Ahmad (Mo) Khalil, PhD

Hok Lam and Kathleen Kam Wong Professor of Bioengineering
Professor of Molecular and Cellular Biology
Harvard University
Broad Institute & Wyss Institute for Biologically Inspired Engineering
Email: mokhalil@seas.harvard.edu; mokhalil@broadinstitute.org Lab: https://khalillab.github.io/

Education

2009 PhD, Mechanical Engineering, MIT (Advisor: Dr. Angela M. Belcher)
2004 MSc, Mechanical Engineering, MIT (Advisor: Dr. Roger D. Kamm)
2002 BSc, Mechanical Engineering (Chemistry Minor), Stanford University

Postdoctoral Training

2008–11 HHMI Postdoctoral Fellow, Boston University (Advisor: Dr. James J. Collins)

Professional Experience

2025– Hok Lam and Kathleen Kam Wong Professor of Bioengineering, Harvard University
2025– Professor of Molecular and Cellular Biology, Harvard University
2025– Associate Member, Broad Institute of MIT and Harvard
2025– Associate Faculty, Wyss Institute for Biologically Inspired Engineering
2025– Research Professor, Department of Biomedical Engineering, Boston University
2023–2025 Professor, Department of Biomedical Engineering, Boston University
2019–2023 Associate Professor, Department of Biomedical Engineering, Boston University
2019–2025 Co-Director, Synthetic Biology & Biotechnology (SB2) NIH/NIGMS T32 PhD Training Program
2015–2025 Associate Director and Founding Member, Biological Design Center, Boston University
2014–2025 Visiting Scholar, Wyss Institute for Biologically Inspired Engineering, Harvard University
2012–2018 Assistant Professor, Department of Biomedical Engineering, Boston University
2012–2025 Faculty, Molecular Biology, Cell Biology & Biochemistry Program, Boston University
Faculty, Bioinformatics Program, Boston University

Extramural Appointments

2025– Scientific Advisory Board, nChroma Bio, Inc.
2024– Co-Founder and Board Member, Eira Bio, Inc.
2022–2025 Scientific Advisory Board, Kytopen Corp.
2021–2022 Consultant, Novartis Institutes for BioMedical Research, Inc.
2020–2025 Scientific Advisory Board, Chroma Medicine, Inc.
2018– Co-Founder and Board Member, Fynch Bio, Inc.
2018–2024 Scientific Advisory Board, Senti Biosciences, Inc.
2018–2019 Consultant, Merck & Co., Inc.
2017–2019 Scientific Advisor, Sigilon Therapeutics, Inc.

Awards & Honors (selected)

2025 Kuwait Prize, Kuwait Foundation for the Advancement of Sciences (KFAS)
2025 Hok Lam and Kathleen Kam Wong Professorship, Harvard University
2023 Outstanding Professor of the Year, College of Engineering, Boston University
2023 Award for Teaching Excellence, Biomedical Engineering Dept., Boston University
2022 Schmidt Science Polymath Award
2022 W. M. Keck Foundation Medical Research Award
2021 AIMBE College of Fellows
2020 DoD Vannevar Bush Faculty Fellowship (VBFF)
2019 Dorf-Ebner Distinguished Faculty Fellow
2018 National Academy of Engineering (NAE) Frontiers of Engineering Invitee
2017 Presidential Early Career Award for Scientists and Engineers (PECASE)

2017 Boston University Early Career Research Excellence Award
2016 NIH New Innovator Award
2016 DARPA Young Faculty Award
2016 Outstanding Professor of the Year, College of Engineering, Boston University
2016 Award for Teaching Excellence, Biomedical Engineering Dept., Boston University
2015 Hartwell Foundation Individual Biomedical Research Award (Hartwell Investigator)
2015 Award for Teaching Excellence, Biomedical Engineering Dept., Boston University
2014 National Academy of Engineering (NAE) Frontiers of Engineering Education Invitee
2014 NSF CAREER Award
2013–2016 Innovation Career Development Professorship, Boston University
2013 Award for Teaching Excellence, Biomedical Engineering Dept., Boston University
2013 Institut Mérieux Research Grant Award
2012 Wallace H. Coulter Foundation Translational Research Partnership Award
2005 Charles Stark Draper Laboratory Graduate Fellowship, MIT
2002 Graduated with Distinction, Stanford University
2002 Phi Beta Kappa Liberal Arts & Sciences Honors Society, Stanford University
2002 Tau Beta Pi Engineering Honors Society, Stanford University

Publications (*equal, † co-corresponding)

1. Shaw, W.M., Gajendiran, A., Tchantouridze, E.I., Bechen, L.L., Clarke, S.G., Guiziou, S., Gehring, M.†, **Khalil, A.S.†** Rational design of T-DNA vectors enables predictable, single-copy integration in *Arabidopsis thaliana*. ***bioRxiv***, 10.64898/2026.06.08.730999 (2026).

2. Klumpe, H., Loshinsky, S., Hart, D., Tong, K., Dunlop, M.J., **Khalil, A.S.** Synthetic cell-cell adhesion provides benefits of proximity without diffusion-related costs. ***bioRxiv***, 10.64898/2026.05.28.7284662 (2026).

3. Gagnon, K.A., Hui, V.W., Ching, T., Stoddard, A.E., Koh, E., Eyckmans, J., **Khalil, A.S.†**, Chen, C.S.† Oncogenic alterations in PI3K signaling emulated optogenetically recapitulate some phenotypic changes in mammary epithelia. ***ACS Synthetic Biology***, doi: 10.1021/acssynbio.5c00651 (2026). PMCID: PMC13022691.

4. Hoyt, K.O., Zhou, G., Gasparrini, W., Sliter, P.J., Hart, D.J., **Khalil, A.S.**, Woolston, B.M. Exploring substrate cofeeding for enhanced acetogenic C1 bioconversion with AneVO, a low-cost anaerobic parallel bioreactor platform. ***Trends Biotechnology***, S0167-7799(25)00484-6 (2025). PMCID: PMC12758629.

5. Tong, K., Datta, S., Cheng, V., Haas, D.J., Gourisetti, S., Yopp, H.L., Day, T.C., Lac, D.T., **Khalil, A.S.**, Conlin, P.L., Bozdag, G.O., Ratcliff, W.C. Genome duplication in a long-term multicellularity evolution experiment. ***Nature***, 639: 691-699 (2025). PMCID: PMC12256070
   - ***Journal Cover***

6. Tycko, J.*, Van, M.V.*, Aradhana, DelRosso, N., Ye, H., Yao, D., Valbuena, R., Vaughan-Jackson, A., Xu, X., Ludwig, C., Spees, K., Liu, K., Gu, M., Khare, V., Mukund, A.X., Suzuki, P.H., Arana, S., Zhang, C., Du, P.P., Ornstein, T.S., Hess, G.T., Kamber, R.A., Qi, L.S., **Khalil, A.S.**, Bintu, L., Bassik, M.C. Development of compact transcriptional effectors using high-throughput measurements in diverse contexts. ***Nature Biotechnology***, 43: 1525-1538 (2025). PMCID: PMC12043968 [*Preprint*: 10.1101/2023.05.12.540558]

7. Larkin, A.*, Kunze, C.*, Seman, M., Levashkevich, A., Curran, J., **Khalil, A.S.**†, Ragunathan, K.† Mapping the dynamics of epigenetic adaptation in S. pombe during heterochromatin misregulation. ***Developmental Cell*****,** 59: 2222-2238 (2024). PMCID: PMC11338711 [*Preprint*: 10.1101/2023.07.10.548368]

8. Neumann, E.N.*, Bertozzi, T.M.*, Wu, E., Serack, F., Harvey, J.W., Brauer, P.P., Pirtle, C.P., Coffey, A., Howard, M., Kamath, N., Lenz, K., Guzman, K., Raymond, M.H., **Khalil, A.S.**, Deverman, B.E., Minikel, E.V., Vallabh, S.M., Weissman, J.S. Brainwide silencing of prion protein by AAV-mediated

delivery of an engineered compact epigenetic editor. ***Science***, 384: ado7082 (2024). PMCID: PMC11875203

- *News:* Conroy G. 'Epigenome editor' silences gene that causes deadline brain disorders. *Nature* (27 June 2024).
- *Perspective:* Whittaker M. and Musunuru K. An epigenetic editor to silence genes. *Science*, 384 (2024).
- *Research Highlights:* Minton K. Epigenetic editing works like a CHARM. *Nature Reviews Genetics*, 25 (2024).
- *News:* Epigenetic editor CHARMs prion disease. *Genetic Engineering & Biotechnology News* (28 June 2024).

9. Guo, Z., Chiesa, G., Yin, J., Sanford, A., Meier, S., **Khalil, A.S.**, Cheng, J.-X. Structural mapping of protein aggregates in live cells modeling Huntington's disease. ***Angewandte Chemie***, e202408163 (2024). PMCID: PMC11781839 [*Preprint*: 10.1101/2023.10.09.561223]

10. D'Amato, R., Taxiarchi, C., Galardini, M., Trusso, A., Minuz, R.L., Grilli, S., Somerville, A.G.T., Shittu, D., **Khalil, A.S.**, Galizi, R., Crisanti, A., Simoni, A., Müller, R. Anti-CRISPR Anopheles mosquitoes inhibit gene drive spread under challenging behavioural conditions in large cages. ***Nature Communications***, 15: 952 (2024). PMCID: PMC10830555

11. Shaw, W.M., **Khalil, A.S.,** Ellis, T. A multiplex MoClo toolkit for extensive and flexible engineering of Saccharomyces cerevisiae. ***ACS Synthetic Biology***, 12: 3393-3405 (2023). PMCID: PMC10661031

12. Bragdon, M.D.J*, Patel, N.*, Chuang, J., Levien, E., Bashor, C.J., **Khalil, A.S.** Cooperative assembly confers regulatory specificity and long-term genetic circuit stability. ***Cell***, 186: 3810-3825 (2023). PMCID: PMC10528910 [*Preprint*: 10.1101/2022.05.22.492993]

13. Klumpe, H.E.*, Lugagne, J-B.*, **Khalil, A.S.**, Dunlop, M.J. Deep neural networks for predicting single cell responses and probabilities landscapes. ***ACS Synthetic Biology***, 12: 2367-2381 (2023). PMCID: PMC11976981 [*Preprint*: 10.1101/2023.06.24.546373]

14. Webber, C.J., Murphy, C.N., Rondón-Ortiz, A.N., van der Spek, S.J.F., Kelly, E.X., Lampl N.M., Chiesa, G., **Khalil, A.S.**, Emili, A., Wolozin, G. Human herpesvirus 8 ORF57 protein is able to reduce TDP-43 pathology: network analysis identifies interacting pathways. ***Human Molecular Genetics***, 32: 2966-2980 (2023). PMCID: PMC10549787 [*Preprint*: 10.1101/2023.05.18.540717]

15. Garcia-Ruano, G,. Jain, A., Heins, Z.J., Wong, B.G., Wolle, E.Y., **Khalil, A.S.**, Coudreuse, D. Long-term evolution of proliferating yeast cells using the eVOLVER platform. ***Open Biology***, 13: 230118 (2023). PMCID: PMC10369027 [*Preprint*: 10.1101/2023.03.28.534552]

16. Martinez-Corral, R., Park, M., Biette, K., Friedrich, D., Scholes, C., **Khalil, A.S.**, Gunawardena, J., DePace, A. Transcriptional kinetic synergy: a complex landscape revealed by integrating modelling and synthetic biology. ***Cell Systems***, 14: 324-339 (2023). PMCID: PMC10472254 [*Preprint*: 10.1101/2020.08.31.276261]

17. Sutradhar, I., Ching, C., Desai, D., Heins, Z., **Khalil, A.S.**, Zaman, M.H. Effects of antibiotic interaction on antimicrobial resistance development in wastewater. ***Scientific Reports***, 13: 7801 (2023). PMCID: PMC10183007 [*Preprint*: 10.1101/2023.02.10.528009]

