Emily C. Davidson

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EDUCATION

Dec 2016	**Doctor of Philosophy, Chemical Engineering** *University of California Berkeley*, Berkeley, CA Dissertation Title: Self-Assembly and Crystallization of Conjugated Block Copolymers
May 2011	**Urban Education Teaching Credential** *Loyola Marymount University*, Los Angeles, CA
June 2010	**Bachelor of Science, Chemical Engineering** Minors: Physics; Earth, Atmospheric, and Planetary Science *Massachusetts Institute of Technology*, Cambridge, MA

EMPLOYMENT

2021 – present	**Assistant Professor, Chemical & Biological Eng.,** Princeton University **Associated Faculty, Princeton Institute of Materials** **Associated Faculty, Andlinger Center for Energy & the Environment**
2017 – 2020	**Postdoctoral Research Fellow, Lewis Lab,** Harvard University
2016 – 2017	**Postdoctoral Researcher, Segalman Lab**, UC Santa Barbara
2012 – 2016	**Graduate Researcher, Segalman Lab,** UC Berkeley (2 yrs visiting scholar at UCSB)
2010 – 2012	**High School Chemistry and Physics Teacher,** Teach for America, Richmond High School (Richmond, CA)
2008 – 2009	**Undergraduate Researcher, Gleason Lab**, MIT

AWARDS, HONORS, WORKSHOPS

2022	DOE Early Career Award
2022	Invited to attend NSF workshop 'Architected Metamaterials for Civil Infrastructure'
2022	Princeton SEAS 'Project X' Innovation Award
2019	Selected to attend the 2019 University of Delaware Future Faculty Workshop
2019	Young Professional Winner, Scientista 'Born Seekers' Fellowship
2017	Second place poster award, APS March Meeting, Division of Polymer Physics
2016	Best Talk, 9th Annual UCSB Clorox-Amgen Graduate Student Symposium
2015	Selected to attend the 18th National School on Neutron and X-ray Scattering
2015	International Research Fellowship Award through UCSB International Center for Materials Research

PUBLICATIONS *(* denotes equal contributions)*

20. J.J. Bown, S. Mooraj, J.A. Goodman, S. Peng, D.P. Street, B. Roman-Manso, **E.C. Davidson**, K.L. Martin, L. M. Rueschhoff, S. N. Schiffres, W. Chen, J.A. Lewis, M.B. Dickerson, "Hierarchically Porous Ceramics via Direct Writing of Preceramic Polymer-Triblock Copolymer Inks," *Accepted, Materials Today,* **2022.**

19. C.L.C. Chan, J.M. Taylor, **E.C. Davidson**, "Design of Soft Matter for Additive Processing," *Accepted, Nature Synthesis,* **2022.**

18. A.J. DeStefano, R.A. Segalman, **E.C. Davidson**, "Where Biology and Traditional Polymers Meet: The Potential of Associating Sequence-Defined Polymers for Materials Science," *JACS Au*, **2021**, DOI: https://doi.org/10.1021/jacsau.1c00297

17. G.C. Faria, D.T. Duong, G.P da Cunha, P. Selter, L.A. Strassø, **E.C. Davidson**, R.A. Segalman, M.R. Hansen, E.R. deAzevedo, A. Salleo, "On the growth, structure and dynamics of P3EHT crystals," *J. of Materials Chemistry C*, **2020**, DOI: 10.1039/d0tc00704h

16. A.L. Patterson, B. Yu, S. Danielsen, **E.C. Davidson**, G.H. Fredrickson, R.A. Segalman, "Monomer sequence effects on interfacial width and mixing in self-assembled diblock copolymers," *Macromolecules,* **2020**, DOI: 10.1021/acs.macromol.9b02426

15. **E.C. Davidson**, A. Kotikian, S. Li, J. Aizenberg, J.A. Lewis, "3D Printable and Reconfigurable Liquid Crystal Elastomers with Light-Induced Shape Memory via Dynamic Bond Exchange," *Advanced Materials,* **2019**, DOI: 10.1002/adma.201905682 ***Featured in the Women in Materials Science Virtual Issue, January 2021***

