Undergraduate Scholarship

2004 Robert L. Pigford Undergraduate Award, University of Delaware

Research Interests

DNA nanotechnology, self-assembly, biological physics, soft condensed matter physics, statistical mechanics and computer simulations

Research Support

National Science Foundation (DMR-2214590), 2022–2025
Dynamic Pathways to Crystallization of DNA-Coated Colloids
Total Costs: $559,373 (1 PI, role=PI)

National Science Foundation (DMR-2004400), 2020–2023
Collaborative Research: Enzyme-powered, programmable active matter.
Total Costs: $824,208 ($280,495 to Rogers Lab) (3 PI, role=co-PI)

Human Frontier Science Program (RGP0029), 2020–2023
Stable propagation of a minimal synthetic cell.
Total Costs: $1,050,000 ($350,000 to Rogers Lab) (3 PI, role=co-PI)

National Science Foundation (DMR-2011846), 2020–2026
MRSEC: Bioinspired Soft Materials
Total Costs: $18,000,000 (role=primary participant)

Smith Family Foundation, 2018–2021 (in NCE)
Experimental studies of RNA secondary structure and RNA-protein interactions.
Total Costs: $300,000 (1 PI, role=PI)

National Science Foundation (DMR-1710112), 2017–2020 (in NCE)
Experimental studies of dynamic self-assembly and phase transitions in colloidal suspensions.
Total Costs: $568,793 (1 PI, role=PI)

Publications

Publications under review

30. O. Hegde, T. Li, A. Sharma, M. Borja, W. M. Jacobs*, **W. B. Rogers***, "Competition between self-assembly and phase separation induces re-entrant condensation of DNA liquids," *arXiv*, (2023) arXiv:2301.06134.

29. A. Hensley, T. Videbaek, H. Seyforth, W. M. Jacobs*, **W. B. Rogers***, "Macroscopic DNA-programmed photonic crystals via seeded growth," *arXiv*, (2023) arXiv:2303.04074.

28. P. Moerman, H. Fang, T. E. Videbaek, **W. B. Rogers***, R. Schulman*, "A simple method to reprogram the binding specificity of DNA-coated colloids that crystallize," *arXiv*, (2022) arXiv:2206.00952.

27. M. Xu, **W. B. Rogers**, W. W. Ahmed, J. L. Ross, "Comparison of different approaches to single-molecule imaging of enhanced enzyme diffusion," *arXiv*, (2020) arXiv:2012.15424.

Publications in print

26. H. Fang, B. Tyukodi, **W. B. Rogers**, M. F. Hagan, "Polymorphic self-assembly of helical tubules is kinetically controlled," *Soft Matter*, 18 (2022) 6716-6728.

25. D. Hayakawa, T. E. Videbaek, D. M. Hall, H. Fang, C. Sigl, E. Feigl, H. Dietz, S. Fraden, M. F. Hagan, G. M. Grason, **W. B. Rogers**, "Geometrically-programmed self-limited assembly of tubules from DNA origami colloids," *PNAS*, 119 (2022) e2207902119.

24. E. Gehrels, **W. B. Rogers**, Z. Zeravcic, V. N. Manoharan, "Programming directed motion with DNA-grafted particles," *ACS nano*, 16 (2022) 9195-9202.

23. H. Seyforth, M. Gomez, **W. B. Rogers**, J. L. Ross, W. W. Ahmed, "Non-equilibrium fluctuations and nonlinear response of an active bath," *Physical Review Research*, (2022) *in press.*

22. A. Hensley, W. M. Jacobs*, **W. B. Rogers***, "Self-assembly of photonic crystals by controlling the nucleation and growth of DNA-coated colloids," *PNAS*, 119 (2022) e2114050118.

21. T. Videbaek*, H. Fang, D. Hayakawa, B. Tyukodi, M. F. Hagan, **W. B. Rogers***, "Tiling a tubule: How increasing complexity improves the yield of self-limited assemblies," *Journal of Physics: Condensed Matter*, 34 (2022) 134003.