18. Jo, C., Zhang, J., Tam, J. M., Church, G.M., **Khalil, A.S.**, Segrè, D., Tang, T.C. Unlocking the magic in mycelium: Using synthetic biology to optimize filamentous fungi for biomanufacturing and sustainability. ***Materials Today Bio***, 19: 100560 (2023). PMCID: PMC9900623

19. Huang, T.P.*, Heins, Z.J.*, Miller, S.M., Wong, B.G., Balivada, P.A., Wang, T., **Khalil, A.S.**[†], Liu, D.R.[†] High-throughput continuous evolution of compact Cas9 variants targeting single-nucleotide-pyrimidine PAMs. ***Nature Biotechnology***, 41, 96-107 (2023). PMCID: PMC9849140

20. Cabrera, A., Edelstein, H.I., Glykofrydis, F., Love, K.S., Palacios, S., Tycko, J., Zhang, M., Lensch, S., Shields, C.E., Livingston, M., Weiss, R., Zhao, H., Haynes, K.A., Morsut, L., Chen, Y.Y., **Khalil, A.S.**, Wong, W.W., Collins, J.J., Rosser, S.J., Polizzi, K., Elowitz, M.B., Fussenegger, M., Hilton, I.B., Leonard, J.N., Bintu, L., Galloway, K.E., Deans, T.L. The sound of silence: transgene silencing in mammalian cell engineering. ***Cell Systems****,* 13: 950-973 (2022). PMCID: PMC9880859

21. Li, H.*, Israni, D.V.*, Gagnon, K.A., Gan, K.A., Raymond, M.H., Sander, J.D., Roybal, K.T., Joung, J.K., Wong, W.W., **Khalil, A.S.** Multidimensional control of therapeutic human cell function with synthetic gene circuits. ***Science***, 378: 1227-1234 (2022). PMCID: PMC1005429 [*Preprint*: 10.1101/2021.02.22.432371]
    - *Perspective:* Salazar-Cavazos E. and Altan-Bonnet A. Engineering time-controlled immunotherapy. *Science*, 378 (2022).
    - *News:* Ledford H. Cancer treatments boosted by immune-cell hacking. *Nature* (15 December 2022).
    - *News & Opinion*: Mesa N. "Smarter" CAR T cells target tumors with precision. *The Scientist* (16 December 2022).
    - *News Feature:* Ledford H. The race to supercharge cancer-fighting T cells. *Nature* (25 January 2023).

22. Sanford, A., Kiriakov, S., **Khalil, A.S.** A toolkit for precise, multi-gene control in *Saccharomyces cerevisiae*. ***ACS Synthetic Biology***, 11: 3912-3920 (2022). PMCID: PMC9764411

23. Sun, Q.*, Vega, N.M.*, Cervantes, B., Mancuso, C.P., Mao, N., Taylor, M., Collins, J.J., **Khalil, A.S.**, Gore, J., Lu, T.K. Enhancing nutritional niche and host defenses by modifying the gut microbiome. ***Molecular Systems Biology***, 18: e9933 (2022). PMCID: PMC9664710 [*Preprint*: 10.1101/2020.03.01.972349]

24. Lee, S., **Khalil, A.S.**, Wong, W.W. Recent progress of gene circuit designs in immune cell therapies. ***Cell Systems***, 13: 864-873 (2022). PMCID: PMC9681026

25. Li, H.*, Wong, N.M.*, Tague, E., Ngo, J.T., **Khalil, A.S.**, Wong, W.W. High-performance multiplex drug-gated CAR circuits. ***Cancer Cell***, 40: 1294-1305 (2022). PMCID: PMC9669166 [*Preprint*: 10.1101/2020.12.14.419812]

26. Shaw, W.M., Zhang, Y., Lu, X., **Khalil, A.S.**, Ladds, G., Luo, X., Ellis, T. Screening microbially produced Δ9-tetrahydrocannabinol using a yeast biosensor workflow. ***Nature Communications***, 13: 5509 (2022). PMCID: PMC9489785

27. Zhu, I.*, Liu, R.*, Garcia, J.M., Hyrenius-Wittsten, A., Piraner, D.I., Alavi, J., Israni, D.V., Liu, B., **Khalil, A.S.**, Roybal, K.T. Modular design of synthetic receptors for programmed gene regulation in cell therapies. ***Cell***, 185: 1431-1443 (2022). PMCID: PMC9108009 [*Preprint*: 10.1101/2021.05.21.445218]
    - *News & Views:* Hamieh M. & Themeli M. Synthetic circuits suited for the clinic. *Nature*, 606 (2022).

28. Kunze, C., **Khalil, A.S.** One cell, many fates (Preview). ***Science***, 375: 262-263 (2022).

29. Molina, R.S., Rix, G., Mengiste, A.A., Alvarez, B., Seo, D., Chen, H., Hurtado, J., Zhang, Q., Garcia-Garcia, J.D., Heins, Z.J., Almhjell, P.J., Arnold, F.H., **Khalil, A.S.**, Hanson, A.D., Dueber, J.E., Schaffer, D.V., Chen, F., Kim, S., Fernandez, L.A., Shoulders, M.D., Liu, C.C. *In vivo* hypermutation and continuous evolution. ***Nature Reviews Methods Primers***, 2: 37 (2022). PMCID: PMC10108624

30. Mancuso, C.P., Lee, H., Abreu, C.I., Gore, J., **Khalil, A.S.** Environmental fluctuations reshape and unexpected diversity-disturbance relationship in a microbial community. ***eLife***, 10: e67175 (2021). PMCID: PMC8460265 [*Preprint*: 10.1101/2020.07.28.225987]

31. Sutradhar, I., Ching, C., Desai, D., Suprenant, M., Briars, E., Heins, Z., **Khalil, A.S.**, Zaman, M.H. Computational model to quantify the growth of antibiotic-resistant bacteria in wastewater. ***mSystems***, 6: e0036021 (2021). PMCID: PMC8579810 [*Preprint*: 10.1101/2020.10.09.333575]

32. Moussa, H.F., Angstman, J.F., **Khalil, A.S.** Here to stay: writing lasting epigenetic memories (Preview). ***Cell***, 184: 2281-2283 (2021).

33. Annas, G.J., Beisel, C.L., Clement, K., Crisanti, A., Francis, S., Galardini, M., Galizi, R., Grünewald, J., Immobile, G., **Khalil, A.S.,** Müller, R., Pattanayak, V., Petri, K., Paul, L., Pinello, L., Simoni, A., Taxiarchi, C., Joung, J.K. A code of ethics for gene drive research. ***Crispr J.***, 4: 19-24 (2021). PMCID: PMC7898401

34. Zhong, Z.*, Wong, B.G.*, Ravikumar, A., Arzumanyan, G.A., **Khalil, A.S.**†, Liu, C.C.† Automated continuous evolution of proteins *in vivo*. ***ACS Synthetic Biology***, 9: 1270-1276 (2020). PMCID: PMC7370864 [*Preprint*: 10.1101/2020.02.21.960328]

35. Qian, J.*, Lu, Z.X.*, Mancuso, C.P.*, Jhuang, H.Y.*, Del Carmen Barajas-Ornelas, R.*, Boswell, S.A.*, Ramírez-Guadiana, F.H., Jones, V., Sonti, A., Sedlack, K., Artzi, L., Jung, G., Arammash, M., Pettit, M.E., Melfi, M., Lyon, L., Owen, S.V., Baym, M., **Khalil, A.S.**, Silver, P.A., Rudner, D.Z., Springer, M. Barcoded microbial system for high-resolution object provenance. ***Science***, 368: 1135-1140 (2020). [*Preprint*: 10.1101/2020.03.14.990804]
- *Perspective:* Nivala J. Follow the barcoded microbes. *Science*, 368 (2020).

36. Chiesa, G.*, Kiriakov, S.*, **Khalil, A.S.** Protein assembly systems in natural and synthetic biology. ***BMC Biology***, 18: 35 (2020). PMCID: PMC7099826

37. Tanner, K., Mancuso, C.P., Peretó, J., **Khalil, A.S.**, Vilanova, C., Pascual, J. *Sphingomonas solaris* sp. nov., isolated from a solar panel in Boston, Massachusetts. ***International Journal of Systematic and Evolutionary Microbiology***, 70: 1814-1821 (2020). PMCID: PMC7539908

38. Bashor, C.J.*, Patel, N.*, Beyzavi, A., Choubey, S., Kondev, J., Collins, J.J., **Khalil, A.S.** Complex signal processing in synthetic gene circuits using cooperative regulatory assemblies. ***Science***, 364: 593-597 (2019). PMCID: PMC6650298
- *Perspective:* Ng A.H. and El-Samad H. Synthetic transcriptional synergy. *Science*, 364 (2019).
- *News & Views:* Cloney R. Cooperating on synthetic gene circuits. *Nat. Biotechnol.* 37 (2019).

39. Heins, Z.J., Mancuso, C.M., Kiriakov, S., Wong, B.G., Bashor, C.J., **Khalil, A.S.** Designing automated, high-throughput continuous cell growth experiments using eVOLVER. ***Journal of Visualized Experiments***, 147: e59652 (2019). PMCID: PMC6738936

40. Lee, H.H., Ostrov, N., Wong, B.G., Gold, M.A., **Khalil, A.S.**, Church, G.M. Functional genomics of the rapidly replicating bacterium *Vibrio natriegens* by CRISPRi. ***Nature Microbiology***, 4: 1105-1113 (2019). [*Preprint*: 10.1101/058487]
- ***Journal Cover***
- *News & Views*: D'Gama J.D. and Waldor M.K. An 'I' for ingenuity. *Nat. Microbiol.*, 4 (2019).

41. Park, M., Patel, N., Keung, A.J., **Khalil, A.S.** Engineering epigenetic regulation using synthetic read-write modules. ***Cell***, 176: 227-238 (2019). PMCID: PMC6329643 [*Preprint*: 10.2139/ssrn.3155804]
- *Faculty of 1000.*
- *Research Highlight*: Trenkmann M. Synthetic readers and writers for mammalian chromatin. *Nat. Rev. Genet.,* 20 (2019).
- *Research Highlight*: Rusk N. Creating epigenetic memory. *Nat. Methods*, 16 (2019).
- *Viewpoint*: Loveless T.B. and Liu C.C. Synthetic epigenetics to engineer regulation. *Biochemistry*, 58 (2019).
- *Spotlight*: Chang T.Z., Kuo J. and Silver P.A. Beyond the four bases: a home run for synthetic epigenetic control? *Mol. Cell*, 74 (2019).
- *Research Highlight*: Song Y. Pass it along. *Nat. Chem. Biol.,* 15 (2019).

42. Weinstein, Z.B., Kuru, N., Kiriakov, S., Palmer, A.C., **Khalil, A.S.**, Clemons, P.A., Zaman, M.H., Roth, F.P., Cokol, M. Modeling the impact of drug interactions on therapeutic selectivity. ***Nature Communications***, 9: 3452 (2018). PMCID: PMC6110842

43. Wong, B.G.*, Mancuso, C.P.*, Kiriakov, S., Bashor, C.J., **Khalil, A.S.** Precise, automated control of conditions for high-throughput growth of yeast and bacteria with eVOLVER. ***Nature Biotechnology***, 36: 614-623 (2018). PMCID: PMC6035058 [*Preprint*: 10.1101/280867]
- ***Journal Cover***
- *Technology Feature*: May M. Automated science on a shoestring. *Nature*, 569 (2019).