14. A. Kotikian,* C. McMahan,* **E.C. Davidson**, J.M. Muhammad, R.D. Weeks, C. Daraio, J.A. Lewis, "Untethered Soft Robotic Matter with Passive Control of Shape Morphing and Propulsion," *Science Robotics,* **2019**, DOI: 10.1126/scirobotics.aax7044

13. S.P.O. Danielsen, **E.C. Davidson**, G.H. Fredrickson, R.A. Segalman, "Absence of Electrostatic Rigidity in Conjugated Polyelectrolytes with Pendant Charges," *ACS Macro Letters,* **2019**, DOI: 10.1021/acsmacrolett.9b00551

12. B. Yu, S.P.O. Danielsen, A.L. Patterson, **E.C. Davidson**, R.A. Segalman, "Effects of Helical Chain Shape on Lamellae-Forming Block Copolymer Self-Assembly," *Macromolecules,* **2019**, DOI: 10.1021/acs.macromol.9b00211

11. A.L. Patterson, S.P.O Danielsen, B. Yu, **E.C. Davidson**, G.H. Fredrickson, R.A. Segalman, "Sequence Effects on Block Copolymer Self-Assembly through Tuning Chain Conformation and Segregation Strength Utilizing Sequence-Defined Polypeptoids," *Macromolecules,* **2019**, DOI: 10.1021/acs.macromol.8b02298

10. M. Barry,* **E.C. Davidson**,* C. Zhang, A.L. Patterson, B. Yu, A.K. Leonardi, N. Duzen, K. Malaviya, J.L. Clarke, J.A. Finlay, A.S. Clare, Z. Chen, C.K. Ober, R.A. Segalman, "The Role of Hydrogen Bonding in Peptoid-based Marine Antifouling Coatings," *Macromolecules,* **2019**, DOI: 10.1021/acs.macromol.8b02390 ***Contributed equally**

9. E.M. Thomas, **E.C. Davidson**, R. Katsumata, R.A. Segalman, M.L. Chabinyc, "Branched Side Chains Govern Counterion Position and Doping Mechanism in Conjugated Polythiophenes," *ACS Macro Letters,* **2018**, DOI: 10.1021/acsmacrolett.8b00778

8. A.R. Chew, R. Ghosh, V. Pakhnyuk, J. Onorato, **E.C. Davidson**, R.A. Segalman, C.K. Luscombe, F.C. Spano, A. Salleo, "Unraveling the Effect of Conformational and Electronic Disorder in the

Charge Transport Processes of Semiconducting Polymers," *Advanced Functional Materials*, **2018**, DOI: 10.1002/adfm.201804142

7. **E.C. Davidson**,* A.M. Rosales,* A.L. Patterson, B. Russ, B.Yu, R.N. Zuckermann, R.A. Segalman, "Impact of Helical Chain Shape in Sequence-Defined Polymers on Polypeptoid Block Copolymer Self-Assembly," *Macromolecules*, **2018**, DOI: 10.1021/acs.macromol.8b00055 ***Contributed equally**

6. J. Martin, **E.C. Davidson**, C. Greco, W. Xu, J. Bannock, A. Agirre, J.D. de Mello, R.A. Segalman, N. Stingelin, K. Daoulas, "Temperature-dependence of persistence length affects phenomenological descriptions of aligning interactions in nematic semiconducting polymers," *Chemistry of Materials*, **2018**, DOI: 10.1021/acs.chemmater.7b04194

5. **E.C. Davidson**, R.A. Segalman, "Thermal Control of Confined Crystallization within P3EHT Block Copolymer Microdomains," *Macromolecules,* **2017**, DOI: 10.1021/acs.macromol.7b01616

4. **E.C. Davidson**, R.A. Segalman, "Confined Crystallization within Cylindrical P3EHT Block Copolymer Microdomains," *Macromolecules,* **2017**, DOI: 10.1021/acs.macromol.7b01323

3. L. Yu, **E.C. Davidson**, M.R. Andersson, R.A. Segalman, C. Müller, "Isothermal Crystallization Kinetics and Time-Temperature-Transformation of the Conjugated Polymer: Poly(3-(2'-ethyl)hexylthiophene)," *Chemistry of Materials,* **2017**, DOI: 10.1021/acs.chemmater.7b01393

