

R. Kōnane Bay

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EDUCATION

Ph.D. Polymer Science and Engineering (PSE) 2020
University of Massachusetts Amherst (UMass Amherst), Amherst, MA
Thesis Advisor: Alfred J. Crosby
Thesis: *Quantifying the Mechanical Properties of Ultrathin Glassy Polymer Films*

M.S. Polymer Science and Engineering 2016
University of Massachusetts Amherst, Amherst, MA

B.S. Materials Engineering, *Magna cum Laude* 2014
Rensselaer Polytechnic Institute (RPI), Troy, NY

PROFESSIONAL POSITIONS

University of Colorado Boulder (CU Boulder), Boulder, CO

Assistant Professor, Chemical and Biological Engineering Dept. 08/2022 – Present
Program Affiliated Faculty, Materials Science and Engineering Program 02/2023 – Present

Princeton University, Princeton, NJ

Presidential Postdoctoral Research Fellow and Postdoctoral Research Associate, Dept. of Chemical and Biological Engineering 07/2020 – 06/2022
Research Advisor: Sujit S. Datta

HONORS AND AWARDS

U.S. National Committee on Theoretical and Applied Mechanics Outreach Fellow 2024

Sylvia Norviel Cancer Research Faculty Fellow 2022–2025

Best Poster Award, International Conference on Engineered Living Materials 2022

MIT IMPACT Fellow 2021

Stanford.Berkeley.UCSF Next Generation Faculty Symposium, Honorable Mention 2020

MIT Chemical Engineering Rising Stars Participant 2020

Princeton Presidential Postdoctoral Research Fellowship 2020 – 2022

APS FGSA Travel Award for Excellence in Graduate Research 2020

NSF ASSIST Travel Grant 2020

NSF ACADEME Travel Grant 2020

Frank J. Padden Jr. Award Finalist, American Physical Society (APS) 2020

Lighting the Pathway to Faculty Careers for Natives in STEM Fellowship 2019 – 2021

Eastman Chemical Student Award in Applied Polymer Science 2019

NSF ACADEME Fellowship 2019

GSOFT Travel Award, APS March Meeting	2019
Best Poster Award, Annual Meeting of the Adhesion Society	2019
Spaulding-Smith STEM Dissertation Fellowship, UMass Amherst	2019
NEAGAP/IMSD Fellowship, UMass Amherst	2015 – 2016
Scott Mackay Award, RPI	2015
WE14 Conference Scholarship, RPI Society of Women Engineers (SWE)	2014
Who's Who Among Students in American Universities and Colleges	2014
September Member of the Month, RPI SWE	2013
Outreach Award, RPI SWE	2012, 2013
Tau Beta Pi: Engineering Honors Society	2012
Rensselaer Leadership Award	2011– 2014

PUBLICATIONS (*denotes Bay as corresponding author, †denotes equal contributions, †denotes undergraduate researcher)

