

RAMYA KUMAR

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SUMMARY

My research group deciphers biointerfacial phenomena transpiring at interfaces between cells, materials, and biomacromolecules by integrating advanced polymer synthesis, surface characterization tools, and statistical learning frameworks. We have been supported by the NIH and the NSF via both regular funding mechanisms (R21) and early career awards (CAREER, ESI MIRA, and TrailBlazer). I will leverage my early mentorship success to inspire students across all educational levels and from all backgrounds to pursue careers in polymers and biomaterials.

RESEARCH INTERESTS

Polymer synthesis & characterization • Engineering cell–material interfaces • Computer-aided polymer design • Intracellular delivery of proteins & DNA

ACADEMIC APPOINTMENTS

Assistant Professor **2022–Present** Colorado School of Mines, Golden, CO
Department of Chemical and Biological Engineering

Affiliate Faculty **2026–Present** University of Colorado, Anschutz Medical Campus, Aurora, CO
Department of Bioengineering

Postdoctoral Associate **2018–21** University of Minnesota, Twin Cities, Minneapolis, MN
Department of Chemistry
Advisor: Theresa M. Reineke

EDUCATION

PhD in Chemical Engineering **2012–2018** University of Michigan, Ann Arbor, MI
Directing interfacial events using biomimetic polymer brushes
Advisor: Joerg Lahann

B.E. (Hons.) in Chemical Engineering **2005–09** BITS Pilani, Pilani, Rajasthan, India.

AWARDS & HONORS

Early career awards **2025** NIGMS ESI MIRA.
2025 NIBIB TrailBlazer.
2025 NSF CAREER, Division of Materials Research, Biomaterials

Teaching & Mentoring **2026** Undergraduate research mentor award, among two faculty members recognized annually for excellence in mentoring undergraduate researchers (student-nominated).

2025 Faculty of the month (April), Panhellenic Council, Colorado School of Mines. For “incredible impact on students through dedication, support, and positive energy” (student-nominated).

2016 Richard & Eleanor Towner Prize for Outstanding Graduate Student Instructor, University of Michigan. For exceptional & innovative teaching (student-nominated).

PhD awards **2018** Rackham Predoctoral Fellowship, University of Michigan.

2018 Finalist, AIChE Graduate Student Awards, Biomaterials, 2018, Minneapolis.

2018 Departmental nominee, Richard & Eleanor Towner Prize for Outstanding PhD research, College of Engineering, University of Michigan.

2016 Poster award, Second Place, Materials Science Engineering, Engineering Graduate Symposium, University of Michigan.

2016 Procter & Gamble Team Innovation Award, 40th Annual Macro Symposium, University of Michigan. Recognized for innovative and collaborative research.

2014 Poster award, First Place, Materials & Chemical Technology, Engineering Graduate Symposium, University of Michigan.

Other Recognitions **2024** Best Talk, Research Fusion, Colorado School of Mines.

2019 PMSE Future Faculty Scholar, Polymeric Material Science and Engineering Division, American Chemical Society.

2019 Career Development Award, Postdoctoral Association, University of Minnesota, Twin Cities.

2019 Travel award, Center for Genome Engineering (CGE), University of Minnesota, Twin Cities.

2012 College of Engineering Fellowship, University of Michigan.

2008 Monali Dey Memorial Award, BITS Pilani alumni memorial award for the most outstanding Chemical Engineering undergraduate in a graduating class.

FUNDING

NSF **2025–30** Faculty Early Career Award (CAREER), 2441526, \$ 803,495
Role: PI.

NIH **2025–30** NIGMS ESI MIRA, 1R35GM160484-01, \$1,993,748.
Role: Sole PI.

2025–30 NCI R01, 1R01CA293906-01A1, \$ 249,000 share of \$ 3 M.
Role: Co-I. (\$ 249,00 sub-contract from PI Hai-Quan Mao at Johns Hopkins).

2025–28 NIBIB TrailBlazer R21, 1R21EB036183-01A1, \$ 604,139.
Role: PI.

2023–25 NIBIB R21, 1R21EB034464-01, \$ 403,868.
Role: PI.

2024-25 Diversity Supplement, 1R21EB034464-01S1, \$ 50,000.
Role: PI.

Competitive **2024-25** Children's Hospital of Colorado and School of Mines Pilot Award, (w/ Dr. internal funding Scott Sagel at CHCO)
Role: Lead PI (\$ 10,000 each to Kumar and Sagel).

2026 Tech Fee award for acquiring lab/instructional equipment.
Role: Led proposal on behalf of my department (\$ 25,727 to replace the department's shared dynamic light scattering instrument that was ageing).

PUBLICATIONS FROM INDEPENDENT CAREER

* indicates that R.K. is corresponding author, # indicates Mines-affiliated graduate student or postdoc mentee of R.K., & indicates Mines-affiliated undergraduate mentee of R.K.