44. Zheng, X.*, Beyzavi, A.*, Krakowiak, J., Patel, N., **Khalil, A.S.**†, Pincus, D.† Hsf1 phosphorylation generates cell-to-cell variation in Hsp90 levels and promotes phenotypic plasticity. ***Cell Reports***, 22: 3099-3106 (2018). PMCID: PMC5893160 [*Preprint*: 10.1101/185934]

45. Krakowiak, J.*, Zheng, X.*, Patel, N.*, Feder, Z.A., Anandhakumar, J., Valerius, K., Gross, D.S.†, **Khalil, A.S.**†, Pincus, D.† Hsf1 and Hsp70 constitute a two-component feedback loop that regulates the

yeast heat shock response. ***eLife***, 7: e31668 (2018). PMCID: PMC5809143 [*Preprint*: 10.1101/183137]

46. Newby, G.A.*, Kiriakov, S.*, Hallacli, E.*, Kayatekin, C., Tsvetkov, P., Mancuso, C.P., Bonner, J.M., Hesse, W.R., Chakrabortee, S., Manogaran, A.L., Liebman, S.W., Lindquist, S., **Khalil, A.S.** A genetic tool to track protein aggregates and control prion inheritance. ***Cell***, 171: 966-979 (2017). PMCID: PMC5675731
    - ***Journal Cover***
    - *Faculty of 1000.*
    - *Modus Operandi*: Williams R. Detecting protein clumps. *The Scientist* (1 February 2018).

47. Hawkins, F., Kramer, P., Jacob, A., Driver, I., Thomas, D.C., McCauley, K.B., Skvir, N., Crane, A.M., Kurmann, A.A., Hollenberg, A.N., Nguyen, S., Wong, B.G., **Khalil, A.S.**, Huang, S.X., Guttentag, S., Rock, J.R., Shannon, J.M., Davis, B.R., Kotton, D.N. Prospective isolation of NKX2-1-expressing human lung progenitors from pluripotent stem cells. ***The Journal of Clinical Investigation***, 127: 2277-2294 (2016). PMCID: PMC5451263

48. Pincus, D., **Khalil, A.S.** Heat shock signaling, fast and slow (In: Principles of systems biology, no. 12). ***Cell Systems***, 3: 504-506 (2016).

49. Zheng, X.*, Krakowiak, J.*, Patel, N., Beyzavi, A., Ezike, J., **Khalil, A.S.**†, Pincus, D.† Dynamic control of Hsf1 during heat shock by a chaperone switch and phosphorylation. ***eLife***, 5: e18638 (2016). PMCID: PMC5127643
    - *Insight:* Breton L. and Mayer M. A model for handling cell stress. *eLife*, 5 (2016).

50. Park, M., Keung, A.J., **Khalil, A.S.** The epigenome: the next substrate for engineering. ***Genome Biology***, 17: 183 (2016). PMCID: PMC5006378

51. Mancuso, C.P., Kiriakov, S., **Khalil, A.S.** Cellular advantages to signaling in a digital world (Preview). ***Cell Systems***, 3: 114-115 (2016).

52. Garcia-Ojalvo, J., **Khalil, A.S.**, McCarthy, J. Biological insights from synthetic biology (Editorial). ***Integrative Biology***, 8: 380-382 (2016).

53. Keung, A.J., **Khalil, A.S.** A unifying model of epigenetic regulation (Perspective). ***Science***, 351: 661-662 (2016). PMCID: PMC6124315

54. Lobritz, M.A., Belenky, P., Porter, C.B.M., Gutierrez, A., Yang, J.H., Schwartz, E.G., Dwyer, D.J., **Khalil, A.S.**†, Collins, J.J.†. Antibiotic efficacy is linked to bacterial cellular respiration. ***Proc Natl Acad Sci USA***, 112: 8173-8180 (2015). PMCID: PMC4500273

55. Keung, A.J., Joung, J.K., **Khalil, A.S.**, Collins, J.J. Chromatin regulation at the frontier of synthetic biology. ***Nature Reviews Genetics***, 16: 159-171 (2015). PMCID: PMC4846386

56. Keung, A.J., Bashor, C.J., Kiriakov, S., Collins, J.J., **Khalil, A.S.** Using targeted chromatin regulators to engineer combinatorial and spatial transcriptional regulation. ***Cell***, 158: 110-120 (2014). PMCID: PMC4110908
    - ***Journal Cover***
    - *Research Highlight:* Burgess D.J. Gene regulation: a chromatin-based recruitment drive. *Nat. Rev. Genet.*, 15 (2014).

57. Dwyer, D.J., Belenky, P., Yang, J.H., MacDonald, I.C., Martell, J.D., Takahashi, N., Chan, C.T.Y., Lobritz, M.A., Braff, D., Schwartz, E.G., Ye, J.D., Pati, M., Vercuysse, M., Ralifo, P.S., Allison, K.R., **Khalil, A.S.**, Ting, A.Y., Walker, G.C., Collins, J.J. Antibiotics induce redox-related physiological alterations as part of their lethality. ***Proc Natl Acad Sci USA***, 111: E2100-9 (2014). PMID: PMC4034191

58. Litcofsky, K.D., Afeyan, R.B., Krom, R.J., **Khalil, A.S.**†, Collins, J.J.† Iterative plug-and-play methodology for constructing and modifying synthetic gene networks. ***Nature Methods***, 9: 1077–1080 (2012). PMCID: PMC3492501
    - *News & Views:* Tabor J.J. Modular gene-circuit design takes two steps forward. *Nat. Methods*, 9 (2012).

59. **Khalil, A.S.***, Lu, T.K.*, Bashor, C.J.*, Ramirez, C.L., Pyenson, N.C., Joung, J.K., Collins, J.J. A synthetic biology framework for programming eukaryotic transcription functions. ***Cell***, 150: 647–658

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- *Research Highlight:* Jones S. Expanding the engineer's toolkit. *Nat. Biotechnol.*, 30 (2012).
- *Research Highlight:* Programming transcription. *Nat. Methods*, 9 (2012).
- Highlighted in *Genetic Engineering & Biotechnology News* and *MIT News.*

60. Vega, N.M., Allison, K.R., **Khalil, A.S.**, Collins, J.J. Signaling-mediated bacterial persister formation. ***Nature Chemical Biology***, 8: 431–433 (2012). PMCID: PMC3329571
    - ***Journal Cover***
    - *Research Highlight:* Microbiology: bacteria signal to survive. *Nature*, 483 (2012).
    - *Editor's Choice:* Microbiology: bacteria hedge their bets. *Science*, 336 (2012).
    - *Research Highlight:* Jermy A. From indolence to persistence. *Nat. Rev. Microbiol.* 10 (2012).
    - *Research Highlight:* Signaling-mediated bacterial persister formation. *Nat. Med.*, 18 (2012).
    - Highlighted in *Chemical & Engineering News*.

61. **Khalil, A.S.**, Collins, J.J. Synthetic biology: applications come of age. ***Nature Reviews Genetics***, 11: 367–379 (2010). PMCID: PMC2896386
    - ***Journal Cover***
    - Highlighted in *The New York Times* and *Folha de S. Paulo.*

62. Borenstein, J.T., Tupper, M.M., Mack, P.J., Weinberg, E.J., **Khalil, A.S.**, Hsiao, J., Garcia-Cardena, G. Functionalized endothelialized microvascular networks with circular cross sections in a tissue culture substrate. ***Biomedical Microdevices***, 12: 71–79 (2010).

63. Lu, T.K., **Khalil, A.S.**, Collins, J.J. Next-generation synthetic gene networks. ***Nature Biotechnology***, 27: 1139–1150 (2009). PMCID: PMC2796205

64. **Khalil, A.S.**, Appleyard, D.C., Labno, A.K., Georges, A., Karplus, M., Belcher, A.M., Hwang, W., Lang, M.J. Kinesin's cover-neck bundle folds forward to generate force. ***Proc Natl Acad Sci USA***, 105: 19247–19252 (2008). PMCID: PMC2592363

65. **Khalil, A.S.**, Ferrer, J.M., Brau, R.R., Kottmann, S.T., Noren, C.J., Lang, M.J., Belcher, A.M. Single M13 bacteriophage tethering and stretching. ***Proc Natl Acad Sci USA***, 104: 4892–4897 (2007). PMCID: PMC1829235
    - ***Journal Cover***

66. **Khalil, A.S.**, Bouma, B.E., Kaazempur-Mofrad, M.R. A combined FEM/genetic algorithm for vascular soft tissue elasticity estimation. ***Cardiovascular Engineering***, 6: 93–102 (2006).

67. **Khalil, A.S.**, Chan, R.C., Chau, A.H., Bouma, B.E., Kaazempur-Mofrad, M.R. Tissue elasticity estimation with optical coherence elastography: toward complete mechanical characterization of in vivo soft tissue. ***Annals of Biomedical Engineering***, 33: 1631–1639 (2005).

68. Chan, R.C., Chau, A.H., Karl, W.C., Nadkarni, S., **Khalil, A.S.**, Iftimia, N., Shishkov, M., Tearney, G.J., Kaazempur-Mofrad, M.R., Bouma, B.E. OCT-based arterial elastography: robust estimation exploiting tissue biomechanics. ***Optics Express***, 12: 4532–4572 (2004).

Invited Talks and Seminars

1. Plenary: 2026 Interdisciplinary Science Summit, Schmidt Sciences, Duke University, Durham, NC, USA
2. The 3rd Symposium on Plant Biochemistry in Greater Boston, Northeastern University, Boston, MA, USA, 2026.
3. Biomedical Engineering Seminar Series, Georgia Tech and Emory University, Atlanta, GA, USA, 2026.
4. Tissue Talks Lecture Series, Virtual, Columbia University, New York, NY, USA, 2025.
5. Omenn-Darling Bioengineering Institute Colloquium, Princeton University, Princeton, NJ, USA, 2025.
6. Department of Systems Biology, Harvard Medical School, Boston, MA, USA, 2025.
7. H Foundation Basic Science Symposium, Robert H. Lurie Comprehensive Cancer Center of Northwestern, Northwestern Feinberg School fo Medicine, Chicago, IL, USA, 2025.