20. S. Merminod, J. R. Edison, H. Fang, M. F. Hagan, **W. B. Rogers**, "Avidity and surface mobility in multivalent ligand-receptor binding," *Nanoscale*, 13 (2021) 12602–12612.

19. H. Fang, M. F. Hagan, **W. B. Rogers**, "Two–step crystallization and solid–solid transitions in binary colloidal mixtures," *PNAS*, 117 (2020) 27927–27933.

18. **W. B. Rogers**, "A mean-field model of linker-mediated colloidal interactions," *The Journal of Chemical Physics*, 153 (2020) 124901.

17. J. Lowensohn, A. Hensley, M. Perlow-Zelman, **W. B. Rogers**, "Self-assembly and crystallization of DNA-coated colloids via linker-encoded interactions," *Langmuir*, 36 (2020) 7100–7108.

16. J. Lowensohn, B. Oyarzun, G. Narvaez Paliza, B. M. Mognetti, **W. B. Rogers**, "Linker-mediated phase behavior of DNA-coated colloids," *Physical Review X*, 9 (2019) 041054.

15. A. Wang, J. W. Zwanikken, D. M. Kaz, R. McGorty, A. M. Goldfain, **W. B. Rogers**, V. N. Manoharan, "Before the breach: Interactions between colloidal particles and liquid interfaces at nanoscale separations," *Physical Review E*, 100 (2019) 042605.

14. E. W. Gehrels, **W. B. Rogers**, V. N. Manoharan, "Using DNA strand displacement to control the temperature dependence of DNA-mediated colloidal interactions," *Soft Matter*, 14 (2018) 969–984.

13. A. Wang, **W. B. Rogers**, V. N. Manoharan, "Effects of contact-line pinning on the adsorption of nonspherical colloids at liquid interfaces," *Physical Review Letters*, 119 (2017) 108004.

12. J.-G. Park, **W. B. Rogers**, S. Magkiriadou, T. Kodger, S.-H. Kim, Y.-S. Kim, V. N. Manoharan, "Photonic-crystal hydrogels with a rapidly tunable stop band and high reflectivity across the visible," *Optical Materials Express*, 7 (2017) 253–263.

11. **W. B. Rogers**, W. M. Shih, V. N. Manoharan, "Using DNA to program the self-assembly of colloidal nanoparticles and microparticles," *Nature Reviews Materials*, 1 (2016) 16008.

10. **W. B. Rogers**, V. N. Manoharan, "Programming colloidal phase transitions with DNA strand displacement," *Science*, 347 (2015) 639–642.

9. **W. B. Rogers**, M. Corbett, S. Magkiriadou, P. Guarillof, V. N. Manoharan, "Breaking tradeoffs between translucency and diffusion in particle-doped films," *Optical Materials Express*, 4 (2014) 2621–2631.

8. **W. B. Rogers**, J. C. Crocker, "A tunable line optical tweezers instrument with nanometer spatial resolution," *Review of Scientific Instruments*, 85 (2014) 043704.

7. **W. B. Rogers**, T. Sinno, J. C. Crocker, "Kinetics and non-exponential binding of DNA-coated colloids," *Soft Matter*, 9 (2013) 6412–6417.

6. M. T. Ung, R. T. Scarlett, **W. B. Rogers**, I. Jenkins, T. Sinno, J. C. Crocker, "Driving diffusionless transformations in colloidal crystals using DNA handshaking," *Nature Communications*, 3 (2012) 1209.

5. **W. B. Rogers**, J. C. Crocker, "Reply to Mognetti et al.: DNA handshaking interaction data are well described by mean-field and molecular models," *PNAS*, 109 (2012) E380.

4. **W. B. Rogers**, J. C. Crocker, "Direct measurements of DNA-mediated colloidal interactions and their quantitative modeling," *PNAS*, 108 (2011) 15687–15692.

