

Curriculum Vitae

EDUCATION AND RESEARCH EXPERIENCE

University of California , Berkeley, CA Ph.D., Organic Chemistry, Advisor: Matthew Francis Thesis: New Methods for the Chemical Modification of Proteins and Strategies for Their Purification	2001-2006
Harvey Mudd College , Claremont, CA B.S., Chemistry (ACS Certified)	1997-2001

PROFESSIONAL APPOINTMENTS

Northeastern University , Boston, MA Associate Professor of Chemistry and Chemical Biology	2020-present
Harvard University , Cambridge, MA Associate Professor of Chemical and Biological Engineering Assistant Professor of Chemical and Biological Engineering	2014-2020 2010-2013
Wyss Institute for Biologically Inspired Engineering at Harvard , Boston, MA Visiting Scholar Core Faculty Member	2020-present 2010-2020
Boston University , Boston, MA Postdoctoral Fellow, Advisor: Mark W. Grinstaff	2006-2009

HONORS AND AWARDS

February 2020	NSF Idea Machine 2026 Winner
December 2016	Kavli Fellow
June 2015	Blavatnik Biomedical Accelerator Pilot Grant Awardee
July 2011	Harvard Materials Research Science and Engineering Center (MRSEC) Seed Grant Awardee
December 2010	Harvard Milton Fund Awardee
September 2004	Klaus and Mary Saegebarth Fellowship (UCB Departmental Honor)

PROFESSIONAL SERVICE

- 2010 - present Lawrence Berkeley National Lab, Molecular Foundry User Program Review Board
- May 2016 Symposium Organizer: "Biomaterials Design via Synthetic Biology" *World Biomaterials Congress 2016 Meeting*
- October 2014 Judge: bioMOD competition (Cambridge, MA)

Journal Reviews: ACS Applied Materials and Interfaces, ACS Nano, Advanced Healthcare Materials, Advanced Materials, Bioconjugate Chemistry, Biomacromolecules, Bioresource Technology, ChemBioChem, Journal of the American Chemical Society, Langmuir, Macromolecular Chemistry and Physics, Nanoscale, Nature Communications, Proceedings of the National Academy of Sciences, Scientific Reports, Soft Matter

Grant Reviews: National Institutes of Health (PCMB section), National Science Foundation (BMAT program), U.S. Israeli Binational Science Foundation, Singapore National Research Foundation

Member: AAAS, ACS, MRS, BMES

Guest Associate Editor: Frontiers in Bioengineering and Biotechnology

UNIVERSITY ACTIVITIES

Teaching

At Northeastern:

CHEM 4621 Introduction to Chemical Biology (Fall 2020)

At Harvard:

BE121/ES222 Cellular Engineering (Spring 2010 and 2011, Fall 2011-2017)

→ Formerly called ES122

ES228 Bioinspired Materials (Spring 2012, 2013, 2015, 2017)

BE191 Introduction to Biomaterials (Spring 2016, 2018)

Mentoring

Freshman Advising, Faculty Advisor for Harvard iGEM program, Faculty Advisor for Harvard BioDesign Program

PhD Thesis advising

Daniel Rubin, 2010-2015 (Now at Takeda)

Zsofia Botyanszki, 2010-2016 (Now at Ginkgo Bioworks)

Rajiv Desai, 2011-2016 (Now at LEK Consulting)

Pei Kun Richie Tay, 2012-2017 (Now at Singapore Nat'l Labs)

Pichet Praveschotinunt, 2013-2019 (Now at Ginkgo Bioworks)

Iliia Gelfat, 2016-present

Daniel Birnbaum, 2016-present

Postdoctoral Advising

Glenna Meister, 2010-2012 (now Research Scientist at Novartis)

Peter Nguyen, 2010-2014 (now Staff Scientist, Wyss Institute)

Martin Nussbaumer, 2013-2015 (now Research Scientist at Roche Switzerland)

Noémie-Manuelle Dorval Courchesne, 2015-2017 (now Assistant Professor at McGill University, Canada)

Miguel Suástegui, 2017-2018 (now Research Scientist at Joyn Bio)

Junling Guo, 2017-2019 (Now Professor at Sichuan University)
Anton Kan, 2017-2019 (Now Postdoc at ETH)
Anna Duraj-Thatte, 2015-present
M. B. Avinash, 2017-present