13. Sekar, R.P.[#], Lawson, J.L.[#], Camacho, A.N.[#], Werneth, A.[#], Jordan, K.[&], Paruchuri, A., **Kumar, R.***. (2026) [Statistical, Block, and Gradient Copolymers Reveal Microstructure-dependent Binding and Intracellular Delivery of Genome Editor Proteins](#), *ChemRxiv*
12. Kim, S., Lee, J., Hernandez, K.E.C, Cartwright, Z., Kappus, M., Forman, J., Lawson, J.L.[#], **Kumar, R.**, Munsky, B.E., Herrera-Alonso, M. (2026) Effects of Macromolecular Architecture and Chemistry on the Mucopenetration of Polymeric Micelles, under review.
11. Humpal, A.P.[#], Ofori, P.[&], Dhupar, A.[&], **Kumar, R.***. (2026) [Hydrophobic Monomer Incorporation Tunes the pH Responsivity of Polycationic Brushes](#), *ChemRxiv*
10. Toh, W.H., Cheng, L., Chang, B., Yu, D., Ma, J., Huang, X., Weng, G., Zhu, Y., Lu, X., Lin, J., Liu, J., Choy, J., Greco, A., Jain, J., Yang, J., Patel, M., Shoemaker, G., Cozzone, I., Antov, D., Zhang, K., Kayabas, S., Shin, C., Aggarwal, A., Green, J., Tzeng, S., **Kumar, R.**, Konig, M.F., Mao, H-Q. (2026) [FALCON: Closed-Loop Multi-Objective Optimization of Lipid Nanoparticles for Cell-Selective mRNA Delivery](#), *bioRxiv*
9. Camacho, A.N. [#] and **Kumar, R.***. (2026) Data-driven Design of Smart Biomaterials in *Stimuli Responsive Drug Delivery Systems*, 2nd Edition, edited by Amiji, M., Royal Society of Chemistry. (invited book chapter to appear in 2026)
8. Lawson, J.L.[#], Lesco, K., Sekar, R.P.[#], Wheeler, G.[&], Williams, K.R.^{*}, **Kumar, R.***. *co-corresponding authors with equal contribution (2026) [Free Polymers Skew Polyplex Solution Properties and Confound the Interpretation of Structure-Function Relationships](#), *ACS Polymers Au*, DOI: 10.1021/acspolymersau.6c00080
7. Nelson, C.[^]&, Castellion, C.A.[^]&, Humpal, A.P.[#], Sekar, R.P., Chaudhary, N., Villa-Diaz, L.G.^{*}, **Kumar, R.***.[^] equal contribution. *co-corresponding authors with equal contribution (2026) [Glycosaminoglycan-inspired polymer brushes promote human mesenchymal stem cell proliferation while retaining tri-lineage differentiation potential](#), *ACS Applied Materials & Interfaces* 18 (3): 4952-4966.
6. Humpal, A.P.[#], Dhupar, A.[&], Sekar, R.P.[#], Muyanja, N.S., Chauhan, A., **Kumar, R.***. (2025) [Polymer Microstructure Directs the Solvent-Selective Swelling Response of Polymer Brushes](#), *Macromolecules*, 58, 17, 9110-9121.

5. Sekar, R.P.[#], Lawson, J.L.[#], McGrath, C.[&], Wheeler, G.[&], Moreau, G.[&], Johansen, C.G., Farnsworth, N.L., **Kumar, R.***. (2025) [Tuning DLVO Interactions Alters Polymer-Mediated pDNA Delivery in a Cell Type-Dependent Manner](#), *Langmuir*, 41, 27, 17426–17438.
4. Lawson, J.L.[#], Sekar, R.P.[#], Wright, A.R.E.[#], Wheeler, G.[&], Yanes, J.[&], Estridge, J.[&], Johansen, C.G., Farnsworth, N.L., Kumar, P., Tay, J., **Kumar, R.***. (2024) [The Spatial Distribution of Lipophilic Cations in Gradient Copolymers Regulates pDNA Binding Interactions, Polyplex Aggregation, and Transgene Expression](#), *Biomacromolecules*, 25, 10, 6855–6870
3. Sekar, R.P.[#], Lawson, J.L.[#], Wright, A.R.E.[&], McGrath, C.[&], Schadeck, C.[#], Kumar, P., Tay, J., Dragovan, J., **Kumar, R.***. (2024) [Poly\(L-glutamic acid\) Overcomes Cationicity-Dependent Tradeoffs Among Cytotoxicity, pDNA Delivery, and Serum Stability](#), *RSC Applied Polymers*, 2, 701-718
2. Cheng, L., Zhu, Y., Ma, J., Aggarwal, A., Toh, W.H., Shin, C., Sangpachatanaruk, W., Weng, G., **Kumar, R.***, Mao, H-Q., *. *co-corresponding authors with equal contribution (2023) [Machine Learning Elucidates Design Features of Plasmid DNA Lipid Nanoparticles for Cell Type-Preferential Transfection](#), *ACS Nano*, 2024, 18, 42, 28735–28747
1. **Kumar, R.***. (2022) [Materiomically Designed Polymeric Vehicles for Nucleic Acids: Quo Vadis?](#), *ACS Applied Biomaterials*, 5, 6, 2507–2535

PUBLICATIONS FROM POSTDOCTORAL AND DOCTORAL WORK

& indicates undergraduate mentee of R.K.