3. R. F. Meyer, **W. B. Rogers**, M. T. McClendon, J. C. Crocker, "Producing monodisperse drug-loaded polymer microspheres via cross-flow membrane emulsification: the effects of polymers and surfactants," *Langmuir*, 26 (2010) 14479–14487.

2. R. Vijay, R. J. Hendershot, S. Rivera, **W. B. Rogers**, B. J. Feist, C. M. Snively, J. Lauterbach, "Noble metal free NO_X storage catalysts using cobalt discovered via high-throughput experimentation," *Catalysis Communications*, 6 (2005) 167–171.

1. R. J. Hendershot, **W. B. Rogers**, C. M. Snively, B. A. Ogunnaike, J. Lauterbach, "Development and optimization of NO_X storage and reduction catalysts using statistically guided high-throughput experimentation," *Catalysis Today*, 98 (2004) 375–385.

* indicates co-corresponding author

Invited Talks

38. *NYU*, Center for Soft Matter Research, December 6, 2022.

∗ 37. *MRS Fall Meeting*, Boston, Ma, November 29, 2022.

36. *MIT*, Department of Materials Science and Engineering, November 1, 2022.

∗ 35. *ACS Fall Meeting*, Chicago, Il, August 24, 2022.

∗ 34. *APS March Meeting*, Online, March 16, 2021.

33. *CAMA Online Talk*, South Korea, January 21, 2021.

∗ 32. *From Soft Matter to Protocells 2020*, Tokyo, Japan, October 28, 2020.

∗ 31. *APS March Meeting Short Course*, DNA Nanotechnology Meets Soft Matter, May 29, 2020.

30. *University of Chicago*, Computations in Science Seminar, December 11, 2019.

29. *MIT*, Physics of Living Systems, November 15, 2019.
28. *Northeastern Granular Materials Workshop, NYU*, Center for Soft Matter Research, June 14, 2019.
27. *Kyoto University, Center for iPS Cell Research and Application*, Kyoto, Japan, May 21, 2019.
26. *University of Utah*, Department of Chemistry, April 22, 2019.
∗ 25. *ACS National Meeting*, Orlando, FL, April 2, 2019.
24. *University of Massachusetts: Amherst*, Polymer Science and Engineering, September 21, 2018.
∗ 23. *International Center for Theoretical Sciences*, Bangalore, India, August 30, 2018.
22. *MIT*, New England Complex Fluids Workshop, June 15, 2018.
21. *Universite Libre de Bruxelles*, Department of Physics, April 27, 2018.
20. *Worchester Polytechnic Instittute*, Department of Physics, March 26, 2018.
19. *University of Oklahoma*, School of Chemical, Biological, and Materials Engineering, April 3, 2018.
18. *University of Massachusetts: Lowell*, Department of Physics, December 13, 2017.
17. *Smith College*, Department of Physics, December 1, 2017.
16. *University of Massachusetts: Boston*, Physics Department, November 16, 2017.
15. *University of Michigan*, Condensed Matter Seminar, September 19, 2017.
14. *Brandeis University*, Quantitative Biology Bootcamp, January 13, 2017.
13. *MIT*, Soft Materials and Soft Devices Colloquium, December 1, 2016.
12. *Brandeis University*, Volen Center for Complex Systems Annual Retreat, October 17, 2016.
11. *Mt. Holyoke College*, Department of Physics, October 4, 2016.
10. *Brandeis University*, Molecular Genetics Journal Club, April 11, 2016.
9. *Brookhaven National Lab*, Center for Functional Nanomaterials, April 1, 2016.
8. *Wellesley College*, Physics Department, February 18, 2016.
7. *Harvard University*, Squishy Physics, August 26, 2015.
6. *FNANO15*, Foundations of Nanoscience Conference, April 14, 2015.
5. *Brandeis University*, Martin A. Fisher School of Physics, February 26, 2015.
4. *Yale University*, Department of Chemical and Environmental Engineering, February 24, 2015.

