Benjamin E. Partridge, Ph.D.

Assistant Professor of Chemistry
University of Rochester | Department of Chemistry
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PROFESSIONAL EXPERIENCE

University of Rochester, Rochester, NY — 2022–present
Assistant Professor of Chemistry
Faculty Member, Materials Science Program

Northwestern University, Evanston, IL — 2019–2022
International Institute for Nanotechnology Postdoctoral Fellow
Advisor: Chad A. Mirkin

EDUCATION

University of Pennsylvania, Philadelphia, PA — 2013–2018
HHMI International Student Research Fellow and Thouron Fellow
Ph.D. in Chemistry; Certificate in College and University Teaching | Advisor: Virgil Percec

University of Oxford, Oxford, United Kingdom — 2009–2013
M.Chem. (Undergraduate Masters) in Chemistry | Advisor: Paul D. Beer

AWARDS AND HONORS

NIH NIGMS Maximizing Investigators' Research Award (MIRA)	2024
Air Force Office of Scientific Research (AFOSR) Young Investigator Award	2023
2023 *RSC Chemical Biology* Emerging Investigator	2023
Levinson-Shapiro Faculty Scholar, University of Rochester	2022–2023
International Institute for Nanotechnology Outstanding Researcher Award	2021
International Institute for Nanotechnology Postdoctoral Fellowship	2019–2022
Branco Weiss Fellowship, ETH Zürich – Shortlisted (top 5% of 657 applicants)	2019
SETARAM Best Student Award, North American Thermal Analysis Society	2017
Student Travel Award, Thermal Analysis Forum of Delaware Valley	2017
International Student Research Fellowship, Howard Hughes Medical Institute	2015–2018
Outstanding Performance by a Teaching Assistant, University of Pennsylvania	2014
Thouron Award, University of Pennsylvania	2013–2015
Inorganic Chemistry Part II Thesis Prize (*Proxime Accesserunt*), University of Oxford	2013

RESEARCH EXPERIENCE (SELECTED)

IIN Postdoctoral Fellow, Northwestern University, Evanston, IL — 2019–2022

- Developed expertise in DNA and protein synthesis, protein crystallography and nanoparticle assembly
- Elaborated a method to program protein crystal structure by design using DNA hybridization (*JACS* **2021**)
- Programmed the spatial location and relative interaction strength of DNA on a protein surface to define protein assembly along hierarchical multistep pathways (*PNAS* **2021**)
- Discovered design rules for the assembly of gold nanoparticles into crystals with defined valency (*Nat. Mater*. **2022**), controllable porosity (*Nature* **2022**), and high particle density (*Science* **2024**)
- Led Programmable Nanomaterials subgroup, with responsibility for overseeing ~20 students and postdocs

Graduate Student, University of Pennsylvania, Philadelphia, PA — 2013–2018

- Investigated structure-property relationships in assemblies of perylene bisimides (*JACS* **2015**, **2019**, **2020**)
- Discovered a supramolecular epitaxy effect in condensed soft matter (*ACS Nano* **2016**, **2017**)
- Developed expertise in organic synthesis, supramolecular assembly, fiber X-ray diffraction, circular dichroism/UV-vis spectroscopy, thermal analysis (differential scanning calorimetry)

PEER-REVIEWED PUBLICATIONS

Independent Publications at University of Rochester:

1. Busschaert, N.; Stephenson, C. J.; Bowman-James, K.; Isaacs, L.; **Partridge, B. E.**; Shimizu, K. D.; Vander Griend, D. A.; Shi, K.; Ojah, E. O. NASC 2023: Showcasing Diversity in North American Supramolecular Chemistry. *Supramolecular Chem.* **2024**, DOI: 10.1080/10610278.2024.2342881.
2. Piedmont, E. R.; Christensen, E. E.; Krauss, T. D.; **Partridge, B. E.** Amphiphilic Dendrons as Supramolecular Holdase Chaperones. *RSC Chem. Biol.* **2023**, *4*, 754–759. (Invited, 2023 Emerging Investigators Collection)