15. Leyden, M.C., Oviedo, F., Saxena, S., **Kumar, R.**, Le, N., Reineke, T.M.. (2024) [Synergistic Polymer Blending Informs Efficient Terpolymer Design and Machine Learning Discerns Performance Trends for pDNA Delivery](#) *Bioconjugate Chemistry*, 35, 7, 897–911
14. Koroth, J., Chitwood, C., **Kumar, R.**, Lin, Wei-Han., Reves, B.T., Boyce, T., Reineke, T.M., Ellingson, A., Johnson, C.P., Stone, L.S., Chaffin, K.C., Simha, N.K., Ogle, B.M., Bradley, E.W., (2024) [Identification of a Novel, MSC-Induced Macrophage Subtype via Single-Cell Sequencing: Implications for Intervertebral Disc Degeneration Therapy](#) *Frontiers in Cell and Developmental Biology*, 11:1286011. doi: 10.3389/fcell.2023.1286011
13. **Kumar, R.**, Le, N., Oviedo, F., Brown, M.E., & Reineke, T.M. (2022) [Combinatorial Polycation Synthesis and Causal Machine Learning Reveal Divergent Polymer Design Rules for Effective pDNA and Ribonucleoprotein Delivery](#). *JACS Au*, 2, 2, 428–442
12. Bockman, M.R., Dalal, R.J., **Kumar, R.**, & Reineke, T.M. (2021) [Facile Synthesis of GalNAc Monomers and Block Polycations for Hepatocyte Gene Delivery](#). *Polymer Chemistry*, 12, 4063–4071.
11. Dalal, R.J., **Kumar, R.**, Ohnsorg, M., Brown, M.E., & Reineke, T.M. (2021) [Cationic Bottlebrush Polymers Outperform Linear Polycation Analogues for pDNA Delivery and Gene Expression](#). *ACS Macro Letters*, 10, 7, 886–893.
10. **Kumar, R.**, Chalarca, C.F.S., Bockman, M.R., Van Bruggen, C., Grimme, C.J., Dalal, R.J., Hanson, M.G., Hexum, J.K., & Reineke, T.M. (2021) [Polymeric Delivery of Therapeutic Nucleic Acids](#) *Chemical Reviews*, 121, 18, 11527–11652. ^ equal contribution.

9. **Kumar, R.**, Le, N., Tan, Z., Brown, M.E., Jian, S.[&], & Reineke, T.M. (2020) [Efficient Polymer-Mediated Delivery of Ribonucleoprotein Payloads Through Combinatorial Design and Parallelized Experimentation](#). *ACS Nano*, 14, 12, 17626–17639.
8. Tan, Z., Jiang, Y., Ganewatta, M.S., **Kumar, R.**, Keith, A., Twaroski, K., Pengo, T., Tolar, J., Lodge, T.P., & Reineke, T.M. (2019). [Block Polymer Micelles Enable CRISPR/Cas9 Ribonucleoprotein Delivery: Physico-Chemical Properties Affect Packaging Mechanisms and Gene Editing Efficiency](#). *Macromolecules*, 52, 21, 8197-8206 .
7. **Kumar, R.**, Kratzer, D., Cheng, K., Prisby, J.[&], Sugai, J., Giannobile, W.V., & Lahann, J. (2019). [Carbohydrate-Based Polymer Brushes Prevent Viral Adsorption on Electrostatically Heterogeneous Interfaces](#). *Macromolecular Rapid Communications*, 1800530.
6. **Kumar, R.**, Welle, A., Becker, F., Kopyeva, I.[&], & Lahann, J. (2018). [Substrate-Independent Micropatterning of Polymer Brushes Based on Photolytic Deactivation of Chemical Vapor Deposition-Based SI-ATRP Initiator Films](#). *ACS Applied Materials & Interfaces*, 10 (38), pp 31965–31976.
5. Bally-Le Gal, F., Hussal, C., Kramer, J.J.P., Cheng, K.C., **Kumar, R.**, Eyster, T., Trouillet, V., Nieger, M., Brase, S., & Lahann, J. (2017). [Polylutidines: Multifunctional Surfaces via Vapor-Based Polymerization of Functional Pyridinophanes](#). *Chemistry: A European Journal*, 23, 13342-13350.
4. **Kumar, R.**, Kopyeva, I.[&], Cheng, K.C., Liu, K. & Lahann, J. (2017). [Examining Interfacial Kinetics on Electrostatically Heterogeneous Surfaces Using \$\zeta\$ -Potential Measurements](#). *Langmuir*, 33 (25), pp 6322-6332.
3. Konig, M., **Kumar, R.**, Hussal, C., Biscarat, J., Barner, L., Schafer, A. & Lahann, J. (2017). [pH-Responsive Aminomethyl Functionalized Poly\(p-xylylene\) Coatings by Chemical Vapor Deposition Polymerization](#) *Macromolecular Chemistry & Physics*, 218, 1600521.
2. **Kumar, R.** & Lahann, J. (2016). [Predictive Model for the Design of Zwitterionic Polymer Brushes: A Statistical Design of Experiments Approach](#). *ACS Applied Materials & Interfaces*, 8 (26), 16595-16603.
1. Qian, X., Villa-Diaz, L. G., **Kumar, R.**, Lahann, J., & Krebsbach, P. H. (2014). [Enhancement of the Propagation of Human Embryonic Stem Cells by Modifications in the Gel Architecture of PMEDSAH Polymer Coatings](#). *Biomaterials*, 35(36), 9581–90.