2. **E.C. Davidson**, B.S. Beckingham, V. Ho, R.A. Segalman, "Confined Crystallization in Lamellae Forming Poly(3-(2'-ethyl)hexylthiophene) (P3EHT) Block Copolymers," *J. of Polymer Science Part B: Polymer Physics*, **2015**, DOI: 10.1002/polb.23904 ***Edward Kramer Memorial Issue***

1. E.S. Cho, C.M. Evans, **E.C. Davidson**, M.L. Hoarfrost, M.A. Modestino, R.A. Segalman, J.J. Urban. "Enhanced Water Vapor Blocking in Transparent Hybrid Polymer-Nanocrystal Films," *ACS Macro Letters*, **2015**, DOI: 10.1021/mz500765y

CONFERENCE PAPERS

2. A. Epstein, J. Easton, R. Murthy, **E.C. Davidson**, J. de Brujin, T. Hayse, E. Hens, M. Lloyd. "Helping engineering and science students find their voice: Radio production as a way to enhance students' communication skills and their competence at placing engineering and science in a broader societal context," *Proceedings of the American Society for Engineering Education Annual Conference*, 2010.

1. A. Epstein, B. Mire, T. Ramsey, K. Gareis, **E.C. Davidson**, E. Jones, M. Slosberg, R. Bras. "Terrascope Youth Radio: Engaging urban teens in a unique university-community partnership," *Proceedings of the American Society for Engineering Education Annual Conference*, 2010.

BOOK CHAPTERS

1. A. Epstein, E. Chambers, **E. Davidson**, J. Fujimori, A. Gururaj, E. Moberg, B. Wang. "When an Engineer Tells a Story…" in *Extraordinary Partnerships: How the Arts and Humanities are Transforming America*. Christine Henseler, Editor. May 2020, Lever Press. https://doi.org/10.3998/mpub.11649046

PATENTS

2. N.L. Black, **E.C. Davidson**, A.K. Remenschneider, E.D. Kozin, and J.A. Lewis. "Melt-extrudable 3D Printing Inks," PCT-US20-64627. Filed December 2020.

1. N.L. Black, R. Friedman, **E.C. Davidson**, and J.A. Lewis. "Composite Melt-extrudable Ink for 3D Printing of Bony Implants," Harvard University Office of Technology Development, HU 7859. Filed June 2019

PRESENTATIONS

28. "Molecular design and directed self-assembly via additive manufacturing for locally programmed, responsive liquid crystal elastomer architectures," American Chemical Society Spring Meeting, March 2022. ***Invited talk***

27. "Soft actuators featuring light-induced shape memory via molecular design and additive manufacturing," Northeast Complex Fluids and Soft Matter Workshop, January 2022. ***Invited virtual talk***

26. "Molecular Design and Directed Self-Assembly via Additive Manufacturing for Locally Programmed, Responsive Polymer Architectures," ExxonMobil Corporate Strategic Research, October 2021. ***Invited virtual talk***

25. "Hierarchical Control over Polymer Assembly for Functional, Responsive Polymer Architectures," Princeton University, Department of Mechanical and Aerospace Engineering, October 2021. ***Invited talk***

24. "Hierarchical Control over Polymer Assembly for Functional, Responsive Polymer Architectures," University of Leeds, Soft Matter Physics Group, June 2021. ***Invited virtual talk***

23. "Hierarchical Control over 3D Polymer Assembly for Functional Polymer Architectures," Lawrence Berkeley National Labs Molecular Foundry Winter Seminar Series, March 2021. ***Invited virtual talk***

22. "Hierarchical Control over 3D Polymer Assembly for Functional Polymer Architectures," North Caroline State University, Early Career Lecture Series in Materials Science and Engineering, October 2020. ***Invited virtual talk***

21. "Light-Induced Shape Memory via 3D Printing of Bond-Exchangeable Liquid Crystal Elastomers," Advanced Light Source, April 2020. ***Invited virtual talk***