Masters Thesis Advising

Thuur van Onzen, 2011 (Eindhoven University of Technology)
Ajay Parmar, 2014 (Loughborough University, UK)
Dionis Minev, 2015 (Technical University of Munich)
Chaochen Lu, 2016 (Ludwig Maximilian University of Munich)
Ilona de Hartog, 2017 (Eindhoven University of Technology)
Arjirios Sourlis, 2017 (ETH, Zurich)
Verena Volf, 2017 (Technical University of Denmark)
Giorgia Cannici, 2017-2018 (Harvard ALM)

Supervised Undergraduate Thesis Advising

Or Gadish, 2011 (ES100)
Trevor Nash, 2015 (BME)
Fred Ward, 2015 (Chemistry and Chemical Biology)
Franziska Bahl, 2017 (University of Freiburg)
Jackson Stansell, 2018 (ES100)
Kevin Shani, 2018 (ES100)

Service and Committees

Interim Director of Undergraduate Studies, SEAS Bioengineering (2011)
Harvard SEAS Thomas McMahon Lectureship and Bioengineering Expo (2011-2013)
Admissions Committee (2011-2014)
Faculty Search Committee, Polymer Chemistry/ChemE (2014-2015)
Harvard Amgen Scholars Program, Selection Committee (2015)
Committee on Higher Degrees (2015-present)

PATENTS

- 1) Nguyen, PQ; Botanszki, Z; Joshi, NS; **2014** "Genetic Reprogramming of Bacterial Biofilms" WO 2014/176311, Filed April 23, 2014, Issued November 14, 2017.
- 2) Joshi, NS; Rubin, DJ; **2014** "D-, L-Cyclic peptide nanotube reinforcing agents" U.S. Patent 0,369,954, Filed May 27, 2014, Issued June 20, 2017.
- 3) **Joshi, NS**; Dorval Courchesne, NM; "Electrically Conductive Protein Nanofibers and Biofilms" (Filed 05/27/2016, WO2017087786A1, Status: Pending).
- 4) Brudno, Y; Kearny, CJ; Silva, E; Aizenberg, M; Kwee, B; Desai, R; **Joshi, NS**; Mooney, DJ "Refillable Drug Delivery Devices and Use Thereof" (Filed 04/04/2014, EP3153155A1, Status: Pending).

PEER-REVIEWED PUBLICATIONS

- 1) Praveschotinunt, P; Duraj-Thatte, A; Gelfat, I; Bahl, F; Chou, DB; **Joshi, NS** "Probiotic Associated Therapeutic Curli Hybrids (PATCH)" *Nature Communications* 2019 10:5580. doi:10.1038/s41467-019-13336-6.
- 2) Duraj-Thatte, A; Dorval Courchesne, NM; Praveschotinunt, P; Rutledge, J; Lee, Y; Karp, JM; **Joshi, NS** "Genetically Programmable Self-Regenerating Bacterial Hydrogels" *Advanced Materials* 2019 doi:10.1002/adma.201901826.
- 3) Kan, A; **Joshi, NS** "Towards the directed evolution of protein materials" *MRS Communications* 2019, 9(2), 1-15. doi:10.1557/mrc.2019.28
- 4) Kan, A; Birnbaum, D; **Joshi, NS** "Characterization of synthetic curli production using Congo Red fluorescence" *Applied and Environmental Microbiology* 2019 doi:10.1128/AEM.00434-19.
- 5) Guo, J; Suástegui, M; Sakimoto, KK; Moody, V; Nocera, DG; Xiao, G; **Joshi, NS** "Light-Driven Fine Chemical Production in Yeast Biohybrids" *Science* 2018 362(6146) 813-16.
- 6) Dorval Courchesne, NM; DeBenedictis, EP; Tresback, J; Kim, JJ; Zanuy, D; Keten, S; **Joshi, NS** "Biomimetic Engineering of Conductive Curli Protein Films" *Nanotechnology* 2018 29, 454002.
- 7) Tay, PKR; MB Avinash; **Joshi, NS** "Repurposing Bacterial Extracellular Matrix for Selective and Differential Abstraction of Rare Earth Elements" *Green Chemistry* 2018, 20, 3512-3520.
- 8) Praveschotinunt, P; Dorval Courchesne, NM; den Hartog, I; Lu, C; Kim, JJ; **Joshi, NS** "Tracking of Engineered Bacteria In Vivo with Non-Standard Amino Acid Incorporation" *ACS SynBio* 2018, 7(6), 1640-50.
- 9) Axpe, E; Duraj-Thatte, A; Chang, Y; Kaimaki, DM; Sanchez-Sanchez, A; Caliskan, HB; Dorval-Courchesne, NM; **Joshi, NS** "Fabrication of Amyloid Curli Fibers-Alginate Nanocomposite Hydrogels with Enhanced Stiffness" *ACS Biomaterials Science and Engineering* 2018, 4, 2100-2105.
- 10) Xiao, G; Chen, W; Fan, T; Richardson, JJ; Tardy, BL; Liu M; **Joshi, NS**; Guo, J. "Thermal Transition of Bimetallic Metal-Phenolic Networks to Biomass-Derived Hierarchically Porous Nanofibers" *Chemistry – An Asian Journal*, 2018 13(8), 972-976.
- 11) Duraj-Thatte, A; Praveschotinunt, P; Nash, TR; Ward, FR; **Joshi, NS** "Modulating Bacterial and Gut Mucosal Interactions with Engineered Biofilm Matrix Proteins" *Scientific Reports*, 2018, 8, 3475.
- 12) Nguyen, PQ; Dorval Courchesne, N-M.; Duraj-Thatte, A; Praveschotinunt, P; **Joshi, NS** "Engineered Living Materials: Prospects and Challenges for Using Biological Systems to Direct the Assembly of Smart Materials" *Advanced Materials* 2018, 30(19), 1704874 (Invited Review).
- 13) Tay, PKR; Nguyen, PQ; Joshi, NS "A Synthetic Circuit for Mercury Bioremediation Using Self-Assembling Functional Amyloids" *ACS SynBio* 2017, 6(10), 1841-1850.
- 14) Nussbaumer, MG; Nguyen, PQ; Tay, PKR; Naydich, A; Hysi, E; Botyanszki, Z; **Joshi, NS** "Engineered curli fiber materials as reversibly functionalizable multi-enzyme surfaces" *ChemCatChem* 2017, 9, 1-7.