MENTORING & ADVISING

Postdoc **Jan 2023–Nov 2025** Ram Prasad Sekar, now Assistant Professor, Mahindra University, India.

Feb 2026 onwards Anushree Mondal.

PhD **Sep 2022–present** Jessica L. Lawson (Materials Science)

Sep 2022–present Adam P. Humpal (Materials Science)

Jan 2025–present Alyson Camacho (Chemical & Biological Engineering)

Jan 2026–present Andrew Werneth (Chemical & Biological Engineering)

MS thesis **Aug 2023–May 2024** Aryelle Wright (Quantitative Biosciences and Engineering), now an Associate scientist at Abbvie

Undergraduates **Jan 2022–May 2024** Claire Nelson (Chemistry), now a PhD student at UC Santa Barbara Materials Science.

Jan 2022–May 2023 Aryelle Wright (Quantitative Biosciences and Engineering), now an Associate scientist at Abbvie

May 2022–Aug 2022 Shawn Muhr (Quantitative Biosciences and Engineering), now a computational biologist at Harvard

Sep 2022–Dec 2023 Caleb McGrath (Quantitative Biosciences and Engineering), now in medical school (MD, University of Colorado, Anschutz Medical Campus)

Aug 2023–May 2025 Wakana Kani, (Chemical & Biological Engineering), now a PhD student at UC Berkeley

May 2023–May 2025 Jordan Estridge, (Chemical & Biological Engineering), now a process engineer at Audubon

Aug 2023–May 2025 Jillian Yanes, (Quantitative Biosciences and Engineering), now works at Abbott

Aug 2023–December 2025 Grant Wheeler, (Quantitative Biosciences and Engineering.)

Jan 2024–May 2025 Gautier Moreau, (Quantitative Biosciences and Engineering)

Aug 2023–present Alexander Dhupar, (Quantitative Biosciences and Engineering)

Aug 2024–May 2025 Olivia Moran, (Quantitative Biosciences and Engineering)

Aug 2023–present Caitlyn Castellion, (Chemistry)

May 2025–present Ryan Brown, (Chemistry)

May 2025–present Pethuel Ofori, (Chemical & Biological Engineering)

Jan 2025–present Thya Galindo, (Chemical & Biological Engineering)

May 2025–present Tanner Page, (Design Engineering)

Aug 2025–present Francesca Nuzzo, (Quantitative Biosciences and Engineering)

Aug 2025–present Lee Whinston, (Quantitative Biosciences and Engineering)

Aug 2025–present August Green, (Quantitative Biosciences and Engineering)

Aug 2025–present Kyra Jordan, (Quantitative Biosciences and Engineering)

Aug 2025–present Arya Kumar, (Biochemistry)

Aug 2025–present Cora Grayson, (Chemical and Biological Engineering)

Aug 2025–present Hannah Schnurr, (Quantitative Biosciences and Engineering)

Jan 2026–May 2026 Hannah Schnurr, (Quantitative Biosciences and Engineering)

May 2026–present Michelle Lau, (Chemical & Biological Engineering)

High school students **Jun–Aug 2024** Kindred Alvarado, (now attending Oregon State University as a Bio-chemistry major)

Jun–Aug 2024 Gabriella Loi, (now attending Purdue as a Materials Science major)

Jun–Aug 2025 Maia Johnson, (now entering senior year of high school)

Jun–Aug 2025 Jordyn Golden, (now entering senior year of high school)