Mentored Publications:

1. Zhou, W.; Li, Y.; **Partridge, B. E.**; Mirkin, C. A. Engineering Anisotropy into Organized Nanoscale Matter. *Chem. Rev.*, under revision.
2. Han, Z.; Hayes, O. G.; **Partridge, B. E.**; Huang, C.; Mirkin, C. A. Reversible Strain-Promoted DNA Polymerization. *Sci. Adv.* **2024**, *10*, eado8020.
3. Zhou, W.; Li, Y.; Je, K.; Vo, T.; Lin, H.; **Partridge, B. E.**; Huang, Z.; Glotzer, S. C.; Mirkin, C. A. Space-Tiled Colloidal Crystals from DNA-Forced Shape-Complementary Polyhedra Packing. *Science* **2024**, *383*, 312.
4. Li, Y.; Zhou, W.; Tanriover, I., Hadibrata, W.; **Partridge, B. E.**; Lin, H.; Hu, X.; Lee, B.; Liu, J.; Dravid, V. P.; Aydin, K.; Mirkin, C. A. Open-Channel Metal Particle Superlattices. *Nature* **2022**, *611*, 695.
5. Wang, S.; Lee, S.; Du, J. S.; **Partridge, B. E.**; Cheng, H. F.; Zhou, W.; Dravid, V. P.; Lee, B.; Glotzer, S. C.; Mirkin, C. A. The Emergence of Valency in Colloidal Crystals through Electron Equivalents. *Nat. Mater.* **2022**, *21*, 580.
6. Sahoo, D.; Peterca, M.; Imam, M. R.; **Partridge, B. E.**; Xiao, Q.; Percec, V. Conformationally Flexible Dendronized Cyclotetraveratrylene (CTTV) Self-Organize a Large Diversity of Chiral Columnar, Frank-Kasper, and Quasicrystal Phases, *Giant* **2022**, *10*, 100096.
7. Percec, V.; Huang, N.; Xiao, Q.; **Partridge, B. E.**; Sahoo, D.; Imam, M. R.; Peterca, M.; Graf, R.; Spiess, H.-W.; Zeng, X.; Ungar, G. Self-Organization of Rectangular Bipyramidal Helical Columns by Supramolecular Orientational Memory Epitaxially Nucleated from a Frank-Kasper σ Phase, *Giant* **2022**, *9*, 100084.
8. **Partridge, B. E.**; Winegar, P. H.; Han, Z.; Mirkin, C. A. Redefining Protein Interfaces within Protein Single Crystals with DNA. *J. Am. Chem. Soc.* **2021**, *143*, 8925.
9. Hayes, O. G.[†]; **Partridge, B. E.**[†]; Mirkin, C. A. Encoding Hierarchical Assembly Pathways of Proteins with DNA. *Proc. Natl. Acad. Sci. U. S. A.* **2021**, *118*, e2106808118. ([†] denotes equal contribution)
10. Ebrahimi, S. B.; Samanta, D.; **Partridge, B. E.**; Kusmierz, C. D.; Cheng, H. F.; Grigorescu, A. A.; Chávez, J. L.; Mirau, P. A.; Mirkin, C. A. Programming Fluorogenic DNA Probes for Rapid Detection of Steroids. *Angew. Chem. Int. Ed.* **2021**, *60*, 15260.
11. Percec, V.; Wang, S.; Huang, N.; **Partridge, B. E.**; Wang, X.; Sahoo, D.; Hoffman, D. J.; Malineni, J.; Peterca, M.; Jezorek, R. L.; Zhang, N.; Daud, H.; Sung, P. D.; McClure, E. R.; Song, S. L. An Accelerated Modular-Orthogonal Ni-Catalyzed Methodology to Symmetric and Nonsymmetric Constitutional Isomeric AB_2 to AB_9 Dendrons Exhibiting Unprecedented Self-Organizing Principles, *J. Am. Chem. Soc.* **2021**, *143*, 17724.
12. Kostina, N. Y.; Soeder, D.; Haraszti, T.; Xiao, Q.; Rahimi, K.; **Partridge, B. E.**; Klein, M. L.; Percec, V.; Rodriguez-Emmenegger, C. Enhanced Concanavalin A Binding to Preorganized Mannose Nanoarrays in Glycodendrimersomes Revealed Multivalent Interactions, *Angew. Chem. Int. Ed.* **2021**, *60*, 8352.
13. Wang, L.; **Partridge, B. E.**; Huang, N.; Olsen, J. T.; Sahoo, D.; Zeng, X.; Ungar, G.; Graf, R.; Spiess, H. W.; Percec, V. Extraordinary Acceleration of Cogwheel Helical Self-Organization of Dendronized Perylene Bisimides by the Dendron Sequence Encoding their Tertiary Structure. *J. Am. Chem. Soc.* **2020**, *142*, 9525.
14. Park, S. S.; Urbach, Z. J.; Brisbois, C. A.; Parker, K. E.; **Partridge, B. E.**; Oh, T.; Dravid, V. P.; Olvera de la Cruz, M.; Mirkin, C. A. DNA- and Field-Mediated Assembly of Magnetic Nanoparticles into High-Aspect Ratio Crystals. *Adv. Mater.* **2020**, *32*, 1906626.