8. Biomedical Science and Engineering Seminar Series, Center for Engineering in Medicine and Surgery, MGH-Harvard Medical School, Boston, MA, USA, 2025.
9. Synthetic and Systems Approaches to Interrogate Spatiotemporal Processes in Cancer, NIH/NCI Virtual Workshop, 2025.
10. Cell Circuits & Epigenomics Seminar Series, Broad Institute, Cambridge, MA, USA, 2025.
11. Department of Biomedical Engineering, University of Minnesota, Minneapolis, MN, USA, 2025.
12. Charles Edward Holt Lecture, Biology Colloquium, MIT, Cambridge, MA, USA, 2025.
13. Keynote: Winter Q-Bio Conference, Oahu, Hawaii, USA, 2025.
14. EMBL Conference: Quantitative Biology to Molecular Mechanisms, Heidelberg, Germany, 2024.
15. Department of Bioengineering, Northeastern University, Boston, MA, USA, 2024.
16. Department of Bioengineering, University of Pennsylvania, Philadelphia, PA, USA, 2024.
17. BioElectronic Therapeutics (BETx) Workshop, Rice Global Paris, Paris, France, 2024.
18. Westlake – *Science* Joint Online Symposium Series (Synthetic Biology), 2024.
19. Computational and Systems Biology (CSB) Seminar, MIT, Cambridge, MA, USA, 2024.
20. Department of Molecular and Cellular Biology, Harvard University, Cambridge, MA, USA, 2024.
21. Department of Biomedical Engineering, Texas A&M University, College Station, TX, USA, 2024.
22. Department of Bioengineering Seminar Series, University of Washington, Seattle, WA, USA, 2024.
23. Biochemistry & Biophysics Seminar Series, Brandeis University, Waltham, MA, USA, 2024.
24. Biochemistry Colloquium, University of Wisconsin, Madison, WI, USA, 2024.
25. American Physical Society (APS) March Meeting, Minneapolis, MN, USA, 2024.
26. Biomedical Engineering Seminar Series, Georgia Tech and Emory University, Atlanta, GA, USA, 2023.
27. Department of Bioengineering, University of Texas, Dallas, TX, USA, 2023.
28. 6th International Conference on CRISPR Technologies, The Revere Hotel Boston Common, Boston, MA, USA, 2023.
29. Rules of Protein-DNA Recognition Meeting, Breathless Riviera Cancun Resort & Spa, Cancun, Mexico, 2023.
30. ITMAT 18th Annual International Symposium, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA, 2023.
31. Genes, Systems and Computation Seminar Series, Institute for Systems Genetics, NYU Langone Health, New York, NY, USA, 2023.
32. Synthetic Biology for Future Health 2023, Wellcome Genome Campus, Hinxton, UK, 2023.
33. Harvard SEAS Topics in Bioengineering, Harvard University, Cambridge, MA, USA, 2023.
34. Chemistry Lecture Series, Boston College, Chestnut Hill, MA, USA, 2023.
35. Panelist: A Celebration of Synthetic Biology (Breakout Session: Accelerating Cell Design), HIVE, Harvard Medical School, Boston, MA, USA, 2022.
36. BioE Seminar Series (sponsored by Center for Biomolecular and Tissue Engineering), Duke University, Durham, NC, USA, 2022.
37. Department of Chemical Engineering, Louisiana State University, Baton Rouge, LA, USA, 2022.
38. Department of Bioengineering, Rice University, Houston, TX, USA, 2022.
39. EMBO Workshop: Modularity of Signaling Proteins and Networks, Seefeld in Tirol, Austria, 2022.
40. Centre for Synthetic Biology Seminar Series, Imperial College London, UK, 2022.
41. Yeast Genetics & Genomics CSHL Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, USA, 2022.
42. Synthetic Biology CSHL Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, USA, 2022.
43. Imperial College Centre for Synthetic Biology Seminar Series, Imperial College London, UK, 2022.
44. Health Innovation Via Engineering (HIVE) Bioengineering Seminar Series, UCSF, San Francisco, CA, USA, 2022.
45. Department of Pharmacology, Physiology & Neuroscience, Rutgers New Jersey Medical School, Newark, NJ, USA, 2022.
46. Interdisciplinary Research Seminar, Institute for Biophysical Dynamics, University of Chicago, Chicago, IL, USA, 2022.
47. Department of Microbiology, UMass Amherst, Amherst, MA, USA, 2022.
48. Program in Systems Biology Seminar Series, UMass Medical School, Worcester, MA, USA, 2022.

49. Bristol BioDesign International (BBI) Seminar Series, University of Bristol, Bristol, UK, 2022.
50. Cell Circuits & Epigenomics Seminar Series, Broad Institute, Cambridge, MA, USA, 2022.
51. International Mammalian Synthetic Biology Workshop, 2021.
52. Panelist: "Future and Opportunities in Synthetic Biology", Synthetic Biology: Engineering, Evolution & Design (SEED), 2021.
53. Invited Seminar: Genentech Research and Early Development (gRED), Genentech, 2021.
54. Donnelly Seminar Series, Donnelly Centre, University of Toronto, 2021.
55. Department of Biochemistry, Boston University School of Medicine, Boston, MA, USA, 2021.
56. EMBO/EMBL Symposium: Synthetic Morphogenesis: From Gene Circuits to Tissue Architecture, 2021.
57. 2021 Keystone Symposia: Precision Engineering of the Genome, Epigenome and Transcriptome, 2021.
58. Biophysical Society's 65th Annual Meeting: Bioengineering Subgroup, 2021.
59. 2021 Keystone Symposia: Emerging Cell Therapies: Realizing the Vision of NextGen Smart Cell Therapeutics for Disease, 2021.
60. Pritzker School of Molecular Engineering (PME) Distinguished Colloquium Series, University of Chicago, Chicago, IL, USA, 2021.
61. 1st International BioDesign Research Conference, Stanford University, Stanford, CA, USA, 2020.
62. 4th International Conference on Epigenetics and Bioengineering (EpiBio 2020), North Carolina State University, Raleigh, NC, USA, 2020.
63. q-Bio 2020: A Virtual Conference on Quantitative Biology, 2020.
64. BME Higher Education and Research in a Pandemic-Challenged Environment, 2020 BME Council of Chairs Online Mini-Summit, 2020.
65. BBC Seminar Series, Biophysics / Bioinformatics / Chemistry & Chemical Biology Graduate Programs, UCSF, San Francisco, CA, USA, 2019.
66. BMG Seminar Series, Department of Biochemistry and Molecular Genetics, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA, 2019.
67. Molecular Engineering & Sciences (MolES) Seminar Series, University of Washington, Seattle, WA, USA, 2019.
68. Department of Chemical and Biological Engineering, Tufts University, Medford, MA, USA, 2019.
69. The Future of Quantitative Biology Symposium, NSF-Simons Center for Mathematical & Statistical Analysis of Biology, Harvard University, Cambridge, MA, USA, 2019.
70. Bioengineering Seminar Series, University of Illinois at Urbana-Champaign, Urbana, IL, USA, 2019.
71. Network Biology Meeting, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, USA, 2019.
72. Bioengineering Lecture Series (BELS), Division of Biology and Biological Engineering, Caltech, Pasadena, CA, USA, 2019.
73. Department of Biomedical Engineering, University of California, Irvine, CA, USA, 2019.
74. 9th International Conference on Biomolecular Engineering (9th ICBE), Newport Beach, CA, USA, 2019.
75. Sterling Drug Lecture. Pharmacological Sciences Seminar Series, Program in Biomolecular Pharmacology, Department of Pharmacology & Experimental Therapeutics, Boston University School of Medicine, Boston, MA, USA, 2018.
76. BioEngineering Seminar, Center for Biomolecular and Tissue Engineering, Duke University, Durham, NC, USA, 2018.
77. 2nd International Conference on Epigenetics and Bioengineering (EpiBio 2018), UCSF, San Francisco, CA, USA, 2018.
78. Department of Biomedical Engineering, Boston University, Boston, MA, USA, 2018.
79. Department of Chemical & Biological Engineering, Northwestern University, Evanston, IL, USA, 2018.
80. Biotechnology Training Program (BTP) Seminar Series, Advances in Biotechnology, Northwestern University, Evanston, IL, USA, 2018.
81. Engineering Biology Research Consortium (EBRC) Spring Retreat, University of Washington, Seattle, WA, USA, 2018.
82. Center for Molecular Discovery, Boston University, Boston, MA, USA, 2018.

83. Department of Genetics & Development, Columbia University Medical Center, New York, NY, USA, 2018.
84. Keynote Talk: Quantitative Biology Boot Camp, Quantitative Biology Program, Brandeis University, Waltham, MA, USA, 2018.
85. Department of Biomedical Engineering, Cornell University, Ithaca, NY, USA, 2017.
86. The BioTechnology Institute Seminar Series, University of Minnesota, St Paul, MN, USA, 2017.
87. Gene Expression and RNA Series (GEARS), Harvard Medical School, Boston, MA, USA, 2017.
88. The Hartwell Foundation 10th Annual Meeting, Duke University, Durham, NC, USA, 2017.
89. Synthetic Biology at Molecular, Cellular and Multicellular Levels (International Workshop Organized by WISB), Venice, Italy, 2017.
90. Draper Laboratory, Cambridge, MA, USA, 2017.
91. Green Center for Systems Biology Seminar, UT Southwestern Medical Center, Dallas, TX, USA, 2017.
92. Gordon Research Conference (GRC) on Synthetic Biology, Stowe, VT, USA, 2017.
93. Synthetic Biology: Engineering, Evolution & Design (SEED), Vancouver, British Columbia, Canada, 2017.
94. Integrative BioSystems Institute Seminar Series, Department of Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, USA, 2017.
95. Center for Engineering in Medicine (CEM) Seminar Series, Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA, 2017.
96. Genome Editing and Advances in Transgenic Technology USA Congress, Harvard Medical School, Boston, MA, 2017.
97. Department of Chemical and Systems Biology, Stanford University School of Medicine, Stanford, CA, USA, 2017.
98. Department of Bioengineering, University of California, Berkeley, CA, USA, 2017.
99. Department of Bioengineering, University of Pennsylvania, Philadelphia, PA, USA, 2017.
100. School of Biological and Health Systems Engineering, Arizona State University, Tempe, AZ, USA, 2017.
101. The Hartwell Foundation 9th Annual Meeting, Cleveland Clinic / Case Western University, Cleveland, OH, USA, 2016.
102. Physiology: Modern Cell Biology Using Microscopic, Biochemical and Computational Approaches, Marine Biological Laboratory, Woods Hole, MA, USA, 2016.
103. Warwick Integrative Synthetic Biology Centre Launch Event, University of Warwick, Coventry, UK, 2016.
104. LabLinks: Gene Circuits, Co-sponsored by Cell Press and the Center for Cell Circuits, Broad Institute, Cambridge, MA, USA, 2016.
105. Theory Lunch, Department of Systems Biology, Harvard Medical School, Boston, MA, USA, 2016.
106. Department of Biomedical Engineering, Johns Hopkins University, Baltimore, MD, USA, 2015.
107. Department of Molecular Microbiology and Immunology, Brown University, Providence, RI, USA, 2015.
108. Lab-on-a-chip, Microfluidics & Microarrays World Congress, San Diego, CA, USA, 2015.
109. Synthetic Biology: From Standard Biological Parts to Artificial Life, B-Debate International Center for Scientific Debate, Barcelona, Spain, 2015.
110. Synthetic Biology CSHL Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, USA, 2015.
111. EpiCongress 2015, Boston, MA, USA, 2015.
112. Gene Regulation by the Numbers, Radcliffe Institute for Advanced Study, Harvard University, Cambridge, MA, USA, 2015.
113. Department of Physiology & Biophysics, Boston University School of Medicine, Boston, MA, USA, 2015.
114. Guest Lecture: MCB 187: Genome Editing – Progress and Frontiers (Spring 2015), Department of Molecular and Cellular Biology, Harvard University, Cambridge, MA, USA, 2015.
115. Biophysics Seminar Series, MIT, Cambridge, MA, USA, 2014.
116. Bioengineering Lecture Series, California Institute of Technology, Pasadena, CA, USA, 2014.
117. Cell Circuits & Epigenomics Seminar, Broad Institute, Cambridge, MA, USA, 2014.

118. Meeting for the Mérieux Research Grants, Annecy, France, 2014.
119. Departments of Biology and Biochemistry, Genetics Training Grant Symposium (Synthetic Biology: Insights and Applications), Brandeis University, Waltham, MA, USA, 2014.
120. 7th World Congress of Biomechanics, Boston, MA, USA, 2014.
121. Towards Next Generation Synthetic Biology, University of Warwick, Coventry, UK, 2013.
122. Materials Research Science and Engineering Center (MRSEC) Seminar, Brandeis University, Waltham, MA, USA, 2013.
123. Precision Genome Engineering and Synthetic Biology, Keystone Symposia, Breckenridge, CO, USA, 2013.
124. Department of Molecular & Cell Biology, Boston University School of Dental Medicine, Boston, MA, USA, 2013.
125. Department of Biology and Program in Molecular Biology, Cell Biology & Biochemistry, Biomolecular Seminar Series, Boston University, Boston, MA, USA, 2012.
126. Synthetic Biology Working Group, Harvard Medical School, Boston, MA, USA, 2012.
127. Invited Plenary Talk: Italian Federation of Life Sciences (FISV) 12th Congress, Rome, Italy, 2012.
128. Department of Biomedical Engineering, Boston University, Boston University, Boston, MA, USA, 2011.
129. Department of Pharmaceutical Chemistry, UCSF, San Francisco, CA, USA, 2011.
130. Departments of Chemical Engineering, Biomedical Engineering, and Cell Biology, Yale University, New Haven, CT, USA, 2011.
131. Platform Presentation: NASA Ames Research Center, Moffett Field, CA, USA, 2010.
132. Center for Excellence in Vascular Biology Seminar Series, Harvard Medical School, Brigham & Women's Hospital, Boston, MA, USA, 2010.
133. Harvard Single Molecule Discussion Group, Cambridge, MA, USA, 2008.
134. Mechanics: Modeling, Experimentation, Computation Seminar Series, Department of Mechanical Engineering, MIT, Cambridge, MA, USA, 2008.
135. Biomechanical Engineering Seminar Series, Department of Mechanical Engineering, Stanford University, Stanford, CA, USA, 2008.
136. Platform Presentation: Biophysical Society Annual Meeting, Long Beach, CA, USA, 2008.
137. Platform Presentation: Biophysical Society Annual Meeting, Salt Lake City, UT, USA, 2006.