- [9] **R.K. Bay***, A.M. Hancock, A.S. Dill-Macky[†], Hao Nghi Luu[†], S.S. Datta*, “3D printing bacteria to study motility and growth in complex 3D porous media” *under revision*.
- [8] X. Xu, N. Guillomaitre, K. Christie, **R.K. Bay**, N. Bizmark, S.S. Datta, Z.J. Ren, R. Priestley, “Quick Release Anti-Fouling Hydrogels for Solar-Driven Water Purification”, *ACS Central Science*, **9**(2), 177-185 (2023).
- [7] A. Martínez-Calvo[†], T. Bhattacharjee[†], **R.K. Bay**, H.N. Luu[†], A.M. Hancock, N.S. Wingreen, S.S. Datta, “Morphological instability and roughening of growing 3D bacterial colonies”, *PNAS*, 119, e2208019119 (2022).
- [6] **R.K. Bay**, T. Zhang, S. Shimomura, M. Ilton, K. Tanaka, R.A. Riggleman, A.J. Crosby, “Decoupling the impact of entanglements and mobility on the failure properties of ultrathin polymer films”, *Macromolecules*, **55**(19), 8505-8514 (2022).
- [5] C. Chen, C.A. Airoidi, C.A. Lugo, **R.K. Bay**, B.J. Glover, A.J. Crosby, “Flower Inspiration: Broad-Angle Structural Color Through Tunable Hierarchical Wrinkles in Thin Film Multilayers”, *Advanced Functional Materials*, 2006256 (2021).
- [4] **R.K. Bay**[†], K. Zarybnicka[†], J. Jančář, A.J. Crosby, “Mechanical Properties of Ultrathin Film Nanocomposites”, *ACS Applied Polymer Materials*, **2**(6), 2220-2227, (2020).
- [3] W.J. Choi[†], **R.K. Bay**[†], A.J. Crosby, “Tensile Properties of Ultrathin Bisphenol-A Polycarbonate Films”, *Macromolecules*, **52**(19), 7489-7494, (2019).
- [2] **R.K. Bay**, A.J. Crosby, “Uniaxial Extension of Ultrathin Freestanding Polymer Films”, *ACS Macro Letters*, **8**(9), 1080-1085, (2019).
- [1] **R.K. Bay**, S. Shimomura, Y. Liu, M. Ilton, A.J. Crosby, “Confinement Effect on Strain Localization in Glassy Polymers”, *Macromolecules*, **51**(10), 3647-3653 (2018).

INTELLECTUAL PROPERTY

- [1] S. S. Datta, R. D. Priestley, X. Xu, **R. K. Bay**, “Method to 3D-Print Engineered Living Materials”, US Provisional Application Filed on 11/4/21.

ARTICLES IN NON-REFEREED PUBLICATIONS

- [3] **R. K. Bay**, A. J. Crosby, "The TUFF Method: Stretching Free-Standing Ultra-Thin Glassy Polymer Films", *Annual Meeting of The Adhesion Society*, Hilton Head, South Carolina, February (2019). [Proceedings]
- [2] **R. K. Bay**, S. Shimomura, M. Ilton, A. J. Crosby, "Deformation Mechanisms in Ultra-thin Glassy Polymer Films", *Deformation, Yield and Fracture of Polymer*, Kerkrade, Netherlands, March (2018). [Proceedings]
- [1] **K. Bay**, S. Boyd, K. Chester, and Peter Lezzi. "RPI Material Advantage Outreach." *Advanced Materials and Processes*, 72, (2014).

INVITED TALKS WHILE AT CU BOULDER

- [20] *Upcoming*: "Title TBD", *CU Boulder 2024 Materials Science and Engineering Symposium*, Boulder, CO, August 2024.
- [19] *Upcoming*: "Title TBD", *19th International Conference on Deformation, Yield, and Fracture of Polymer*, Kerkrade, Netherlands, March 2024.
- [18] "Impacts of Confinement: From Polymer Films to Bacteria", *Adhesion Community of Practice*, Dow, Midland, MI, May 2023.
- [17] "Impacts of Confinement: From Polymer Films to Bacteria", *Center for Integrated Nanotechnologies*, Sandia National Laboratories, Albuquerque, NM, April 2023.
- [16] "Impacts of Confinement: From Polymer Films to Bacteria", *Department of Chemical and Biological Engineering*, University of New Mexico, Albuquerque, NM, April 2023.
- [15] "Harnessing the Functions of Living Polymeric Materials", *Engineered Living Materials through Synthetic Biology-Beyond the Crossroads of Biology and Chemistry*, American Chemical Society National Meeting, Indianapolis, IN, March 2023.
- [14] "Impacts of Confinement: From Polymer Films to Bacteria", *Department of Chemical and Biological Engineering*, Colorado State University, Fort Collins, CO, October 2022.