15. Holerca, M. N.; Peterca, M.; **Partridge, B. E.**; Xiao, Q.; Lligadas, G.; Monteiro, M. J., Percec, V. Monodisperse Macromolecules by Self-Interrupted Living Polymerization, *J. Am. Chem. Soc.* **2020**, *142*, 15265.
16. Huang, N.; Imam, M. R.; Sienkowska, M. J.; Peterca, M.; Holerca, M. N.; Wilson, D. A.; Rosen, B. M.; **Partridge, B. E.**; Xiao, Q.; Percec, V. Supramolecular Spheres Assembled from Covalent and Supramolecular Dendritic Crowns Dictate the Supramolecular Orientational Memory Effect Mediated by Frank-Kasper Phases, *Giant* **2020**, *1*, 100001.
17. **Partridge, B. E.**; Wang, L.; Sahoo, D.; Olsen, J. T.; Leowanawat, P.; Roche, C.; Ferreira, H.; Reilly, K. J.; Zeng, X.; Ungar, G.; Heiney, P. A.; Graf, R.; Spiess, H. W.; Percec, V. Sequence-Defined Dendrons Dictate Supramolecular Cogwheel Assembly of Dendronized Perylene Bisimides. *J. Am. Chem. Soc.* **2019**, *141*, 15761.
18. Wilson, D. A.; Andreopoulou, K. A.; Peterca, M.; Leowanawat, P.; Sahoo, D.; **Partridge, B. E.**; Xiao, Q.; Huang, N.; Heiney, P. A.; Percec, V. Supramolecular Spheres Self-Assembled from Conical Dendrons are Chiral. *J. Am. Chem. Soc.* **2019**, *141*, 6162.
19. Rodriguez-Emmenegger, C.; Xiao, Q.; Kostina, N. Y.; Sherman, S. E.; Rahimi, K.; **Partridge, B. E.**; Li, S.; Sahoo, D.; Reveron Perez, A. M.; Buzzacchera, I.; Han, H.; Kerzner, M.; Malhotra, I.; Möller, M.; Wilson, C. J.; Good, M. C.; Goulian, M.; Baumgart, T.; Klein, M. L.; Percec, V. Encoding Biological Recognition in a Bicomponent Cell-Membrane Mimic. *Proc. Natl. Acad. Sci. U. S. A.* **2019**, *116*, 5376.
20. Holerca, M. N.; Sahoo, D.; **Partridge, B. E.**; Peterca, M.; Zeng, X.; Ungar, G.; Heiney, P. A.; Percec, V. Dendronized Poly(2-Oxazoline) Displays Within Only Five Monomer Repeat Units Liquid Quasicrystal, A15 and σ Frank-Kasper Phases. *J. Am. Chem. Soc.* **2018**, *140*, 16941.
21. Sahoo, D.; Imam, M. R.; Peterca, M.; **Partridge, B. E.**; Wilson, D. A.; Zeng, X.; Ungar, G.; Heiney, P. A.; Percec, V. Hierarchical Self-Organization of Chiral Columns from Chiral Supramolecular Spheres. *J. Am. Chem. Soc.* **2018**, *140*, 13478.
22. Sahoo, D.; Peterca, M.; Aqad, E.; **Partridge, B. E.**; Klein, M. L.; Percec, V. Losing Supramolecular Orientational Memory *via* Self-Organization of a Misfolded Secondary Structure. *Polym. Chem.* **2018**, *9*, 2370.