Patent Applications

1. "Novel Yeast Display Libraries and Uses Thereof." Patent Application No. 63/778,581 (March 27, 2025).

2. "Self-Amplifying RNA (saRNA) Vectors and Uses Thereof." Patent Application No. 63/717,421 (November 7, 2024).

3. "Regulated Synthetic Gene Activation Systems." Patent Application Nos. 18/756,596 (June 27, 2024) and PCT/US24/035774 (June 27, 2024).

4. "Immune Cell Fusion (ICF) and Uses Thereof." Patent Application No. 18/593,853 (March 1, 2024).

5. "Inducible Anti-Sense Repressor Switches and Uses Thereof." Patent Application Nos. 63/398,071 (August 15, 2023), 63/454,508 (March 24, 2023), and PCT/US23/72229 (August 15, 2023).

6. "Cas9 Variants Having Non-Canonical PAM Specificities and Uses Thereof." Patent Application Nos. PCT/US2023/065312 (April 4, 2023), 63/327,354 (April 4, 2022), and 63/396,943 (August 10, 2022).

7. "Notch Receptors with Zinc Finger-Containing Transcriptional Effector." Patent Application No. US 17/995,765 (October 7, 2022), PCT/US2021/052244 (September 23, 2020), and PCT/US2021/023911 (March 24, 2021).

8. "Regulated Synthetic Gene Expression Systems." Patent Application No. US 11/530,246 B2 (May 15, 2020) and WO 2020/232366 A2 (November 19, 2020).

9. "Methods for Experimental Evolution of Natural and Synthetic Microbes." Patent Application Publication No. US 16/081,975 (February 17, 2017) and WO 2018/152442 A1 (August 23, 2018).

Patents Issued

10. "Systems and Methods for Control of Gene Expression." Patent No. US 11,781,149 B2 (October 10,2023) and WO 2020/006409 A1 (January 2, 2020).

11. "An Integrated System for Programmable DNA Methylation." Patent No. US 10,465,187 B2 (November 5, 2019) and WO 2018/145068 A1 (August 9, 2018).

12. "Synthetic Transcriptional and Epigenetic Regulators Based on Engineered, Orthogonal, Zinc Finger Proteins." Patent No. US 10,138,493 B2 (November 27, 2018) and WO 2018/039471 A3 (March 1, 2018).

13. "Method of Fabricating Microfluidic Structures for Biomedical Applications." Patent No. US 8,266,791 B2 (September 18, 2012), WO 2009/039378 A2 (March 26, 2009), and EP 2 200 931 B1 (June 7, 2017).

14. "High-Throughput Biological Screening." Patent No. US 9,006,149 B2 (April 14, 2015), WO 2010/083282 A1 (July 22, 2010), and EP 2 382 305 B1 (July 24, 2014).

Academic Service at the Departmental, College and Campus Levels

2026-27 Member, Committee on Appointments and Promotions (CAP), Faculty of Arts and Sciences, Harvard University
2026-27 Member, Engineering Sciences Committee on Higher Degrees (CHD), School of Engineering and Applied Sciences, Harvard University
2024–25 Co-Chair, NEIDL Faculty Search Committee, Boston University
2024–25 Member, Appointments & Promotions (APT) Committee, College of Engineering, Boston University
2024–25 Member, Biomedical Engineering Undergraduate Committee, Boston University
2023–24 Member, Biomedical Engineering Undergraduate Committee, Boston University
2022–23 Co-Chair, Biological Design Center Faculty Search Committee, Boston University
2022–23 Member, Taskforce on the Future of PhD Education at Boston University, Boston University
2021–22 Member, Appointments & Promotions (APT) Committee, College of Engineering, Boston University
2021–22 Member, Biomedical Engineering Faculty Search Committee, Boston University
2021–24 Faculty Review Committee for Research Conflicts of Interest, Boston University
2021–22 Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2020–21 Initiative Owner, Strategy Implementation Group, Boston University Strategic Plan For 2030
2020–21 Co-Chair, Biological Design Center Faculty Search Committee, Boston University
2020–21 Member, Biomedical Engineering Undergraduate Committee, Boston University
2020–21 Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2019–20 Provost Faculty Mentor Fellows Program, Boston University
2019– Co-Director, Synthetic Biology & Biotechnology (SB2) NIH/NIGMS T32 PhD Training Program
2019–20 Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2018–19 Chair, Biological Design Center Faculty Search Committee, Boston University
2018–19 Member, Biomedical Engineering Undergraduate Committee, Boston University
2018–19 Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2017–18 Member, Biomedical Engineering Undergraduate Committee, Boston University
2017–18 Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2016–17 Member, Biomedical Engineering Faculty Search Committee, Boston University
2016–17 Member, Biomedical Engineering Undergraduate Committee, Boston University
2016–17 Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2015– Associate Director and Founding Member, Biological Design Center, Boston University
2015–16 Member, Biomedical Engineering Faculty Search Committee, Boston University
2015–16 Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2014–15 Member, Biomedical Engineering Faculty Search Committee, Boston University
2014–15 Member, Biomedical Engineering Undergraduate Committee, Boston University
2014–15 Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2013–14 Member, Biomedical Engineering Undergraduate Committee, Boston University

2013–14 Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2012–13 Member, Biomedical Engineering Undergraduate Committee, Boston University
2012–13 Member, Biomedical Engineering Graduate Admissions Committee, Boston University

Professional Service at the National and International Levels

2026 External Study Member, 1000X Biological Science and Technology (BSAT) Study Group, Biological Technologies Office (BTO), DARPA
2026 NIH Study Section Ad Hoc Member, ZRG1 F05-D (20) L, 2026/10 Fellowship: Cell Biology, Developmental Biology, and Bioengineering
2026 Organizing Committee, International Mammalian Synthetic Biology Workshop, Atlanta, GA, USA
2025 NIH Study Section Ad Hoc Member, ZRG1 IIDB-Q (70) R, 2026 NIH Director's New Innovator Award Program (DP2) (Stage 1 Reviewer)
2025 Organizing Committee, International Mammalian Synthetic Biology Workshop, The Beckman Center, Irvine, CA, USA
2024 NIH Study Section Ad Hoc Member, ZRG1 IIDB-Q (70) R, 2025 NIH Director's New Innovator Award Program (DP2) (Stage 1 Reviewer)
2024 NIH Study Section Ad Hoc Member, ZRG1 MCST-U (85) S, Special Topics: Molecular and Cellular Sciences and Technologies
2024 Organizing Committee, International Mammalian Synthetic Biology Workshop, Boston University, Boston, MA, USA
2023 NIH Study Section Ad Hoc Member, ZRG1 RCCS-A (70), 2024 NIH Director's New Innovator Award Program (DP2) (Stage 1 Reviewer)
2023 Chair, Gordon Research Conference (GRC) on Synthetic Biology
2023 Chair, Future Directions Workshop: Controlled Living Organisms, Office of the Under Secretary of Defense for Research and Engineering, Arlington, VA, USA
2023 Organizing Committee, International Mammalian Synthetic Biology Workshop, San Jose, CA, USA
2022 Organizing Committee, Synthetic Biology: Engineering, Evolution & Design (SEED), Arlington, VA, USA
2022 Organizing Committee, International Mammalian Synthetic Biology Workshop, Edinburgh, UK
2021 Review Committee for the 2022 Class of the College of Fellows, AIMBE Molecular Engineering, Synthetic Biology, and Drug Delivery
2021 Organizing Committee, 11th International Conference on Biomolecular Engineering, Santa Barbara, CA, USA
2021 NIH Study Section Ad Hoc Member, Special Emphasis Panel ZCA1 TCRB-Q (A1), Engineered Biology for Cancer Applications (U01)
2021 Organizing Committee, Virtual International Mammalian Synthetic Biology Workshop
2020 NIH Study Section Ad Hoc Member, ZGM1 TWD-5 (KR), Review of NIGMS Pathway to Independence Award K99/R00 Applications
2020 NIH Study Section Ad Hoc Member, Cellular and Molecular Technologies (CMT) 2020/05
2019 Steering Committee, The Role of Synthetic Biology in Atmospheric Greenhouse Gas Reduction: Prospects and Challenges (Alfred P. Sloan Foundation), Boston University, Boston, MA USA
2019 Co-Author, EBRC Engineering Biology Roadmap (A Research Roadmap for the Next-Generation Bioeconomy)
2019 Vice Chair, Gordon Research Conference (GRC) on Synthetic Biology
2019 NSF Advisory Panelist, Panel 191842, EFRI: Chromatin and Epigenetic Engineering
2019 Co-Chair, International Mammalian Synthetic Biology Workshop 6.0, Northwestern University, Evanston, IL, USA
2018 Organizing Committee, Synthetic Biology: Engineering, Evolution & Design (SEED), Scottsdale, AZ, USA
2018 Chair, International Mammalian Synthetic Biology Workshop, Harvard Medical School, Boston, MA, USA
2018– Academic Member, Engineering Biology Research Consortium (EBRC)
2018 Organizing Committee, 2nd International Conference on Epigenetics and Bioengineering (EpiBio 2018), UCSF, San Francisco, CA, USA

2017 Chair, International Mammalian Synthetic Biology Workshop, Boston University, Boston, MA USA
2017 Chair, 1st International Conference on Epigenetics and Bioengineering (EpiBio 2017), Miami, FL, USA
2016 Co-Chair, International Mammalian Synthetic Biology Workshop, MIT, Cambridge, MA, USA
2016 Instructor, Cold Spring Harbor Laboratory Course on Synthetic Biology, Cold Spring Harbor, NY, USA
2016 Guest Editor, *Integrative Biology* special themed issue on Synthetic Biology (8: 380-382 (2016))
2015 Workshop Invitee, "Gene Regulation by the Numbers", Radcliffe Institute for Advanced Study, Harvard University, Cambridge, MA, USA
2015 Organizing Committee, International Mammalian Synthetic Biology Workshop, MIT, Cambridge, MA, USA.
2015 Organizing Committee, B-Debate International Center for Scientific Debate Meeting on Synthetic Biology, Barcelona, Spain
2014 NIH Study Section Ad Hoc Member, Special Emphasis Panel ZGM1 PPBC-Y(GN), Review of U01 Applications: Genomes to Natural Products
2014 Organizing Committee, Synthetic Biology Boston (SB2), Boston University, Boston, MA, USA
2014 NSF Advisory Panelist, Panel P140678, Division of Molecular and Cellular Biosciences
2013 Organizing Committee, Towards Next Generation Synthetic Biology, University of Warwick, UK
2013 Organizing Committee, Synthetic Biology Research & Innovation Partnership Campaign (US-UK Partnerships in Synthetic Biology), Boston University & UK Consulate, Boston, MA, USA
2013 NIH Study Section Ad Hoc Member, Special Emphasis Panel ZGM1 PPBC-A (NP), Genomes to Natural Products
2013 Organizing Committee & Session Chair, 4th International Conference on Biomolecular Engineering, Fort Lauderdale, FL, USA
2010 Workshop Invitee, "What Are the Potential Roles for Synthetic Biology in NASA's Mission?" NASA Ames Research Center, Moffett Field, CA, USA