INVITED TALKS PRIOR TO CU BOULDER

- [13] "Quantifying the Mechanics of Ultrathin Polymer Films", *Department of Materials Science and Engineering*, Massachusetts Institute of Technology, March 2021.
- [12] "Quantifying the Mechanics of Ultrathin Polymer Films", *Department of Chemical and Biological Engineering*, University of Colorado Boulder, January 2021.
- [11] "Quantifying the Mechanics of Ultrathin Polymer Films", *Department of Materials Science and Engineering*, Carnegie Mellon University, January 2021.
- [10] "What controls failure in ultrathin polymer films?", *National ChemE Seminar Series*, <https://bit.ly/2lqJEkb>, November 2020.
- [9] "What controls failure in ultrathin polymer films?", *Soft Matter for All Symposium*, MRSEC of Princeton University and University of Delaware, October 2020.
- [8] *Condensed Matter Seminar series*, Tufts University, Somerville, MA, April 2020. (Canceled due to COVID-19)

- [7] “Decoupling the Role of Entanglements and Mobility in the Mechanics of Ultrathin Polymer Glasses”, *DPOLY Virtual Padden Symposium, March Meeting of the APS*, March 2020. **Finalist**
- [6] “Directly Measuring the Uniaxial Stress-Strain Response of Freestanding Ultra-Thin Glassy Polymer Films”, *Eastman Chemical Student Award Symposium, 257th American Chemical Society National Meeting*, San Diego, CA, August 2019. **Awarded**
- [5] “Deformation and Failure Mechanisms of Ultra-Thin Polymer Films”, *Soft Materials Coffee Hour, Princeton University*, Princeton, NJ, July 2019.
- [4] “Quantifying the Mechanical Properties of Ultra-Thin Glassy Polymer Films”, *Polymer Science – Zernike Institute for Advanced Materials, University of Groningen*, Groningen, Netherlands, Jan. 2019.
- [3] “Quantifying the Mechanical Properties of Ultra-Thin Glassy Polymer Films”, *Lindner and du Roure Group Meeting, ESPCI*, Paris, France, January 2019.
- [2] “Quantifying the Mechanical Properties of Ultra-Thin Glassy Polymer Films”, *Polymer Physics Gordon Research Seminar*, South Hadley, MA, July 2018.
- [1] “Deformation Mechanisms in Ultra-Thin Glassy Polymer Films.” *Department of Material Science and Engineering, Rensselaer Polytechnic Institute*, Troy, NY, September 2017.

CONTRIBUTED ORAL PRESENTATIONS

- [10] *Upcoming*: “Expanding the TUFF and TUTTUT methods: Stretching Ultrathin Rubbery Polymers Films and Microbial Biopolymer Films” *Annual Meeting of The Adhesion Society*, Savannah, GA, February 2024.
- [9] “Escaping Confinement: How Bacteria Reshape Their Surroundings to Enable Migration” *March Meeting of the APS*, Chicago, IL, Mar. 2022.
- [8] “Biofilm Growth Morphology in Confined Heterogeneous Media” *American Institute of Chemical Engineers Annual Meeting*, Boston, MA, Nov. 2021.
- [7] “What controls failure in ultrathin glassy polymer films?” *March Meeting of the APS*, Virtual, March 2021.
- [6] “Uniaxial Extension of Ultra-Thin Freestanding Polymer Films”, *Materials Research Society*, Boston, MA, December 2019.
- [5] “How do ultra-thin polymer films fail?”, *Center for UMass/Industry Research on Polymers (CUMIRP)*, Amherst, MA, October 2019.
- [4] “The TUFF Method: Stretching Free-Standing Ultra-Thin Glassy Polymer Films”, *March Meeting of the APS*, Boston, MA, March 2019.
- [3] “Quantifying the Mechanical Properties of Ultra-Thin Glassy Polymer Films”, *NEW.Mech*, Providence, RI, September 2018. (Sound Bite)
- [2] “How Do Ultra-Thin Glassy Polymers Fail?”, *March Meeting of the APS*, Los Angeles, CA, March 2018.
- [1] “Thickness Dependence on Failure in Ultra-Thin Glassy Polymers”, *March Meeting of the APS*, New Orleans, LA, March 2017.