AWARDS & RECOGNITIONS TO TRAINEES

Nationally competitive fellowships **2026** Beckman Scholar, Kyra Jordan (undergraduate)
2025 NSF graduate research fellowship award, Wakana Kani (undergraduate)
2025 Goldwater Scholar, Caitlyn Castellion (undergraduate)
2025 Beckman Scholar, Caitlyn Castellion (undergraduate)
2023 NSF graduate research fellowship award, Jessica Lawson (PhD student)
2023 NSF graduate research fellowship honorable mention, Adam Humpal (PhD student)
2023 NSF graduate research fellowship honorable mention, Aryelle Wright (MS thesis student)
2023 American Association for University Women Selected Professions Fellowship honorable mention, Aryelle Wright (MS thesis student)

Best talk **2026** First place, oral presentation, International Symposium on Field and Flow-based Separations (iSFFF), Washington DC, Jessica Lawson (PhD student)
2026 Third place, oral presentation, Mines Fall Undergrad Research Symposia, Cora Grayson (undergraduate)
2025 First place, oral presentation, Materials Science session, Graduate Research and Discovery Symposia, Adam Humpal (PhD student)
2024 First place, oral presentation, Mines Undergrad Research Symposia, Claire Nelson (undergraduate)

Best poster **2025** Third place, poster presentation, Mines Fall Undergrad Research Symposia, Caitlyn Castellion (undergraduate)
2025 First place, poster presentation, Biological and Health Sciences session, Graduate Research and Discovery Symposia, Alyson Camacho (PhD student)
2025 First place, poster presentation, Mines Spring Undergrad Research Symposia, Gautier Moreau (undergraduate)
2024 First year honorable mention (best poster presented by a freshman), Mines Spring Undergrad Research Symposia, Caitlyn Castellion (undergraduate)
2024 First place, poster presentation, Mines Fall Undergrad Research Symposia, Jordan Estridge (undergraduate)
2022 First place, poster presentation, Mines Spring Undergrad Research Symposia, Aryelle Wright (undergraduate)

Other recognitions **2026** Outstanding researcher award, Graduating class of 2026, Quantitative Biosciences and Engineering, Colorado School of Mines, Grant Wheeler (undergraduate)
2025 Best undergraduate research mentor, Colorado School of Mines, Adam Humpal (PhD student)
2024 ACS LEADS program, Jessica Lawson (PhD student)
2024 Academic Ascent, UNC Chapel Hill Future Faculty Symposia, Ram Prasad Sekar (postdoc)

2024 MRSEC REU, University of Minnesota, Wakana Kani (undergraduate)

2024 ARCS Scholar, Caitlyn Castellion (undergraduate)

2023 MRSEC REU, University of Minnesota, Claire Nelson (undergraduate)

2023 Amgen scholar, Columbia University, Shawn Muhr (undergraduate)

TEACHING

As faculty **Fall 2025**, CBEN 310 Introduction to Biomedical Engineering, 4.3/5

at Mines **Spring 2025**, CBEN 375 Chemical Process Separations, 4.5/5

Fall 2024, CBEN 310 Introduction to Biomedical Engineering, 4.2/5

Spring 2024 CBEN 620 Engineering of Soft Matter, 4.33/5

Fall 2023 CBEN 310 Introduction to Biomedical Engineering, 3.9/5

Spring 2023 CBEN 310 Introduction to Biomedical Engineering, 4/5

Spring 2022 CBEN 620 Engineering of Soft Matter, 4.8/5

As PhD student **Spring 2015** ChE 330 Chemical & Engineering Thermodynamics, *Graduate Student*
at Michigan *Instructor*, Rated 4.9/5, won a college-wide teaching award after being nominated
by students

2013-2018 *Mentor*, Undergraduate Research Opportunity Program. Trained 8 undergraduate students in experimental design, synthesis, analytical techniques and writing/presentation skills. Undergraduate students contributed to three journal publications.

2015-17 *Engineering Teaching Consultant*, Center for Research on Learning & Teaching. Observed classes and provided feedback to graduate student instructors. Consulted with instructors, helped them learn and implement effective teaching practices.

Other teaching **Summer 2008** *Co-instructor*, Practice School Division, BITS Pilani, Pilani. Assisted with summer school.

SERVICE & OUTREACH

Editorial Boards **2026-29** Early career advisory board, *Bioconjugate Chemistry*, American Chemical Society

2026-28 Early career advisory board, *Beilstein Journal of Nanotechnology*, Beilstein Institute for the Advancement of Chemical Sciences

Organizing **2026** Session chair and abstract reviewer, physical gene delivery methods, American Society for Cell and Gene Therapy, Boston, MA.

2025 Session organizer and abstract reviewer, non-viral gene delivery vehicles, American Society for Cell and Gene Therapy, New Orleans, LA.