Professional Societies

American Institute for Medical and Biological Engineering (AIMBE)
Biophysical Society (BPS)
Engineering Biology Research Consortium (EBRC)
Biomedical Engineering Society (BMES)

Editorial Board

eLife (Board of Reviewing Editors), Molecular Systems Biology, iScience (Cell Press), Scientific Reports (Nature)

Archival Journals Refereed (selected)

ACS Synthetic Biology, ACS Chemical Biology, APL Bioengineering, Biophysical Journal, Biotechnology Journal, Cell, Cell Chemical Biology, Cell Reports, Cell Systems, eLife, Frontiers in Antimicrobials, G3: Genes Genomes Genetics, Journal of Biological Engineering, Journal of Visualized Experiments, Molecular Biosystems, Molecular Cell, Nature Biomedical Engineering, Nature Biotechnology, Nature Chemical Biology, Nature Communications, Nature Methods, Nature Nanotechnology, Nature Protocols, Nucleic Acids Research, PLoS Computational Biology, PNAS, Resistance and Chemotherapy, Science

Teaching

Boston University, Department of Biomedical Engineering

Term	Subject Number	Title	Role (Evaluation)	Type / # of Students
Fall 2012	EK 424	Thermodynamics & Statistical Mechanics	Instructor (4.82/5.00) **AWARD**	Lecture / 78 Ugrad
Spring 2014	EK 424	Thermodynamics & Statistical Mechanics	Instructor (4.92/5.00)	Lecture / 81 Ugrad

Fall 2014	BE 700	Methods and Logic in Quantitative Biology	Instructor (N/A) **NEW COURSE**	Discussion / 11 Grad
Fall 2014	EK 424	Thermodynamics & Statistical Mechanics	Instructor (4.85/5.00)	Lecture / 87 Ugrad
Spring 2015	BE 402	Control Systems in Biomedical Eng.	Instructor (4.84/5.00) **AWARD**	Lecture / 130 Ugrad
Spring 2016	EK 424	Thermodynamics & Statistical Mechanics	Instructor (4.73/5.00) **AWARD**	Lecture / 74 Ugrad
Spring 2016	BE 402	Control Systems in Biomedical Eng.	Instructor (4.54/5.00) **AWARD**	Lecture / 110 Ugrad
Spring 2017	BE 402	Control Systems in Biomedical Eng.	Instructor (4.49/5.00)	Lecture / 154 Ugrad
Spring 2018	BE 700	Methods and Logic in Quantitative Biology	Instructor (4.95/5.00)	Discussion / 22 Grad
Fall 2018	BE 403	Biomedical Signals and Controls	Co-Instructor (4.23/5.00)	Lecture / 142 Ugrad
Spring 2020	BE 700	Methods and Logic in Quantitative Biology	Instructor (4.95/5.00)	Discussion / 26 Grad
Fall 2020	BE 403	Biomedical Signals and Controls	Instructor (4.65/5.00)	Lecture / 121 Ugrad
Spring 2021	BE 700	Methods and Logic in Quantitative Biology	Instructor (5.00/5.00)	Discussion / 24 Grad
Fall 2021	BE 403	Biomedical Signals and Controls	Instructor (4.68/5.00)	Lecture / 103 Ugrad
Spring 2022	BE 700	Methods and Logic in Quantitative Biology	Instructor (4.73/5.00)	Discussion / 24 Grad
Fall 2022	BE 403	Biomedical Signals and Controls	Instructor (4.69/5.00) **AWARD**	Lecture / 121 Ugrad
Spring 2023	BE 700	Methods and Logic in Quantitative Biology	Instructor (5.00/5.00)	Discussion / 27 Grad
Spring 2024	BE 700	Methods and Logic in Quantitative Biology	Instructor	Discussion / 25 Grad
Spring 2025	BE 700	Methods and Logic in Quantitative Biology	Instructor	Discussion / 30 Grad

Teaching

Harvard University, John A. Paulson School of Engineering and Applied Sciences

Term	Subject Number	Title	Role (Evaluation)	Type / # of Students
Spring 2026	APPHY 298R	Frontier Topics in Quantitative and Synthetic Biology	Instructor (5.00/5.00)	Discussion / 3 Ugrad, 4 Grad
Fall 2026	BE 110	Signals, Systems, and Control in Bioengineering	Instructor	Lecture /

Doctoral Theses

2026 Thesis Advisor: Daniel Hart, “Development of the Atmostat as a Tool for Anaerobic Microbial Ecology and Evolution,” Department of Biomedical Engineering, Boston University. (Co-Advisor: Dr. Seth Rakoff-Nahoum).

2026 Thesis Committee Member: James M. Robson, “Decoding Sequence-Structure-Function Relationships of Programmable RNA Sensors,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Alexander Green).

2026 Thesis Committee Member: Jaehoon Choi, “Signaling Motif Refactoring Uncovers Positional and Receptor Expression Dependency of ITIM in Chimeric Inhibitory Receptor,” Department of Biomedical Engineering, Boston University. (Advisor: Dr Wilson Wong).

2026 Thesis Committee Member: Ramya R. Desphande, “Engineering Cellular Self-Organization,” Engineering Sciences (Bioengineering), Harvard University. (Advisors: Drs. Michael Brenner and Wendell Lim).

2026 External Thesis Committee Member: Briana R. Lino, “Eukaryotic Release Factor Engineering to Enhance Noncanonical Amino Acid Incorporation in Yeast,” Biotechnology Engineering Program, Tufts Engineering. (Advisor: Dr. James Van Deventer).

2026 Thesis Committee Member: Jiayi Li, “RNA Reprogramming for RNA Sensing and Imaging in Live Cells,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Alexander Green).

2026 Thesis Committee Advisor: Ari Ben Fitzsimmons, “Noncanonical Structure and Mechanism of Organelle-Dedicated Signaling by GPR143,” Department of Biomedical Engineering, Boston University.

2026 Thesis Committee Chair: Quan Le, “Development of Drug-Stabilizable Molecular Tools for Modulating Protein Activity and Intracellular Signaling,” Department of Biomedical Engineering, Boston University. (Advisors: Dr. John Ngo).

2026 Thesis Committee Member: Sarah Catherine Adams, “Local Delivery of Small Molecules for Switch CAR T Cells to Improve Safety and Efficacy in Solid Tumors,” Department of Biomedical Engineering, Boston University. (Advisors: Drs. Wilson Wong and Mark Grinstaff).

2026 Thesis Committee Chair: Zhuoying (Joey) Huang, “Synthetic Receptor Engineering for Immune Control: Precision Targeting of Autoreactive T Cells and Quantitative Dissection of T Cell Fate,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Wilson Wong).

2026 Thesis Committee Chair: Yudan Li, “Adaptive Biosensors for Multiplexed Nucleic Acid Detection in Complex Biological Samples,” Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Alexander Green).

2026 External Thesis Committee Member: Kenneth Pham, “Consequences of Chromatin Mosaicism and Persistence in Neuronal Plasticity and Disease,” Cell and Molecular Biology Graduate Group, University of Pennsylvania. (Advisor: Dr. Jennifer Phillips-Cremins).

2026 Thesis Committee Chair: Cristian E. Coriano-Ortiz, “Engineering Optogenetic Tools for Protein Degradation in *Escherichia coli*,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Mary Dunlop).

2026 Thesis Committee Member: Hellen Huang, “Single-Cell Characterization and Optimization of Microbial Optogenetic Systems for Cellular Processes,” Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Mary Dunlop).

2025 Thesis Committee Chair: Samantha Fletcher, “Improving our Understanding of Microbiome Pathogen Colonization Resistance Through the Development of a Colon Epithelium Model,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Muhammad Zaman).

2025 Thesis Advisor: Charles Jo, “Ecological Determinants and Evolutionary Landscapes of Antibiotic Resistance,” Department of Biomedical Engineering, Boston University. (Co-Advisor: Dr. Seth Rakoff-Nahoum).

2025 Thesis Committee Chair: Scott Gaines, “Expanding Allosteric Transcription Factor-Based Biosensors Through the Design and Development of a Novel Estrogen Sensor,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. James Galagan).

2025 Thesis Committee Member: Noshin Nawar, “A Live-Cell Reporter to Track *Drosophila* Innate Immunity Reveals Heterogeneity in NF-kB Activation and Target Gene Expression,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Zeba Wunderlich).

2025 Thesis Committee Member: MacKenzie Patterson, “Evolution: How We Use It, and How It Works Around Us,” Biochemistry and Biophysics Graduate Program, Brandeis University. (Advisor: Dr. Dorothee Kern).

2025 Thesis Committee Member: Brett Michael Tingley, "Therapeutic TAC-nology & Targeted Drug Delivery for Precision Medicines," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Mark Grinstaff).

2025 Thesis Committee Chair: Padric Garden, "Harnessing the Untapped Potential of DNA Repair Enzymes for Biosensing," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Alexander Green).

2025 Thesis Advisor: Hanrong (Belle) Ye, "Unlocking Macrophage Engineering and Therapies with Synthetic Polarization Circuits," Department of Biomedical Engineering, Boston University.

2025 Thesis Committee Member: Kathryn Hoyt, "Investigation of the Metabolic Flexibility of *Eubacterium limosum* to Improve Methanol Utilization," Department of Chemical Engineering, Northeastern University. (Advisor: Dr. Benjamin Woolston).

2025 Thesis Committee Member: Milad Babaei, "Programmable Detection and Modification of Nucleic Acids," Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Alexander Green).

2025 Thesis Committee Member: Nin Rebecca Kang, "Adaptive Molecular Recognition Strategies for Multimodal Sensing in Biological Systems," Department of Biomedical Engineering, Boston University. (Advisor: Alexander Green).

2025 Thesis Advisor: Colin Kunze, "Synthetic Epigenetic Circuits to Investigate Robustness and Adaptability of Epigenetic Inheritance in S. pombe," Department of Biomedical Engineering, Boston University.

2025 Thesis Committee Chair: Cristina Tous, "Engineering Chemical- and Light-Inducible Split Proteins to Regulate RNA and Gene Expression in Mammalian Cells," Department of Biomedical Engineering, Boston University. (Advisor: Wilson Wong).

2024 Thesis Committee Member: Owen O'Connor, "Advancing Single-Cell Analysis: Deep Learning for Cell Segmentation and Tracking with Improved Metrics," Department of Biomedical Engineering, Boston University. (Advisor: Mary Dunlop).

2024 Thesis Committee Chair: Michael R. Silverstein, "Principles of Microbiome Structure and the Implications for Climate Change Mitigation," Bioinformatics Program, Boston University. (Advisor: Daniel Segrè).

2024 Thesis Committee Chair: Zhongyue Guo, "Protein Assemblies in their Natural Environment by Mid-Infrared Photothermal Microscopy," Department of Biomedical Engineering, Boston University. (Advisor: Ji-Xin Cheng).

2024 Thesis Advisor: Eli McPherson (MS), "Luminescence Detection in eVOLVER for Autonomous Bioreactor Control," Department of Biomedical Engineering, Boston University.

2024 Thesis Committee Chair: Ting-Ya (Sophia) Chang, "Identification of Functional Enhancers at Open Chromatin Regions Involved in Sex Specificity and Xenobiotic Metabolism Using In Vivo STARR-seq," Department of Biomedical Engineering, Boston University. (Advisor: Dr. David Waxman).

2024 Thesis Committee Member: Caroline Margret Blassick, "Characterizing Heterogeneity in *Escherichia Coli* Gene Expression and its Consequences for Antimicrobial Tolerance," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Mary Dunlop).

2024 Thesis Committee Chair: Xinwen Zhu, "Tools and Strategies for Gene Expression Control in Service of Understanding and Constructing Multicellular Systems," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Wilson Wong).