- 15) Dorval Courchesne, NM; Duraj-Thatte, A; Tay, PKR; Nguyen, PQ; **Joshi, NS** “Scalable Production of Genetically Engineered Nanofibrous Macroscopic Materials via Filtration” *ACS Biomaterials Science and Engineering* 2017, 3(5), 733-741.
- 16) Pardee, K; Slomovic, S, Nguyen, PQ; Lee, JW; Donghia, N; Burrill, D; Ferrante, T; McSorley, F; Furuta, Y; Vernet, A; Lewandowski, M; Boddy, CN; **Joshi, NS**; Collins, JJ “Portable, On-Demand Biomolecular Manufacturing” *Cell* 2016 167(1) 248-259.
- 17) Koshy, ST; Desai, RM; Joly, P; Li, J; Bagrodia, RK; Lewin, SA; **Joshi, NS**; Mooney DJ “Click-Crosslinked Injectable Gelatin Hydrogels” *Advanced Healthcare Materials* 2016, 5 541-547.
- 18) MacKellar, D; Lieber, L; Norman, JS; Bolger, A; Tobin, C; Murray, JW; Oksaksin, M; Chang, RL; Ford, TJ; Nguyen, PQ; Woodward, J; Permingeat, HR; **Joshi, NS**; Silver, PA; Usadel, B; Rutherford, AW; Friesen, ML; Prell, J “*Streptomyces thermoautotrophicus* does not fix nitrogen” *Scientific Reports* 2015, 6, 20086.
- 19) Botyanszki, Z; Tay, PK; Nguyen, PQ; **Joshi, NS** “Engineered Catalytic Biofilms: Site-Specific Enzyme Immobilization onto *E. coli* Curli Nanofibers” *Biotechnology and Bioengineering*, 2015 112(10), 2016-2024.
- 20) Brudno, Y; Desai, RD; Kwee, BJ; **Joshi, NS**; Aizenberg, M, Mooney, DJ “In Vivo Targeting Through Click Chemistry” *ChemMedChem* 2015, 10(4) 617-620.
- 21) Rubin, DJ; Amini, S; Zhou, F; Su, H; Miserez, A; **Joshi, NS**. “Structural, nanomechanical, and computational characterization of D,L-Cyclic Peptide Assemblies” *ACS Nano* 2015, 9(3), 3360-68.
- 22) Desai, RD; Koshy, ST; Hildebrand, SA; Mooney, DJ; **Joshi, NS** “Versatile click alginate hydrogels crosslinked via tetrazine–norbornene chemistry.” *Biomaterials*, 2015, 50 30-37.
- 23) Nguyen, PQ; Botyanszki, Z; Tay, PK; **Joshi, NS** “Programmable Biofilm-Based Materials from Engineered Curli Nanofibers” *Nature Communications*, 2014, 5, 4959.
- 24) Rubin, DJ; Nia, HT; Desire, T; Nguyen, PQ, Gevelber, M; Ortiz, C; **Joshi, NS** “Mechanical Reinforcement of Polymeric Fibers through Peptide Nanotube Incorporation” *Biomacromolecules*, 2013, 14(10), 3370-3375.
- 25) Meister, GE; **Joshi, NS** “An Engineered Calmodulin-Based Allosteric Switch for Peptide Biosensing” *ChemBioChem*, 2013, 14(12), 1460-1467.
- 26) **Joshi, NS**; Bansal, PN; Stewart, RC; Snyder BD; Grinstaff, MW “Cationic contrast agents improve quantification of glycosaminoglycan (GAG) content by Contrast Enhanced CT imaging of cartilage.” *Journal of Orthopedic Research* 2011 29(5) 704-709. PMID: 21184496
- 27) Bansal, PN; **Joshi, NS**; Entezari, V; Grinstaff, MW; Snyder, BD “Contrast Enhanced Computed Tomography Can Predict the Glycosaminoglycan Content and Biomechanical Properties of Articular Cartilage.” *Osteoarthritis and Cartilage* 2010, 18(2): 184-191. PMID: 19815108
- 28) **Joshi, NS**; Bansal, PN; Stewart, RC; Snyder, BD; Grinstaff, BW “Effect of Contrast Agent Charge on Visualization of Articular Cartilage Using Computed Tomography: Exploiting Electrostatic Interactions for Improved Sensitivity.” *Journal of the American Chemical Society* 2009, 131(37): 13234-5. PMID: 19754183