2024 Organizing Committee Member, Society for Biomaterials, Western Conference, Denver, CO.

2024 Session chair, Biomimetic materials, AIChE, San Diego, CA.

2023 Session chair, Graduate student awards in Biomaterials, AIChE, Orlando, FL.

2022 Session chair, Graduate student awards in Biomaterials, AIChE, Phoenix, AZ.

2022 Discussion leader, ACS Polymers in Biology and Medicine, Napa Valley, CA.

Journal reviews ACS Nano, Advanced Materials, JACS, Bioconjugate Chemistry, Macromolecules, RSC Biomaterials Science, RSC Applied Polymers, ACS Engineering Au, Nature Computational Materials, Nature Catalysis, Acta Biomaterialia, Journal of Controlled Release, Biomacromolecules, Soft Matter, ACS AMI, Polymer Chemistry, Journal of Materials Chemistry B, IEEE Transactions on NanoBioscience, ACS Macro Letters, Chemical Science, Advanced Healthcare Materials, ACS Applied Biomaterials, Advanced Functional Materials.

Proposal reviews **National Institutes of Health** Ad hoc reviewer for NIH study sections, May 2023 (Antiviral drugs), November 2023 (Biomaterials special emphasis panel), June 2024 (Innovations in Nanosystems and Nanotechnology or INN), October 2024 (INN), January 2026 (INN)

National Science Foundation December 2022, December 2023, December 2024,

National Science Foundation CBET Interfacial Engineering, May 2022

Los Alamos National Labs, DOE CINT, May 2022-present

Beckman Scholars Program August 2025

Wellcome Trust India Alliance Fellowships (co-sponsored by Department of Biotechnology, Government of India) June 2026

Conference reviews **AI for Accelerated Materials Design, NeurIPS**, 2023, 2024
American Society for Cell and Gene Therapy, 2025, 2026

K-12 outreach **High school** I lead outreach activities at Arvada West High School throughout the academic year in partnership with 2 high school teachers. My lab members and I offer hands-on polymer chemistry lab experiences for 120 students across 5 sections. See lab website for more details.

Middle school I also judge pre-college science poster competitions (Rocky MESA) and participate in summer camps that engage middle school students.

Broadening participation **Diversity, Equity, & Inclusion committee member**, Department of Chemistry, University of Minnesota, Twin Cities. Working group for training graduate students on inclusive teaching, cultural sensitivity, and DEI issues.

PhD committees Samantha Siska (Chemical Engineering), Zoe Taylor Adkins (Chemical Engineering), Zachary Sparks (Chemical Engineering), Salvatore Luciano (Chemistry), Lindsey Wadsworth (Chemical Engineering), Christine El Hirani (Quantitative Biosciences & Engineering), Tariq Shereef (Chemical Engineering), Elise Collins (Chemical Engineering), Nicole Wills (Chemistry).

Committees at Mines **University-level Graduate Council** Fall 2026 and Spring 2027

Selection committee Goldwater scholarships, 2023, 2024, 2025.

Graduate affairs committee member, Department of Chemical and Biological Engineering, 2022-present

Judging **Judge** Graduate Research and Discovery Symposium, 2022, 2024, 2025

Judge Undergraduate Research Symposium, 2025

Selection Committee, Panel to evaluate nominations for biannual travel awards instituted by the Postdoctoral Association, University of Minnesota, Twin Cities. (2019-2021)

Selection Committee, Serving on the selection panel to evaluate nominations for teaching awards presented by the College of Engineering, University of Michigan, Ann Arbor. (2017-2021)

Other service **Panelist** Applying for and attending graduate school, Quantitative Biosciences and Engineering, Colorado School of Mines (Spring 2025)

Panelist Postdoc panel for faculty careers, University of Colorado, Boulder (Jul 2023)

Volunteer, Xplore Engineering: Engineering a Cure for Cancer workshop. An annual outreach activity to help middle school students learn how my lab was using engineering to understand cancer and find treatments. (2014-2018)

Volunteer. Researchers Expanding Lay Audience Teaching & Engagement (RELATE), Ann Arbor.

Underwent 3 month-long training and obtained certification in advanced oral communication.

Recorded short videos and delivered interactive presentations for community engagement events. (May-Oct 2016)

Mentor, Lunch & Lab with a grad student, College of Engineering, University of Michigan, Ann Arbor.

Help sophomore/junior students to prepare for graduate school admissions.

Lab tours and long conversations about life in grad school with three students. (May 2014 to Aug 2016)

INVITED TALKS

CU Denver **April 2026** “Elucidating structure–function relationships in polymer-mediated gene delivery via light scattering and causal machine learning”, Nanomedicine Symposium, Skaggs School of Pharmacy, University of Colorado, Denver (Anschutz campus), CO

CU Denver **Dec 2025** “Tuning gradient steepness in copolymers augments intracellular pDNA Delivery”, Department Seminar, Biomedical Engineering, University of Colorado, Denver (Anschutz campus), CO

USM Poly **Sep 2025** “Tuning gradient steepness in copolymers augments intracellular pDNA Delivery”, Department Seminar, Polymer Science and Engineering, University of Southern Mississippi, MS