SELECTED POSTER PRESENTATIONS (Out of 18)

- [6] **R.K. Bay**, S.S. Datta, "3D Printing Bacteria: Growth in Confined Environments to Material Fabrication", *Gordon Research Conference on Polymer Physics*, South Hadley, MA, July 2022.
- [5] **R.K. Bay**, S.S. Datta, "3D Printing Bacteria: Growth in Confined Environments to Material Fabrication", *International Conference on Engineered Living Materials*, Saarbürken, Germany, June 2022. **Best Poster Award**
- [4] **R.K. Bay**, S.S. Datta, "3D Printing Bacteria: Growth in Confined Environments to Material Fabrication", *TOSOH Polymer Conference*, Hollywood, CA, June 2022.
- [3] **R.K. Bay**, K. Zarybnicka, J. Jančář, A.J. Crosby, "Unfolding of Polymer Thin Films on Liquid Surfaces", *March Meeting of the APS*, Virtual, March 2021.
- [2] **R. K. Bay**, A. J. Crosby, "The TUFF Method: Stretching Free-Standing Ultra-Thin Glassy Polymer Films", *Annual Meeting of The Adhesion Society*, Hilton Head, SC, February 2019. **Best Poster Award**
- [1] **R. K. Bay**, S. Shimomura, M. Ilton, A. J. Crosby, "Deformation Mechanisms in Ultra-thin Glassy Polymer Films", *Deformation, Yield, and Fracture of Polymer*, Kerkade, Netherlands, Mar. 2018.

TEACHING

At CU Boulder

Term	Course #	Course Title	Credits	Enrollment	Team Taught
2024 Spring	BMEN 2010 (001,002)	<i>Biomaterials</i>	3.0	98	Y
2023 Fall	CHEN 3320 (002)	<i>Chemical Engineering Thermodynamics</i>	3.0	63	N
2022 Fall	CHEN 3320 (001)	<i>Chemical Engineering Thermodynamics</i>	3.0	89	Y

Prior to CU Boulder

Guest Lecturer	Squishy Engineering-Using Soft Materials to Solve Hard Problems	Fall 2021
Trainee	Teaching Transcript Program at Princeton University	2020 – 2022
Teaching Assistant	Introduction to Polymer Science and Engineering	Spring 2018

STUDENT ADVISING

Graduate Students:

Student	Department/Program	Thesis Type	Period
Olivia Pear	Materials Science and Eng.	Ph.D.	01/2024 – Present
Alyssa Libonatti	Biological Engineering	Ph.D.	01/2024 – Present
Samson Adelani	Materials Science and Eng.	Ph.D.	01/2023 – Present
Ava Crowley	Chemical Engineering	Ph.D.	01/2023 – Present
Nickolas Gibson	Biological Engineering	N/A	01/2023 – 12/2023

Undergraduate Students

Student	Department/Program	School	Period
Owen Sablocik	Chemical Engineering	CU Boulder	01/2024 – Present
Carlos Ruiz Gonzalez	Chem. and Bio. Engineering	CU Boulder	05/2023 – 08/2023
Teagan Kelly	Chem. and Bio. Engineering	CU Boulder	01/2023 – 09/2023
Lydia Flackett	Chemical Engineering	CU Boulder	01/2023 – Present
Nicole Garza	Chem. and Bio. Engineering	CU Boulder	01/2023 – Present
Hao Nghi Luu	Chemical Engineering	Princeton	08/2021 – 05/2022
Courtney Guertin	Chemical Engineering	UMass	09/2018 – 01/2019
Alexander Hamer	Chemical Engineering	UMass	06/2017 – 06/2019

Ph.D. Committees (not chair)