- 29) Degoricija, LV; Bansal, PN; Sontjens, SHM; **Joshi, NS**; Takahashi, M; Snyder, BD; Grinstaff, MW "Hydrogels for Osteochondral Repair Based on Photocrosslinkable Carbamate Dendrimers." *Biomacromolecules* 2008, 9(10): 2863-2872. PMID: 18800810
- 30) McFarland, JM; **Joshi, NS**; Francis, MB "Characterization of a Three-Component Coupling Reaction on Proteins by Isotopic Labeling and Nuclear Magnetic Spectroscopy." *Journal of the American Chemical Society* 2008, 130(24), 7639-7644. PMID: 18498164
- 31) **Joshi, NS**; Grinstaff, MW "Applications of Dendrimers in Tissue Engineering." *Current Topics in Medicinal Chemistry* 2008 8(14) 1225-1236.
- 32) Gilmore, JM; Scheck, RA; Esser-Kahn, AP; **Joshi, NS**; Francis, MB "N-Terminal Protein Modification Through a Biomimetic Transamination Reaction." *Angewandte Chemie International Edition*, 2006, 45(32), 5307-5311. PMID: 16847857
- 33) Nguyen, T; **Joshi, NS**; Francis, MB "An Affinity-Based Method for the Purification of Fluorescently-Labeled Biomolecules." *Bioconjugate Chemistry* 2006, 17(4), 869-872. PMID: 16848391
- 34) **Joshi, NS**; Whitaker, LR; Francis, MB "A Three Component Mannich-Type Reaction for Selective Tyrosine Bioconjugation." *Journal of the American Chemical Society* 2004, 126(49), 15942-15943. PMID: 15584710
- 35) Van Ryswyk, H; Moore, EE; **Joshi, NS**; Zeni, RJ; Eberspacher, TA; Collman, JP "Surface-Confining Metalloporphyrin Oligomers." *Angewandte Chemie International Edition* 2004, 43(43), 5827-5830. PMID: 15523726
- 36) Tilley, SD; **Joshi, NS**; Francis, MB "The Chemistry and Chemical Reactivity of Proteins." *Wiley Encyclopedia of Chemical Biology*, Ed. Tadhg P. Begley. Wiley-VCH.

BOOK CHAPTERS

Engineering Living Materials: Designing Biological Cells as Nanomaterials Factories

21ST CENTURY NANOSCIENCE: A Handbook. Editor, Klaus D. Sattler, Ph.D.