Mines QBE **Apr 2025** “Tuning gradient steepness in copolymers augments intracellular pDNA Delivery”, Department Seminar, Quantitative Biosciences and Engineering, Colorado School of Mines, Golden, CO

- U Vermont Chemistry **Nov 2024** “Tuning gradient steepness in copolymers augments intracellular pDNA Delivery”, Department Seminar, Chemistry, University of Vermont, Burlington, VT
- Oakland University Biological Sciences **May 2024** “Causal Machine Learning Reveals Payload-Specific Polymer Design Criteria for pDNA and RNP Delivery”, Department Seminar, Biological Sciences, Oakland University, Rochester, MI
- U Arizona Chem E **Nov 2023** “Causal Machine Learning Reveals Payload-Specific Polymer Design Criteria for pDNA and RNP Delivery”, Department Seminar, Chemical & Environmental Engineering, University of Arizona, Tucson, AZ
 “Student’s choice”
- Keystone Symposia **Sep 2023** “Causal Machine Learning Reveals Payload-Specific Polymer Design Criteria for pDNA and RNP Delivery”, Keystone Symposia, Next-Gen Nanomedicine, Irvine, CA
 invited
- Ohio State Chemistry **Jan 2023** “Causal Machine Learning Reveals Payload-Specific Polymer Design Criteria for pDNA and RNP Delivery”, Department Seminar, Chemistry, Ohio State University, Columbus, OH
- ACS **Dec 2022** “Causal Machine Learning Reveals Payload-Specific Polymer Design Criteria for pDNA and RNP Delivery”, ACS Polymers in Biology and Medicine, Napa Valley, CA.
 invited
- Col. State Chem E **Oct 2022** “Causal Machine Learning Reveals Payload-Specific Polymer Design Criteria for pDNA and RNP Delivery”, Department Seminar, Chemical Engineering, Colorado State University, Fort Collins, CO
- Mines Chemistry **Sep 2022** “Causal Machine Learning Reveals Payload-Specific Polymer Design Criteria for pDNA and RNP Delivery”, Department Seminar, Chemistry, Colorado School of Mines, Golden, CO
- nanoDDS **Sep 2022** “Causal Machine Learning Reveals Payload-Specific Polymer Design Criteria for pDNA and RNP Delivery”, nanoDDS, UNC Chapel Hill.
 invited
- IIT Madras **Dec 2021** “Translating Polymeric Vehicles Between Ribonucleoprotein and Plasmid Cargoes: Do the Same Design Rules Apply?”, Bioprocessing India Mini Symposium Series, IIT Madras, India (Virtual).
 Bioprocessing
- Genome Writers Guild **Jul 2021** “Translating Polymeric Vehicles Between Ribonucleoprotein and Plasmid DNA Cargoes: Do the Same Design Rules Apply?”, 2021 Genome Writers Guild, Minneapolis, MN.
 early career honorees
- U Michigan Chem E **Mar 2021** “Directed evolution of polymers through combinatorial design & statistical learning: Applications in gene editing”, Department Seminar, Chemical Engineering, University of Michigan, Ann Arbor, MI.
- IIT Madras **Mar 2021** “Directed evolution of polymers through combinatorial design & statistical learning: Applications in gene editing”, Department Seminar, Biotechnology, Indian Institute of Technology Madras, Chennai, India.
 Biotechnology

U Houston Chem E **Feb 2021** “Directed evolution of polymers through combinatorial design & statistical learning: Applications in gene editing”, Department Seminar, Chemical and Biomolecular Engineering, University of Houston, Houston, TX.

Texas A&M Chem E **Feb 2021** “Directed evolution of polymers through combinatorial design & statistical learning: Applications in gene editing”, Department Seminar, Chemical Engineering, Texas A&M University, College Station, TX.

NJIT Chem E **Nov 2020** “Directed evolution of polymers through combinatorial design & statistical learning: Applications in gene editing”, Department Seminar, Chemical and Materials Engineering, New Jersey Institute of Technology, Newark, NJ.

UMN IPRIME **Apr 2020** “Combinatorial design & high-throughput experimentation accelerate invited discovery of polymers for CRISPR delivery”, Industrial Partnership in Interfacial and Materials Engineering, Minneapolis, MN.

ACS PMSE **Aug 2019** “Polymeric biomaterials via high-throughput experimentation & statistical learning”, 2019 ACS national meeting (Fall), PMSE Future Faculty Scholars, San Diego, CA.

AIChE **Nov 2017** “Sugar-Coating the Answers to Virus Binding: Glycocalyx-Mimetic Interfaces”, 2017 AIChE national meeting, Biomaterials Graduate Student Awards Session, Minneapolis, MN.

CONTRIBUTED TALKS AND POSTERS

Are Structure-Function Relationships Governing Polymeric Gene Delivery Payload-Specific?, **Ramya Kumar**, Ngoc Le, Mary E. Brown, & Theresa M. Reineke, 2021 AIChE national meeting, Boston, MA.