2024 Thesis Advisor: Adam Sanford, "Development of a Scalable Yeast-Based Functional Selection Platform to Enable the Discovery of Diverse Protein-Based G Protein-Coupled Receptor Modulators," Department of Biomedical Engineering, Boston University.

2024 Thesis Committee Member: Ajay Larkin, "Mapping the Dynamics of Epigenetic Adaptation," Molecular and Cell Biology Program, Brandeis University. (Advisor: Dr. Kaushik Ragunathan).

2024 Thesis Committee Member: Anna C. Berenson, “Paired One-Hybrid Assays to Detect DNA-Binding Cooperativity and Antagonism Across Transcription Factors,” Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Juan Fuxman Bass).

2024 Thesis Committee Member: Jacob Quinn Shenker, “Exploring Protein and Circuit Design Spaces Using Massively Parallel Microscopy-Based Screening,” Systems, Synthetic, and Quantitative Biology Program, Harvard University. (Advisor: Dr. Johan Paulsson).

2024 Thesis Committee Chair: Jingyao Chen, “Engineering Genetic Circuits to Expand Cell-Free Sensing and Cancer Immunotherapy Applications,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Wilson Wong).

2024 Thesis Committee Member: Chelsea Joy Webber, “Modulating Immune System Activation in Neurodegenerative Disease,” Department of Pharmacology, Boston University School of Medicine. (Advisor: Dr. Benjamin Wolozin).

2024 Dissertation Advising Committee: Smriti Pandey, “Directed Evolution and Protein Engineering of Genome Editing Proteins,” Biological and Biomedical Science PhD Program, Harvard University. (Advisor: Dr. David Liu)

2023 Thesis Committee Member (MS): Xuexin (Sherinx) Li, “Engineering Synthetic Notch Receptors and Activation-Inhibition Genetic Circuits to Regulate Gene Expression Levels,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Wilson Wong)

2023 Thesis Committee Chair: Jing Zhang, “Methods for Studying and Manipulating Microbial Ecosystems,” Bioinformatics Program, Boston University. (Advisor: Dr. Daniel Segrè).

2023 Thesis Committee Chair: Indorica Sutradhar, “Using One Health Approaches to Study Effects of Antibiotic Stewardship on AMR Development,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Muhammad Zaman).

2023 Thesis Advisor: Kok Ann Gan, “SynZiFTR 2.0: The Development of Improved Synthetic Human Transcription Activation Factors,” Molecular Biology, Cell Biology & Biochemistry Program, Boston University.

2023 Thesis Committee Chair: Menna Yamany Siddiqui, “Engineering Universal Chimeric Antigen Receptor Systems to Expand Cell Therapy Applications,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Wilson Wong).

2023 Thesis Advisor: Keith Gagnon “Tools for the Mechanistic Dissection of Mutation-Specific Carcinogenesis,” MD/PhD Program, Department of Biomedical Engineering, Boston University. (Co-Advisor: Dr. Christopher Chen).

2023 Thesis Committee Chair (MS): Amit Eshed, “Aptamer-Based Sequence Verification Platform for Rapid Multiplexed Detection of Viral RNA Targets,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Alex Green).

2023 Thesis Committee Chair: Sebastian Jusuf, “Antimicrobial Phototherapy: Mechanisms and Translation,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Ji-Xin Cheng).

2023 Thesis Committee Member: Chloe Ding, “Orthogonal Inducible Control of Cas13 Circuits Enables Programmable RNA Regulation in Mammalian Cells,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Wilson Wong).

2023 Thesis Committee Chair: Eric Bressler, “Engineering Biomaterial-Enhanced Therapeutics to Control Locally Aggressive Malignancies,” Department of Biomedical Engineering, Boston University. (Advisors: Drs. Mark Grinstaff and Wilson Wong)

2023 Thesis Committee Chair: Nathan Tague, “Utilizing Light as an Input and Output for Synthetic Biology and Metabolic Engineering,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Mary Dunlop)

2023 Thesis Committee Member: Mark S. Aronson, “Biophysical Methods Bridging Signal Pathway Architecture and Dynamics in Multigenerational Bacterial Processes,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Allyson Sgro).

2022 Thesis Committee Member (MS): Priyam S. Ambastha, "Developing a Microfluidic Device for Detecting Antibiotic Tolerance in Bacteria," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Christine McBeth).

2022 Thesis Committee Member: Sean F. Sullivan, "Regulon Engineering for the Assimilation of Non-Native Carbon Sources in *Saccharomyces cerevisiae*," Biotechnology Engineering, Tufts University. (Advisor: Dr. Nikhil Nair)

2022 Thesis Advisor: Zachary J. Heins, "Development of the eVOLVER Continuous Culture Platform for High-Throughput Phage-Assisted Continuous Evolution," Department of Biomedical Engineering, Boston University.

2022 Thesis Advisor: Meghan D.J. Bragdon, "Cooperative Assembly Confers Regulatory Specificity and Promotes Evolution," Molecular Biology, Cell Biology & Biochemistry Program, Boston University.

2022 Thesis Committee Chair: Elena Forchielli, "Metabolic Phenotypes of Marine Heterotrophic Bacteria," Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Daniel Segrè).

2022 External PhD Examiner: Tiasha Ayumi Shafiq, "Locus-Dependent Epigenetic Inheritance of Polycomb-Mediated Gene Silencing," Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. Danesh Moazed).

2022 Thesis Committee Member: Seunghee Lee, "Engineering Inhibitory Chimeric Antigen Receptor for Adoptive T Cell and NK Cell Therapy," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Wilson Wong).

2022 External PhD Examiner: Nader Alerasool, "Systematic Characterization of Transcriptional Regulators by Site-Specific Protein Recruitment," Department of Molecular Genetics, University of Toronto. (Advisor: Dr. Mikko Taipale).

2021 Thesis Committee Chair: Hannah L. Dotson, "Chemogenetic Control of Gene Expression and Protein Function with Small Molecules," Department of Biomedical Engineering, Boston University. (Advisor: Dr. John T. Ngo).

2021 Thesis Advisor: Emma A. Briars, "Development of Methods to Diagnose and Predict Antibiotic Resistance Using Synthetic Biology and Computational Approaches," Bioinformatics Program, Boston University.

2021 Thesis Committee Chair: Shannon Tunney, "Construction of Molecular Tools Through Protein Excision and Splicing," Department of Biomedical Engineering, Boston University. (Advisor: Dr. John T. Ngo).

2021 Thesis Committee Chair: Brian J. Haas, "Bioinformatic Tool Developments with Applications to RNA-seq Data Analysis and Clinical Cancer Research," Bioinformatics Program, Boston University. (Advisors: Drs. Aviv Regev and Simon Kasif).

2021 Thesis Committee Member: Mary Morrison, "Broadening the Scope of Phage-Assisted Continuous Evolution," Department of Molecular and Cellular Biology, Harvard University. (Advisor: Dr. David R. Liu).

2021 Thesis Committee Member: Negin Zaraee, "Interferometric Imaging for Pathogenic Bacteria Identification and Antibiotic Susceptibility Testing," Department of Electrical and Computer Engineering, Boston University. (Advisor: Dr. Selim Ünlü).

2020 Thesis Committee Member: Christine Nykyforchyn Goldfarb, "Sex-Biased and Xenobiotic-Responsive Long Non-Coding RNAs in Mouse Liver: Sub-Cellular Localization, Liver Cell-Type Specificity, and Knockdown by Epigenetic Reprogramming," Department of Biomedical Engineering, Boston University. (Advisor: Dr. David J. Waxman).

2020 Thesis Committee Member: Alexander S. Garruss, "Accelerating the Understanding and Development of Intracellular Biosensors by Massively Multiplexed Experimentation and Machine Learning," Biomedical Informatics, Division of Medical Sciences, Harvard University. (Advisor: Dr. George Church).

2020 Thesis Committee Member: Alan R. Pacheco, "Environmental Modulation of Microbial Ecosystems," Bioinformatics Program, Boston University. (Advisor: Dr. Danel Segrè).

2020 Thesis Committee Chair: Ariel M. Langevin, "Dynamics and Evolution of Efflux Pump-Mediated Antibiotic Resistance," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Mary Dunlop).

2020 Thesis Committee Chair: Elliot Tague, "Engineering Novel Chemosensory Proteins to Respond to Antiviral Drugs," Department of Biomedical Engineering, Boston University. (Advisor: Dr. John Ngo).

2020 Thesis Advisor: Divya V. Israni, "Advanced Gene Expression Control in Therapeutic Human Cells Using Synthetic Transcriptional Programs," Department of Biomedical Engineering, Boston University.

2020 Thesis Committee Member: Bernardo Cervantes, "Tool Development for the Rapid Identification of Microbiome Manipulating Agents," Microbiology Graduate Program, MIT. (Advisors: Drs. James J. Collins and Kristala Prather).

2020 Thesis Committee Member: Ross D. Jones, "Genetic Devices for Robust, Context-Independent Control of Gene Expression Levels in Mammalian Cells," Department of Biological Engineering, MIT. (Advisors: Drs. Ron Weiss and Domitilla Del Vecchio).

2020 Thesis Committee Chair: David B. Bernstein, "Probabilistic Metabolic Modeling of Microbial Communities," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Daniel Segré).

2020 Thesis Committee Member: Isaak E. Müller, "Engineering Probiotic Microbes for *In Vivo* Applications," Microbiology Graduate Program, MIT. (Advisor: Dr. Timothy K. Lu).

2020 Thesis Committee Member: Rebecca T. Cottman, "Engineering CTCF DNA-Binding Specificity to Alter Gene Expression and Genome Topology in Human Cells," Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. J. Keith Joung).

2020 External PhD Examiner: Gergana Shipkovenska, "Requirements for Epigenetic Inheritance of Heterochromatin in Fission Yeast," Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. Danesh Moazed).

2020 Thesis Committee Member: Surojit Biswas, "Principles of Machine Learning-Guided Protein Engineering," Bioinformatics and Integrative Genomics, Division of Medical Sciences, Harvard University. (Advisor: Dr. George Church).

2020 Thesis Advisor: Christopher P. Mancuso, "Environmental Fluctuations Modulate Microbial Competition, Diversity, and Persistence," Department of Biomedical Engineering, Boston University.

2020 Thesis Committee Chair: Meghan Thommes, "Strategies for Engineering Microbial Communities," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Daniel Segrè).

2020 Thesis Committee Member: Wei-Hsi Yeh, "*In Vivo* Delivery and Therapeutic Applications of Base Editors," Speech and Hearing Bioscience and Technology, Division of Medical Sciences, Harvard University. (Advisor: Dr. David Liu).

2020 Thesis Committee Chair: Tiebin Wang, "Fitness Costs in Antibiotic Resistance and Metabolic Engineering," Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Mary Dunlop).

2019 Thesis Committee Member: James Angstman, "Characterizing and Reducing Spurious DNA Edits by CRISPR Cytosine Base Editors," Department of Molecular and Cellular Biology, Harvard University. (Advisor: Dr. J. Keith Joung).

2019 Thesis Committee Member: Puting Dong, "Single-Cell Pump Probe Imaging of Intrinsic Chromophores Identifies Diagnostic Marker and Therapeutic Target of Diseases," Department of Chemistry, Boston University. (Advisor: Dr. Ji-Xin Cheng).

2019 Thesis Committee Member: Robert J. Seager, "Toward a Quantitative Understanding of Cancer Cell Signaling: Mathematical Models, Computational Tools, Applications, and Beyond," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Muhammad Zaman).

2019 Thesis Committee Chair: Patricia Marie Aquino, "Genome-Wide Identification and Characterization of Transcription Factor-DNA Binding Interactions in Bacteria," Department of Biomedical Engineering, Boston University. (Advisor: Dr. James Galagan).