Student	Department/Program	Thesis type	Period
Paula Pranda	Chemical Engineering	Ph.D.	11/2023 – Present
Claire Niemet	Chemical Engineering	Ph.D.	11/2023 – Present
Montana Minnis	Chemical Engineering	Ph.D.	06/2023 – Present
Hannah Edstrom	Biological Engineering	Ph.D.	05/2023 – Present
Gregory Donovan	Chemical Engineering	Ph.D.	10/2022 – Present
Alexis Phillips	Chemical Engineering	Ph.D.	10/2022 – Present
Maria Kelly	Chemical Engineering	Ph.D.	10/2022 – Present
Dana Stamos	Chemical Engineering	Ph.D.	10/2023 – 11/2023
Hayden Fowler	Chemical Engineering	Ph.D.	10/2022 – 09/2023

Kyle Schlafmann	Chemical Engineering	Ph.D.	07/2023 – 08/2023
Karan Dikshit	Materials Science and Eng.	Ph.D.	07/2021 – 07/2022

PROFESSIONAL MEMBERSHIP

American Physical Society (APS)
 American Chemical Society (ACS)
 American Indian Science and Engineering Society (AISES)
 American Institute of Chemical Engineers (AIChE)
 Society of Indigenous Physicists (SIP)

PROFESSIONAL ACTIVITIES AND SERVICE

For the Professional Community

Ad hoc Peer Reviewer for Journals	<i>Nature Communications, Science Advances, ACS Nano, ACS Polymers Au, ACS Macro Letters, Macromolecules, Soft Matter, Polymer</i>	
Ad hoc Reviewer for Proposals	Army Research Office, BioPACIFIC MIP	
Co-chair	Polymer Physics Gordon Research Conference Power Hour	2024
Session Chair	“Physics of Polymer Coatings and Thin Films” Focus Session, APS March Meeting	2024
Member	Inaugural Gathering of the Society of Indigenous Physicists Planning Committee	2023 – Present
Session Chair	“Polymer Thin Films, Confinement, and Interfaces”, AIChE Annual Meeting	2023, 2024
Session Chair	“Rheology and Mechanics of Polymers”, APS March Meeting	2023
Participant	NSF Workshop on Materials Laboratories of the Future: Instrumentation and Infrastructure to Accelerate the Unification of the Materials Innovations Infrastructure: Soft Matter, Polymers, and Biomaterials	2022
Founder	Polymer Assistant Professor Slack	2022
Reviewer	ACS PMSE Student Award	2022
Chair	Polymer Physics Gordon Research Seminar	2022
Discussion Leader	Tosoh Polymer Conference	2022
Invited Participant & Scribe	NCI-NSF Living Materials Square Table Meeting	2021
Co-founder	Early Career Researchers in Polymer Physics Slack	2020

Co-organizer	Virtual Polymer Physics Symposium	2020
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For the University/Department

Member	Chemical and Biological Engineering Faculty Search Committee	2022 – 2023
Member	Chemical and Biological Engineering Faculty Committee	2022 – Present
Co-coordinator	Soft Materials Coffee Hour (SMatCH) at Princeton	2020 – 2021
Coordinator	PSE Undergraduate Researcher Seminar	2018
Member	PSE Mentoring Committee	2016 – 2017

Community Outreach

Fellow	U.S. National Committee on Theoretical and Applied Mechanics Outreach Program	2024 –Present
Mentor	AISES Lighting the Pathways Program	2023– Present
Panelist	“Conversations with Recently Hired Research and Teaching Faculty” for the AISES Lighting the Pathways Program	2023
Organizer/Presenter	“Failure is an Option: How to Design & Engineer Materials” at 2022 AISES National Conference	2022
Volunteer	Princeton Holiday Lecture	2020
Organizer/Presenter	“It’s a Material World: Materials Science & You!” at 2020 AISES National Conference	2020
Outreach Coordinator & Volunteer	Crosby Group, PSE Dept., PSE ASPIRE	2015 – 2019