23. Andreopoulou, K. A.; Peterca, M.; Wilson, D. A.; **Partridge, B. E.**; Heiney, P. A.; Percec, V. Demonstrating the 8_1-Helicity and Nanomechanical Function of Self-Organizable Dendronized Polymethacrylates and Polyacrylates. *Macromolecules* **2017**, *50*, 5271.
24. Sahoo, D.; Peterca, M.; Aqad, E.; **Partridge, B. E.**; Heiney, P. A.; Graf, R.; Spiess, H. W.; Zeng, X.; Percec, V. Tetrahedral Arrangements of Perylene Bisimide Columns *via* Supramolecular Orientational Memory. *ACS Nano* **2017**, *11*, 983.
25. Holerca, M. N.; Sahoo, D.; Peterca, M.; **Partridge, B. E.**; Heiney, P. A.; Percec, V. A Tetragonal Phase Self-Organized from Unimolecular Spheres Assembled from a Substituted Poly(2-Oxazoline). *Macromolecules* **2017**, *50*, 375.
26. Ho, M.-S.; **Partridge, B. E.**; Sun, H.-J.; Sahoo, D.; Leowanawat, P.; Peterca, M.; Graf, R.; Spiess, H. W.; Zeng, X.; Ungar, G.; Heiney, P. A.; Hsu, C.-S.; Percec, V. Screening Libraries of Semifluorinated Arylene Bisimides to Discover and Predict Thermodynamically Controlled Helical Crystallization. *ACS Comb. Sci.* **2016**, *18*, 723.
27. Peterca, M.; Imam, M. R.; Hudson, S. D.; **Partridge, B. E.**; Sahoo, D.; Heiney, P. A.; Klein, M. L.; Percec, V. Complex Arrangement of Orthogonal Nanoscale Columns *via* a Supramolecular Orientational Memory Effect. *ACS Nano* **2016**, *10*, 10480.
28. Sahoo, D.; Peterca, M.; Aqad, E.; **Partridge, B. E.**; Heiney, P. A.; Graf, R.; Spiess, H. W.; Zeng, X.; Percec, V. Hierarchical Self-Organization of Perylene Bisimides into Supramolecular Spheres and Periodic Arrays Thereof. *J. Am. Chem Soc.* **2016**, *138*, 14798.
29. Roche, C.; Sun, H.-J.; Leowanawat, P.; Araoka, F.; **Partridge, B. E.**; Peterca, M.; Wilson, D. A.; Prendergast, M. E.; Heiney, P. A.; Graf, R.; Spiess, H. W.; Zeng, X.; Ungar, G.; Percec, V. A Supramolecular Helix that Disregards Chirality. *Nat. Chem.* **2016**, *8*, 80.
30. Guerra, S.; Iehl, J.; Holler, M.; Peterca, M.; Wilson, D. A.; **Partridge, B. E.**; Zhang, S.; Deschenaux, R.; Nierengarten, J.-F.; Percec, V. Self-Organisation of Dodeca-Dendronized Fullerene into Supramolecular Discs and Helical Columns Containing a Nanowire-Like Core. *Chem. Sci.* **2015**, *6*, 3393.