11-20. "Hierarchical Control over 3D Polymer Assembly for Functional Polymer Architectures," ***Invited talks, Junior Faculty Candidate Seminars***

NJIT, Dept. of Chemical & Materials Engineering, December 2019
Georgia Tech, Dept. of Chemical & Biomolecular Engineering, January 2020
Princeton U., Dept. of Chemical & Biological Engineering, January 2020
Northwestern U., Dept. of Chemical & Biological Engineering, January 2020
U. of Wisconsin, Dept. of Chemical & Biological Engineering, January 2020
U. of Delaware, Dept. of Chemical & Biomolecular Engineering, January 2020
Cornell U., Dept. of Materials Science & Engineering, February 2020
U. of Michigan, Dept. of Chemical Engineering, February 2020
U. of Washington, Dept. of Chemical Engineering, February 2020
Northwestern U., Dept. of Materials Science and Engineering, March 2020

10. "Light-Induced Shape Memory Materials via 3DP of Liquid Crystal Elastomers containing Dynamic-Covalent Bonds," **E.C. Davidson**, A. Kotikian, S. Li, J. Aizenberg, J.A. Lewis. GRS on Liquid Crystals, Colby-Sawyer College, New London, NH, July 2019. ***Selected for oral presentation.*** Poster Presentation at accompanying GRC.

9. "3D Printed Reconfigurable Liquid Crystal Elastomer Architectures via Dynamic-Covalent Bonds," **E.C. Davidson**, A. Kotikian, S. Li, J. Aizenberg, J.A. Lewis. Condensed Matter Seminar series, Tufts University. February 2019. ***Invited talk***

8. "3D Printed Reconfigurable Liquid Crystal Elastomer Architectures via Dynamic-Covalent Bonds," **E.C. Davidson**, A. Kotikian, S. Li, J. Aizenberg, J.A. Lewis. GRC on Complex Active and Adaptive Material Systems, Ventura, CA, January 2019. Poster Presentation.

7. "Impact of Sequence-Level Control on Block Copolymer Self-Assembly," **E.C. Davidson**, A.M. Rosales, A.L Patterson, B.Yu, R.N Zuckermann, R.A. Segalman. APS March Meeting, New Orleans, LA, March 15, 2017. Poster Presentation. ***2nd Place Poster Award, Division of Polymer Physics.***

6. "Self-Assembly and Crystallization of P3EHT Containing Block Copolymers Controlled via Thermal Processing," **E.C. Davidson**, R.A. Segalman. UCSB, Materials Research Opportunities Program, Santa Barbara, CA, February 1, 2017. Poster Presentation.

5. "Structure of Poly(3-(2'-ethyl)hexylthiophene) (P3EHT) Containing Diblock Copolymers Controlled via Thermal Processing," **E.C. Davidson**, R.A. Segalman. APS March Meeting, Baltimore, MD, March 18, 2016.

4. "Self-Assembly and Crystallization of P3EHT Containing Block Copolymers" UCSB Clorox-Amgen Graduate Student Symposium, October 2016. ***Best Talk Award.***

3. "Confined Crystallization in Lamellae Forming Poly(3-(2'-ethyl)hexylthiophene) (P3EHT) Block Copolymers," **E.C. Davidson**, V. Ho, B.S. Beckingham, R.A. Segalman. APS March Meeting, San Antonio TX, March 4, 2015.

2. "Confined Crystallization in Lamellae Forming Poly(3-(2'-ethyl)hexylthiophene) (P3EHT) Block Copolymers," **E.C. Davidson**, V. Ho, B.S. Beckingham, R.A. Segalman. UCSB, Materials Research Opportunities Program, Santa Barbara, CA, February 4, 2015. Poster Presentation.

1. "Crystallization in Poly(3-alkylthiophene) Containing Block Copolymers," **E.C. Davidson**, V. Ho, B.S. Beckingham, R.A. Segalman. APS March Meeting, Denver CO, March 5, 2014. Poster Presentation.