3. *University of Wisconsin: Madison*, Department of Chemical and Biological Engineering, February 11, 2015.

2. *UC Santa Barbara*, Materials Department, February 2, 2015.

1. *Syracuse University*, Department of Physics, January 29, 2015.

* indicates national or international conference or workshop

Postdoctoral Scholars Advised

Manodeep Mondal, 2023-present.
Myeonggon Park, 2023-present.
Omkar Hegde, 2022-present.
Thomas Videbaek, 2020-present.
Anjali Sharma, 2021-2022, now an associate editor at Nature Communications.
Simon Merminod, 2017-2020, now a postdoctoral scholar at Harvard University.
Melissa Rinaldin, 2020-2020, now a postdoctoral scholar at Max Planck Institute.
Gael Prado, 2016, now in France.

Ph.D. Students Advised

Daichi Hayakawa, 2018-present
Zachary Curtis, 2021-present (co-supervised with Alex Bisson)
Ian Murphy, 2022-present
Hunter Seyforth, 2022-present
Alex Hensley, PhD (2022)
Huang Fang, PhD (2022)
Janna Lowensohn, PhD (2020)

Undergraduate Students Advised

Marco Borja, Adrian Koretsky, current students.

Hannah Clott, Gabe Freiman, Angelina Gallego, Kyra Hamel, Daniel Hariyanto, Josh Heller, Alexa Livingstone, Larry Luster, Mohammad Malik, Guillermo Narvaez-Paliza, Jordan Nobles, Kess Ofunrein, Michael Perlow-Zelman, Shira Roserberg, Zach Trotz, Alex Wofford, Alfred Yeung, Guoxi Zhu, Olivia Zou, past students.

Teaching Experience

Physics 20a: Waves and Oscillations, 2020, 2022.
Physics 40a: Introduction to Thermodynamics and Statistical Mechanics, 2020, 2021.
Physics 18a/b: Introductory Laboratory I/II, 2016-2019.I designed this course with Prof. Melissa Kosinki-Collins for advanced undergraduates in the life sciences. The new curriculum highlights the use of physical approaches to biology and resembles modern biophysics experiments being

performed in an academic research lab. Students use research-grade optical microscopes to conduct inquiry-based explorations into the behavior of living systems.

Quantitative Biology 120b: Quantitative Biology Instrumentation Laboratory, 2022

University and Professional Service

Graduate Admissions Committee, 2016–2019, 2021, 2022, chair
Department Colloquium Committee, 2016–2017
Undergraduate Curriculum Committee, 2016–2021, chair
Department Website Committee, 2017–2020, chair
Chair of the Biological Physics program, 2022

Organizing Committee of the Greater Boston Area Statistical Mechanics meeting, 2018–present

Organizing Committee of the New England Complex Fluids Workshop, 2021–present

Grant reviewer and panelist for National Science Foundation, Department of Energy, and Army Research Office.

Reviewer/Referee: I have reviewed articles for journals relevant to my research field including *Nature*, *Physical Review Letters*, *Physical Review X*, *ACS nano*, *Physical Review E*, *Soft Matter*, *Langmuir*, and *Journal of Chemical Physics*.

Outreach Activities

Panelist, New England SACNAS Regional Conference, Spring 2021
Served as a panelist on a panel to discuss the PhD-application process at the regional Society for Advancement of Chicanos/Hispanics & Native Americans in Science conference 2021.

Portal to the Public Science Communications Fellow, Spring 2016
I participated in a program in which scientists engage in 10 hours of professional development workshops to learn effective outreach and communication skills. Subsequently each Fellow develops a hands-on activity to explain his or her research to the public. I developed an activity exploring the physics of complex fluids found in everyday life, which I presented at the Discovery Museums in Acton, MA on June 3, 2016.

Science Fair Judge, Massachusetts State Science & Engineering Fair, Spring 2016
Served as a judge for the High School Division of the Massachusetts State Science & Engineering Fair 2016.