31. **Partridge, B. E.**; Leowanawat, P.; Aqad, E.; Imam, M. R.; Sun, H.-J.; Peterca, M.; Heiney, P. A.; Graf, R.; Spiess, H. W.; Zeng, X.; Ungar, G.; Percec, V. Increasing 3D Supramolecular Order by Decreasing Molecular Order: A Comparative Study of Helical Assemblies of Dendronized Non-Chlorinated and Tetrachlorinated Perylene Bisimides. *J. Am. Chem. Soc*. **2015**, *137*, 5210.

32. Wu, Y.-C.; Leowanawat, P.; Sun, H.-J.; **Partridge, B. E.**; Peterca, M.; Graf, R.; Spiess, H. W.; Zeng, X.; Ungar, G.; Hsu, C.-S.; Heiney, P. A.; Percec, V. Complex Columnar Hexagonal Polymorphism in Supramolecular Assemblies of a Semifluorinated Electron-Accepting Naphthalene Bisimide. *J. Am. Chem. Soc.* **2015**, *137*, 807.

33. Roche, C.; Sun, H.-J.; Prendergast, M. E.; Leowanawat, P.; **Partridge, B. E.**; Heiney, P. A.; Araoka, F.; Graf, R.; Spiess, H. W.; Zeng, X.; Ungar, G.; Percec, V. Homochiral Columns Constructed by Chiral Self-Sorting During Supramolecular Helical Organization of Hat-Shaped Molecules. *J. Am. Chem. Soc.* **2014**, *136*, 7169.

34. Mullaney, B. R.; **Partridge, B. E.**; Beer, P. D. A Halogen-Bonding Bis-Triazolium Rotaxane for Halide Selective Anion Recognition. *Chem.—Eur. J.* **2014**, *21*, 1660.

35. Noonan, G. M.; Hayter, B. R.; Campbell, A. D.; Gorman, T. W.; **Partridge, B. E.**; Lamont, G. M. Expanding the Scope of Silane-Mediated Hydrodehalogenation Reactions. *Tetrahedron Lett.* **2013**, *54*, 4518.

PATENTS

"Encoding Hierarchical Assembly Pathways of Proteins with DNA". Mirkin, C. A.; Hayes, O. G.; Partridge, B. E. U.S. Patent Application; US 2022/0372062 A1; published November 24, 2022, provisionally filed May 24, 2021.

PRESENTATIONS (SELECTED)

Northwestern University, IIN Titans of the Tiny Symposium, Evanston, IL (invited)	July 2024
Gordon Research Conference on Bioinspired Materials, Les Diablerets, Switzerland (poster)	June 2024
North American Supramolecular Chemistry Meeting, Tulane University, New Orleans, LA (oral)	December 2023
University of Rochester, Biomedical Engineering Colloquium, Rochester, NY (invited)	November 2023
Rochester Institute of Technology, ChemE and BME Department Seminar, Rochester, NY (invited)	Sept. 2023
University of Rochester, Chemistry-Biology Interface Program Retreat, Rochester, NY (invited)	June 2023
Gordon Research Conference on Supramolecular Chemistry, Les Diablerets, Switzerland (poster)	May 2023
4th International Conference on Chemistry, Lahore Garrison University, Lahore, Pakistan (keynote)	March 2023
American Chemical Society Northeast Regional Meeting, Rochester, NY (oral)	October 2022
RSC Macrocyclic and Supramolecular Chemistry Young Scientist Series, Virtual (oral)	June 2022
Gordon Research Symposium on Bioinspired Materials, Les Diablerets, Switzerland (oral)	June 2022
International Chemical Congress of Pacific Basin Societies (Pacifichem), Virtual Meeting (oral)	December 2021
Wesleyan University, Chemistry Department Colloquium, Middletown, CT (invited, oral)	October 2021
American Chemical Society National Meeting, Virtual Meeting (oral)	April 2021
American Chemical Society National Meeting, Boston, MA (poster, selected for Sci-Mix)	August 2018
North American Thermal Analysis Society Annual Meeting, Philadelphia, PA (plenary lecture)	August 2018
North American Thermal Analysis Society Annual Meeting, Newark, DE (award lecture)	August 2017