TEACHING

Fall 2021	**Professor, CBE250,** Princeton University ***Course:*** Separations in Chemical Engineering
Fall 2020	**Guest Lecturer, AP 225**, Harvard University ***Course:*** Introduction to Soft Matter ***Lectures:*** Polymer Physics I; Polymer Physics II; Chemistry, Processing, and Applications of Block Copolymers
Fall 2018	**Guest Lecturer, AP 225**, Harvard University ***Course:*** Introduction to Soft Matter ***Lecture:*** Chemistry, Processing, and Applications of Block Copolymers
Fall 2013	**Teaching Assistant, Chemical Engineering 185**, UC Berkeley ***Course:*** Technical Communication for Chemical Engineers
Fall 2012	**Teaching Assistant, Chemical Engineering 140**, UC Berkeley ***Course:*** Introduction to Chemical Process Analysis

2010 – 2012	**High School Chemistry, AP Physics Teacher**, Richmond, CA *West Contra Costa Unified School District, Richmond High School* Selected by Teach for America for a two-year commitment.
Summers 2010, 2011	**Computer Science Instructor and Mentor**, Jerusalem *Middle East Education through Technology, with MIT-MISTI*
2008 – 2010	**Undergraduate Teaching Fellow, MIT Terrascope,** Cambridge, MA Mentored teams of MIT freshmen to develop and communicate engineering solutions to complex world problems involving earth systems.
2008 – 2010	**Youth Radio Instructor, City of Cambridge**, Cambridge, MA
2007 – 2010	**Associate Advisor**, MIT Collaborated with a faculty advisor to support MIT freshmen.

UNDERGRADUATE STUDENTS MENTORED

2022	*Princeton University HMEI Summer Intern* *Project:* Crystallinity and mechanical properties of poly(divinyloligocyclobutane)	Callie Zheng
2022	*Princeton University Summer Researcher* *Project:* Synthesis and development of host-guest cement rheology modifiers	Lawrence Azzariti
2021-22	*Princeton University* *Project:* Design and integration of custom extrusion equipment with an Aerotech 3D printer	Ben Gorse, Jonathan Pollock, Abdullah Ramadan, Daniel Simone
2021-22	*Princeton University Senior Thesis* *Thesis Title:* Embedded 3D printing of liquid crystal elastomers	Derek Poletti
2021-22	*Princeton University Senior Thesis* *Thesis Title:* Impact of crosslinking density on the properties of liquid crystal elastomers	Anahi Ambrosio
2019-20	*Harvard University Senior Thesis* *Thesis Title:* Development of a viscoelastic, conductive hydrogel for cardiac patch treatment of myocardial infarction *Honorable Mention, Dean's Award for Best Bioengineering Senior Thesis*	Michelle Walsh
2018	*Harvard REU student, Southern University* *Project:* Development of liquid crystalline elastomers with tunable nematic-isotropic transition temperatures	Jalilah Muhammad
2016-17	*UCSB Undergraduate Researcher* *Project:* Synthesis and characterization of densely grafted sequence-defined polypeptoid surfaces for marine antifouling	Ketaki Malaviya
2015-16	*RISE UCSB Intern* *Project:* Design and development of equipment for controlled annealing and alignment of conjugated polymers	Christian Gomez

SERVICE and OUTREACH

Reviewer for Journals: *ACS Macro Letters, Macromolecules, Physical Review Materials, ACS Nano Materials, Science Advances, Chemical Reviews,*

	Nature Reviews Materials, ACS Applied Materials & Interfaces, MRS Communications, Advanced Science
2021 – 2022	Princeton advisor to engineering freshman in Whitman College.
2021 – 2022	Co-chair of the January 2022 Northeast Complex Fluids & Soft Matter Workshop at Princeton
2021	Co-chair with Dr. Marianne Prévôt of the 2021 (delayed to 2023) Liquid Crystals Gordon Research Seminar
2020	Served on Loyola Marymount University panel "Grad + Professional School Networking Event"
2014 – 2017	Volunteer, Family Ultimate Science Exploration (FUSE)
2014 – 2017	Member, UCSB Graduate Students for Diversity in Science
2012 – 2013	Volunteer, Students for Environmental Energy Development (SEED)
2007	Bike and Build (bicycled from FL to CA to benefit affordable housing)