Efficient Intracellular Delivery of CRISPR Payloads Mediated By a Polymeric Vehicle Discovered through Combinatorial Design and High-Throughput Experimentation., **Ramya Kumar**, Ngoc Le, Zhe Tan, & Theresa M. Reineke, 2020 Virtual AIChE national meeting.

Data-Driven Discovery of Polymeric Vehicles for Gene Editing: Serendipity-Inspired Design Directions., **Ramya Kumar**, Ngoc Le, Zhe Tan, & Theresa M. Reineke, 2020 Virtual AIChE national meeting.

Accelerating the Discovery of Polymeric Vehicles for Gene Editing through Combinatorial Synthesis and Statistical Learning., **Ramya Kumar**, Ngoc Le, Zhe Tan, & Theresa M. Reineke, 2020 Virtual AIChE national meeting.

Polymeric biomaterials via high-throughput experimentation & statistical learning., **Ramya Kumar**, Ngoc Le, Zhe Tan, & Theresa M. Reineke, 2019 AIChE national meeting, Orlando, FL.

Substrate-independent micropatterning of polymer brushes using chemical vapor deposition-based polymerization initiator films., **Ramya Kumar**, Alexander Welle, Fabian Becker, Irina Kopyeva & Joerg Lahann, 2019 ACS national meeting (Fall), San Diego, CA.

Glycocalyx-mimetic interfaces: Sugar-coating the answers to virus binding., **Ramya Kumar**, Domenic Kratzer, Kenneth Cheng, Irina Kopyeva & Joerg Lahann, 2017 ACS national meeting (Spring), San Francisco, CA.

Glycocalyx-mimetic interfaces with tunable protein and virus adsorption characteristics., **Ramya Kumar**, Domenic Kratzer, Kenneth Cheng, Julia Prisby, Kai Liu & Joerg Lahann, 2016 Chemical Engineering Graduate Symposium, University of Michigan, Ann Arbor, MI.

Glycocalyx-mimetic interfaces with tunable protein and particulate adsorption characteristics., **Ramya Kumar**, Kenneth Cheng, Julia Prisby, Kai Liu & Joerg Lahann, 2016 ACS national meeting (Spring), San Diego, CA.

Glycocalyx-Mimetic Surfaces with Tunable Surface Charge– Synthesis, Electrokinetic Investigation and Adsorption Studies., **Ramya Kumar**, Kenneth Cheng, Julia Prisby, Kai Liu & Joerg Lahann, 2015 MRS Fall meeting, Boston, MA.

A Predictive Model for the Design of Polymer Brushes for hESC Culture: A Statistical Design of Experiments Approach., **Ramya Kumar**, Tristan Brohm & Joerg Lahann, 2015 AIChE annual meeting, Salt Lake City, UT.

RESEARCH HIGHLIGHTS

[Chemical and biological engineering faculty win NIH grants for early career investigators](#) , Mines press release.

[4 Mines students named National Science Foundation Graduate Research Fellows](#), Mines press release.

[Two from Mines Named 2025 Goldwater Scholars](#), Mines press release.

[FIRST program gives first-year students direct research experience](#), Mines press release.

[Ramya Kumar wins NSF CAREER Award for research on genome editor delivery](#), Mines press release.

Mines grad students named National Science Foundation Graduate Research Fellows, Mines press release.

Machine learning makes magnificent macromolecules for medicine, paper from postdoctoral training highlighted in *Matter*.

The Quest to Design Better Experiments, special feature on PhD work in *BioTechniques*.

Why Viruses Stick: Sugar Coating the Answer, filmed as a part of RELATE 2016.

Selected to record a short video at the 2016 ACS national meeting (Spring).

PATENTS

Provisional patent **2025**. Sulfonated polymer brush substrates for mesenchymal stem cell engineering. In prep.

Patents Pre-Mines **2023** Copolymers for Intracellular Therapeutic Nucleic Acid Payload Delivery. US Patent App. 18/000,258.

2013 Crystalline form of Retigabine and processes for mixture of Retigabine crystalline modifications United States Patent WO/2013/008250 A2.

2012 Preparation Of Crystalline Bazedoxifene And Its Salts, United States Patent WO/2012/037187.

OTHER WORK EXPERIENCE

Process engineer **2009-12** Dr. Reddy's Labs, Hyderabad, India. Worked at the R&D center of a major pharmaceutical company for 3 years before PhD. Contributed to crystal polymorph screening & development, scale-up, and technology transfer.

Research analyst **2009** LatentView Analytics, Chennai, India. Worked on competitive intelligence, market estimation and product analysis for a biomedical device client during 6-month internship.

OTHER INTERESTS

Long-distance running (primarily half-marathons, only marathon was Grandma's 2019), reading literary fiction and science fiction, and baking naturally fermented bread.