RESEARCH PERSONNEL SUPERVISED

Graduate Students:	*(current)* Elizabeth Piedmont (G3), Hannah Claus (G2), Parbhat Kumar (G2), Abhishek Roy (G2), Alejandro Lazaro (G1), Alana Huynh (G1)
Undergraduate Students:	*(current)* Grace van der Meer ('25), Aiden Ward ('25), Marvin Wu ('26), McKenna Young ('26), Kari Maxian ('27), Tess Anthony (REU, '25)
	(former) Camden Parker (UG '23), Ubanni Opashi (UG '25)
Visiting International Students:	*(former)* Áron Adorján (Hungary), Basil Biju Aliyas (India)

FUNDING AND SUPPORT

NIH NIGMS Maximizing Investigators' Research Award [PI, 2024–2029] **$1,925,000**
Supramolecular Strategies to Modulate Biomolecular Folding and Assembly

AFOSR Young Investigator Award [PI, 2024–2027] **$449,997**
Impact-Resistant Soft Materials Engineered by Hierarchical Noncovalent Energy Dissipation

ACS Petroleum Research Fund Doctoral New Investigator Award [PI, 2024–2026] **$110,000**
Hierarchical Supramolecular Assembly: Toward Next-Generation Fibrous Materials with Programmable Mechanical Properties

Transdisciplinary Center Planning Grant, University of Rochester [co-PI, 2024–2025] **$36,000**
Center for Emergent Complexity in Biomaterials (CECB)

TEACHING ACTIVITIES

Course Instructor, University of Rochester
CHEM 210W Organic Chemistry II: Lab — Spring 2024
CHEM 433 Advanced Organic Chemistry I — Fall 2022, Fall 2023

Facilitator, Inclusive STEM Teaching Project — 2023

CIRTL Associate Level Certification, Northwestern University — 2021

Certificate in College and University Teaching, University of Pennsylvania — 2017

Teaching Assistant, University of Pennsylvania
CHEM 241 Organic Chemistry II — Spring 2017
CHEM 054 General Chemistry II Laboratory — Spring 2014
CHEM 053 General Chemistry I Laboratory — Fall 2013

LEADERSHIP, OUTREACH, AND SERVICE (SELECTED)

Reviewer, Schwartz Discover Grant, University of Rochester — 2024
Facilitator, Inclusive STEM Teaching Project Learning Community, University of Rochester — 2023
Reviewer, National Science Foundation — 2023–2024
Chair, Natural Sciences Panel, Sproull and Provost Fellowship Committee, U. Rochester — 2023
Member, *Protein Science* Early Career Reviewer Board — 2023–present
Member, Dept. of Chemistry Graduate Studies Committee, University of Rochester — 2023–present
Member, Dept. of Chemistry Graduate Recruiting Committee, University of Rochester — 2022–present
Member, Dept. of Chemistry Diversity, Equity, Inclusion, and Outreach Committee, U. Rochester — 2022–present
Session Chair, 2022 ACS Northeast Regional Meeting, Rochester, NY — October 2022
Session: Organic Chemistry
Poster Judge, 2022 ACS Northeast Regional Meeting, Rochester, NY — October 2022
Leader, Programmable Nanomaterials Subgroup, Mirkin Group, Northwestern University — 2020–2022
Session Organizer, 2016 ACS National Meeting, Philadelphia, PA — August 2016
Session: From Bench-to-Bench and Beyond: Engaging People with High Impact Chemistry (GSSPC initiative)
Graduate Chair, International Student Advisory Board, U. Pennsylvania — 2014–2016

PROFESSIONAL AFFILIATIONS

Royal Society of Chemistry (RSC) — 2008–present
American Chemical Society (ACS) — 2013–present
Divisions: Chemical Health and Safety (CHAS), Colloids (COLL), Organic (ORGN), Polymers (POLY)
North American Thermal Analysis Society (NATAS) — 2017–present
Protein Society — 2019–present
American Association for the Advancement of Science (AAAS) — 2023–present