2019 Thesis Committee Member: Demetrius DiMucci, "Machine Learning Applications for Synthetic Microbial Ecology: Predicting Interactions and Identifying Their Putative Mechanisms," Bioinformatics Program, Boston University. (Advisor: Dr. Danel Segrè).

2019 Thesis Committee Chair: Jessica Keenan, "Characterizing Mechanisms of Regulatory Specificity in the Nuclear Receptors and General Transcriptional Cofactors," Bioinformatics Program, Boston University. (Advisor: Dr. Trevor Siggers).

2019 Thesis Advisor: Minhee Park, "Engineering a Synthetic Epigenetic System," Department of Biomedical Engineering, Boston University.

2019 Thesis Committee Member (MS): Charles Jo, "A Co-Culture Microplate Platform to Quantify Microbial Interactions and Growth Dynamics," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Daniel Segrè).

2019 Thesis Co-Advisor (MS): Abdul Bhuiya, "Amplification-Free Detection of Transcriptional Biomarkers of Antibiotic Resistance Using Interferometric Reflectance Imaging Sensor (IRIS)," Department of Biomedical Engineering, Boston University.

2019 Thesis Committee Member: Pierce J. Ogden, "Dissecting Protein Fitness Landscapes Using DNA Synthesis and Sequencing: Case Studies in AAV and Beyond," Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. George Church).

2019 Thesis Co-Advisor: James Chuang, "Genomic Analyses of Transcription Elongation Factors and Intragenic Transcription," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Fred Winston).

2019 Thesis Advisor (MS): Maria Simbirsky, "Continuous Culture of Bacteria Under Antibiotic Response," Department of Biomedical Engineering, Boston University.

2019 Thesis Committee Chair: James Needham, "Multiplexed Antibody Kinetics Using the Interferometric Reflectance Imaging Sensor," Department of Biomedical Engineering, Boston University. (Advisor: Dr. M. Selim Ünlü).

2019 Thesis Committee Member: Jang Hwan Cho, "Synthetic Biology Approaches to Improve Cell-Based Cancer Immunotherapy," Department of Biomedical Engineering, Boston University. (Advisors: Drs. Wilson Wong and James Collins).

2018 Thesis Committee Member: Nicholas Rossi, "Noise and Information in Bacterial Multigene Stress Response Systems," Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Mary Dunlop).

2018 Thesis Committee Member: Demarcus Briers, "Mathematical Modeling and Pattern Design in Networks of Mammalian Cells," Bioinformatics Program, Boston University. (Advisor: Dr. Calin Belta).

2018 Thesis Committee Chair: Nitinun Bell Varongchayakul, "Protein Sensing Using Solid-State Nanopore," Department of Biomedical Engineering, Boston University. (Advisors: Dr. Mark Grinstaff, Dr. Amit Meller).

2018 Thesis Committee Member: Andrew M. Shumaker, "Discovery and Characterization of an Antimicrobial Toxin of the Gut Symbiont *Bacteroides fragilis*," Chemical Biology PhD Program, Harvard University. (Advisors: Dr. Pamela Silver, Dr. Laurie E. Comstock).

2018 Thesis Committee Member: Joshua E. Goldford, "Multi-Scale Metabolism: From the Origin of Life to Microbial Ecology," Bioinformatics Program, Boston University. (Advisor: Dr. Daniel Segrè).

2018 Thesis Advisor: Nikit Patel, "Engineering Biological Networks Using Cooperative Transcription Factor Assembly," Department of Biomedical Engineering, Boston University.

2018 Thesis Committee Member: Jason M. Gehrke, “Engineering High-Precision CRISPR-Cas9 Nuclease and Base Editor Technologies,” Department of Molecular and Cellular Biology, Harvard University (Advisor: Dr. J. Keith Joung).

2018 Thesis Advisor: Brandon G. Wong, “Design, Development and Application of an Automated Framework for Cell Growth and Laboratory Evolution,” Department of Biomedical Engineering, Boston University.

2018 Thesis Committee Member: Johnny H. Hu, “Directed Evolution of Cas9 for Mammmalian Genome Editing,” Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. David Liu).

2018 Thesis Committee Chair: Benjamin H. Weinberg, “Engineering Biocomputers in Mammalian Cells,” Department of Biomedical Engineering, Boston University (Advisor: Dr. Wilson Wong).

2018 Thesis Advisor: Szilvia Kiriakov, “Synthetic Epigenetics in Yeast,” Molecular Biology, Cell Biology & Biochemistry Program, Boston University.

2017 Thesis Committee Chair: Deboki Chakravarti, “Recombinase-Based Genetic Circuits in Human T Cells for Cellular Immunotherapy,” Department of Biomedical Engineering, Boston University (Advisor: Dr. Wilson Wong).

2017 Thesis Co-Advisor: Ning Mao, “Exploiting the Benefits of Probiotics for Intestinal Disease Diagnosis and Therapy,” Department of Biomedical Engineering, Boston University (Advisor: Dr. James Collins).

2017 Thesis Committee Member: Arion Stettner, “How Evolutionary Objectives and the Intracellular Environment Shape Metabolic Fluxes,” Department of Biomedical Engineering, Boston University (Advisor: Dr. Daniel Segrè).

2017 Thesis Committee Member: Derin Sevenler, “Development of a Digital Microarray with Interferometric Reflectance Imaging,” Department of Biomedical Engineering, Boston University (Advisor: Dr. M. Selim Ünlü).

2017 Thesis Advisor: Dana Braff, “Technological Advancements Towards Paper-Based Biomolecular Diagnostics,” Department of Biomedical Engineering, Boston University.

2017 Thesis Advisor: Saloni Jain, “Quinolone Mechanism of Action: Sensitivity, Mutagenesis and Tolerance,” Department of Biomedical Engineering, Boston University.

2017 Thesis Committee Member: Tyler E. Wagner, “Engineering a Regulatory Framework for Synthetic Self-Amplifying RNA Circuits,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Ron Weiss).

2016 Thesis Committee Member: William Hesse, “Quantitative Analysis of Proteotoxicity Associated with Neurodegenerative Disease,” Department of Biological Engineering, MIT. (Advisor: Dr. Susan Lindquist).

2016 Thesis Committee Chair: Swati Banerjee, “Reliable Gene Expression and Assembly for Synthetic Biological Devices in E. coli Through Customized Promoter Insulator Elements and Automated DNA Assembly,” Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Douglas Densmore).

2016 Thesis Advisor: Ali Beyzavi, “Investigation of the Heat Shock Response in Yeast: Quantitative Modeling and Single-Cell Microfluidic Studies,” Department of Mechanical Engineering, Boston University.

2016 Thesis Committee Member: Deepak Mishra, “Principles for the Design and Construction of Synthetic Circuits Utilizing Protein-Protein Interactions in Saccharomyces cerevisiae,” Department of Biological Engineering, MIT. (Advisor: Dr. Ron Weiss).

2015 Thesis Committee Member: Yu Sun, “Improving Recombineering Beyond Escherichia coli MG1655 Through the Broad Host-Range Expression of Metagenomic Libraries of Recombinases,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. George M. Church).

2015 Thesis Committee Member: Haiyao Huang, “Fluigi: An End-to-End Software Workflow for Microfluidic Design,” Department of Electrical and Computer Engineering, Boston University. (Advisor: Dr. Douglas Densmore).

2015 Thesis Committee Chair: Christopher Jacobs, “Functional and Evolutionary Implications of In Silico Gene Deletion Studies,” Bioinformatics Program, Boston University. (Advisor: Dr. Daniel Segrè).

2015 Thesis Committee Member: Sonia V. Iverson, “Improved Modular Multipart Assembly, Development of a DNA Part Toolkit for E. coli, and Applications in Traditional Biology and Bioelectronic Systems,” Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Douglas Densmore).

2015 Thesis Committee Member: Evan Appleton, “A Design-Build-Test-Learn Tool for Synthetic Biology,” Bioinformatics Program, Boston University. (Advisor: Dr. Douglas Densmore).

2015 Thesis Committee Member: Yasha Sharma, “Collective Cell Motility in 3-Dimensions: Dynamics, Adhesions, and Emergence of Heterogeneity,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Muhammad Zaman).

2015 Thesis Committee Chair: Elif Seymour, “Improvement of a Microarray-based Immunosensor for Rapid and Robust Detection of Viral Pathogens,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. M. Selim Ünlü).

2015 Thesis Committee Member: James E. DiCarlo, “Engineering Yeast Genomes and Populations,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. George M. Church).

2015 Thesis Committee Member: Michael T. Mee, “Controlling Microbial Community Dynamics Through Engineered Metabolic Dependencies,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. George M. Church).

2015 Thesis Committee Member: Russell-John Krom, “Bacteriophage Technologies and Their Application to Synthetic Gene Networks,” MD/PhD Program, Boston University School of Medicine (Advisor: Dr. James J. Collins).

2015 Thesis Committee Member: Tyler J. Ford, “Engineering Escherichia coli Fatty Acid Metabolism for the Production of Biofuel Precursors,” Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. Pamela A. Silver).

2014 Thesis Committee Member: Sandeep Choubey, “Biophysical Models of Transcription in Cells,” Graduate Program in Physics, Brandeis University. (Advisor: Dr. Jané Kondev).

2014 Thesis Committee Member: Anna Lyubetskaya, “Transcription Factor Binding Distribution and Properties in Prokaryotes,” Bioinformatics Program, Boston University. (Advisor: Dr. James Galagan).

2014 Thesis Committee Chair: Paul Iazzetti, “High-Throughput Binding Characterization of Bacterial Transcription Factors,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. James Galagan).

2014 Thesis Committee Chair: Suma Jaini, “Methods for Functional Characterization of Transcription Factor Binding Sites in Bacteria,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. James Galagan).

2014 Thesis Committee Chair: Jason P. Keller, “A Microfluidic Platform for Quantitative Analysis of Single Mycobacteria Cells,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. James Galagan).

2014 Thesis Committee Member: Mara C. Inniss, “Tracking Cell Fate with Synthetic Memory and Pulse Detecting Transcriptional Circuits,” Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. Pamela A. Silver).

2014 Thesis Committee Member: Jun Li, “Towards Construction of Synthetic Ribosomes and a Self-Replicating System,” Biological Sciences in Dental Medicine, Harvard University. (Advisor: Dr. George M. Church).

2013 Thesis Committee Member: Wen-Han Yu, "Quantitative Studies of Mycobacterial Single Cell Dynamics Using a Synthetic Gene Oscillator," Bioinformatics Program, Boston University. (Advisor: Dr. James Galagan).

2013 Thesis Committee Member: Irina Glotova, "Reconstruction of Lipid Metabolism Regulatory Network in Mycobacterium Tuberculosis," Bioinformatics Program, Boston University. (Advisor: Dr. James Galagan).

2013 Thesis Committee Member: Antonio Gomes, "Computational Approaches to Deciphering Regulatory Circuits in Mycobacterium tuberculosis From ChIP-Seq Data, and Developing Theoretical Strategies to Combat Drug-Resistant Infections," Bioinformatics Program, Boston University. (Advisor: Dr. James Galagan).

2012 Thesis Committee Chair: Sheetal Modi, "Systems Biology Approaches to Mechanisms of Bacterial Stress Adaptation," Department of Biomedical Engineering, Boston University. (Advisor: Dr. James J. Collins).

2012 Thesis Committee Member: Nicole M. Vega, "Induction of Antibiotic Tolerance in Bacteria by Self-Produced and Inter-Species Signaling," Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. James J. Collins).

2012 Thesis Committee Chair: Jonathan A. Winkler, "Improving Antibiotic Activity by Manipulating Bacterial Reactive Oxygen Species Metabolism," Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. James J. Collins).

2012 Thesis Committee Chair: Kyle R. Allison, "Engineering Solutions to Persistent Bacteria," Department of Biomedical Engineering, Boston University. (Advisor: Dr. James J. Collins).