Peter Q. Nguyen, Pichet Praveschotinunt, Avinash Manjula-Basavanna, Ilia Gelfat, and Neel S. Joshi

INVITED TALKS

March 2020	ACS Spring National Meeting, Symposium on Engineering Functionality into Biomimetic Polymers
March 2020	Stanford University Materials Science and Engineering (student invited)
February 2020	Living Materials 2020 (Saarbrücken, Germany)
February 2020	University of Minnesota, Chemical Biology Colloquium series
September 2019	CCNY, Chemical Engineering Department Seminar
August 2019	International Conference on Yeast Genetics and Molecular Biology (Sweden)
June 2019	VIB Conference on Applied Microbiology (Belgium)
February 2019	Washington Univ. St. Louis, Chemical Engineering Department Seminar

December 2018	University of Michigan, Chemical Engineering Department Seminar
October 2018	Johns Hopkins University, Chemistry Department Seminar
October 2018	UCLA, Bioengineering Department Seminar
October 2018	UCSD, Nanoengineering Department Seminar
October 2018	UC Irvine, Bioengineering Department Seminar
September 2018	Northeastern, Bioengineering Department Seminar
June 2018	GRC Bio-inspired Materials (Switzerland)
May 2018	L'Oreal Scientific Advisory Board Meeting, Boston, MA
May 2018	California Institute of Technology, Chemical Engineering Departmental Seminar, Pasadena, CA
March 2018	Columbia University, Bioengineering Departmental Seminar, New York, NY
February 2018	University of California, Santa Barbara, Biomolecular Science and Engineering Departmental Seminar
January 2018	University of Delaware, Biotechnology Institute Seminar
October 2017	Max Plank Institute on Colloids and Interfaces, Potsdam, Germany
October 2017	ETH, Zurich, Switzerland
October 2017	Bayreuth University, Bayreuth, Germany
October 2017	Third Infinity Conference, October 2017, Göttingen, Germany (student sponsored conference at Max Plank Institute for Complex Systems)
September 2017	Boston University, Chemistry Department Seminar
July 2017	University of Colorado Boulder, Bioengineering Departmental Seminar
July 2017	DOE Workshop on Cell-Free Synthetic Biology
July 2017	Micro- and Nanomedicine for Medicine Conference, Cambridge, MA
June 2017	Harvard Alumni Association, Outreach Seminar, Cambridge, MA
May 2017	University of California, Berkeley, Bioengineering Departmental Seminar
December 2016	Kavli Frontiers of Science Annual Symposium
November 2016	Northwestern University, Frontiers in Nanotechnology Seminar Series, student Invited
November 2016	University of Chicago – Institute of Molecular Engineering Seminar Series
November 2016	Squishy Physics Seminar, Harvard SEAS
May 2016	World Biomaterials Congress, Symposium on “Synthetic biology Design in Materials”
July 2016	Micro- and Nanomedicine for Medicine Conference, Cambridge, MA
March 2016	Materials Research Society, Annual Spring Meeting, Symposium: “Future Healthcare Needs Through Biomaterials, Bioengineering, and the Cellular Building Block”, Phoenix, AZ
January 2016	Harvard School of Public Health, Immunology Departmental Seminar
October 2015	University of California, Irvine. Chemistry Departmental Seminar

June 2015	FASEB Special Topics Meeting on Protein Aggregation
May 2015	Aalto University, Conference on Molecular Engineering of Biosynthetic Materials, Helsinki, Finland
March 2015	Worcester Polytechnic Institute. Biomedical Engineering Seminar
December 2014	BIOFABRICATE Summit (NY)
August 2014	Army Research Lab, Invited Talk, Aberdeen, MD
August 2014	Air Force Research Lab, Invited Talk, Dayton, OH
July 2014	Micro- and Nanomedicine for Medicine Conference, Cambridge, MA
March 2014	Georgia Tech University – Biomedical Engineering Departmental Seminar
March 2014	Emory University – Chemistry Departmental Seminar
January 2014	Harvard Graduate School of Design. Ideation Workshop Series
October 2013	Harvard University – Topics in Bioengineering
September 2013	ACS National Meeting (Indianapolis, IN) Symposium on Biohybrids
April 2013	Massachusetts Institute of Technology, Synthetic Biology Group Seminar
July 2013	International Conference for Young Researchers on Advanced Materials (Singapore)
September 2012	ACS National Meeting (Philadelphia, PA) – Innovative Research for Health and Medicine: Global Perspective on Chemistry
July 2012	International Conference on Materials, Energy and Environment (Toledo, OH)
June 2012	Gordon Research Conference: Bio-inspired Materials (Charlotte, NC)
April 2012	Army Research Office: Workshop on Synthetic Molecular Materials
April 2010	University of Massachusetts, Dartmouth – Chemistry Departmental Seminar
April 2010	University of Massachusetts, Lowell – Chemistry Departmental Seminar
August 2010	International Cartilage Repair Society Annual Meeting (Boston, MA)
August 2008	Annual Meeting of the Pediatric Orthopedic Society of North America (Albuquerque, NM)