Kate E Galloway

Synthetic biology · Cell fate engineering · Molecular systems biology

Massachusetts Institute of Technology, 25 Ames St 66-570A, Cambridge, MA 02420

katiegal@mit.edu | gallowaylab.mit.edu | 0000-0001-7416-3193

Biography

Katie Galloway is an assistant professor of Chemical Engineering at the Massachusetts Institute of Technology. Her lab focuses on developing integrated gene circuits and identifying the systems-level principles that govern cell-fate transitions with the goal of engineering cell and gene therapies. Galloway earned her PhD in Chemical Engineering from the California Institute of Technology, and a BS in Chemical Engineering from University of California at Berkeley. She completed her postdoctoral work at USC Stem Cell in the Keck School of Medicine. Her research has been featured in *Science, Cell Stem Cell, Cell Systems, Nucleic Acids Research, Development, and Cell Reports*. She has won multiple fellowships and awards including the NSF CAREER, the Pershing Square MIND Prize, the BMES Cellular and Molecular Bioengineering Rising Star Award, Princeton's CBE Saville Lecture Award, NIH Maximizing Investigators' Research Award, the C. Michael Mohr Award for Undergraduate Teaching in Chemical Engineering at MIT, and Caltech's Everhart Award.

Education

California Institute of Technology *Pasadena, CA*

PhD Chemical Engineering, minor Biology *2007 - 2012*

- Advisor: Dr. Christina D Smolke
- Thesis: Development of RNA-based control systems and their application to the *Saccharomyces cerevisiae* pheromone-responsive MAPK pathway

California Institute of Technology *Pasadena, CA*

MS Chemical Engineering *2005 - 2007*

University of California, Berkeley *Berkeley, CA*

BS Chemical Engineering *2001 - 2005*

- Graduated with Honors; NCAA Women's Crew Team; NCAA Women's Soccer Team

Publications

Principal Investigator

Pre-prints

31. Johnstone, CP, Love KS, Kabaria, SK, Jones, RD, Blanch-Asensio, A, Peterman EL, Ploessl, DS, Lee, J Yun, J Oakes, CG, Mummery, CL, Davis, RP, DeKosky, BJ, Zandstra, PW, and **Galloway, KE** . Gene syntax defines supercoiling-mediated transcriptional feedback. *bioRxiv*. 2025. Link.

30. Beitz AM, Teves, J, Oakes, CG, Johnstone, CP Wang, NB, Brickman,JM and **Galloway, KE**. Cells transit through a quiescent-like state to convert to neurons at high rates. *bioRxiv*. 2024. Link.

29. Blanch-Asensio, A, Ploessl, DS, Wang, NB, Mummery, CL, **KE Galloway***, Davis, RP*. STRAIGHT-IN Dual: A platform for dual, single-copy integrations of DNA payloads and gene circuits into human induced pluripotent stem cells. *bioRxiv*. 2024. **Co-corresponding.* Link.

Published

28. Kabaria, KS, Bae, Y, Beitz AM Lende-Dorn BA Ehmann, ME, Ehmann,Peterman, EL, Love KS, Ploessl, DS, and **Galloway, KE**. Programmable promoter editing for precise control of transgene expression. *Nature Biotechnology*. 2024. Link.

27. Lende-Dorn BA, Atkinson JC, Bae Y, and **KE Galloway**. Chemogenetic tuning reveals optimal MAPK signaling for cell fate programming. *Cell Reports*. 2025. Link.

26. Peterman EL, Love KS, Sanabria, V, Daniels, RF, Johnstone CP, Ploessl, DS, Kabaria, KS, Godavarti, DR, Pai, A, and **KE Galloway**. High-resolution profiling reveals coupled transcriptional and translational regulation of transgenes. *Nucleic Acids Research*. 2025. Link.

25. Love KS, Johnstone CP, Peterman EL, Gaglione S, Birnbaum, ME and **Galloway, KE**. Model-guided design of microRNA-based gene circuits supports precise dosage of transgenic cargoes into diverse primary cells. *Cell Systems*. 2025. Link

24. A Zouein, B Lende-Dorn, **KE Galloway**, T Ellis, F Ceroni. Engineered transcription factor binding arrays for DNA-based gene expression control in mammalian cells. *Trends in Biotechnology*. 2025. Link

23. Wang NB, Adewumi HO, Lende-Dorn BA, Beitz AM, O'Shea TM, and **Galloway, KE**. Compact transcription factor cassettes generate functional, engraftable neurons by direct conversion *Cell Systems*. 2025.Link

22. Wang NB, Lende-Dorn BA, Adewumi HO, Beitz AM, Han P, O'Shea TM, and **Galloway, KE**. Proliferation history and transcription factor levels drive direct conversion. *Cell Systems*. 2025. Link

21. Rivnay, J, Raman, R, Robinson, JT Christian Schreib, C, Tzahi Cohen-Karni, T, **KE Galloway**, Omid Veiseh, O. Integrating bioelectronics with cell-based synthetic biology *Nature Review Bioengineering*. 2025. Link

20. **Galloway, KE** and Johnstone, CP. Bringing neural networks to life. *Science*. 2024. Link

19. I. Incer, A. Pandey, E. Peterman, N. Nolan, **K. E. Galloway**, R. M. Murray, E. D. Sontag, and D. Del Vecchio. Guaranteeing system-level properties in genetic circuits subject to context effects *In Proc. 2024 63rd IEEE Conference on Decision and Control (CDC)*, 2024. Link

18. **Galloway, KE**. Rewinding the tape to identify intrinsic determinants of reprogramming potential. *Cellular Reprogramming*. 2024. Link

17. Peterman, EL, Ploessl, DS, and **Galloway, KE**. Accelerating diverse cell-based therapies through scalable design. *Annual Review of Chemical and Biomolecular Engineering*. 2024. Link

16. **Galloway, KE**. Changes in cell-cycle rate drive diverging cell fates. *Nature Reviews Genetics*. 2024. Link

15. Takahashi, K, and **Galloway, KE**. RNA-based controllers for engineering gene and cell therapies. *Current Opinion in Biotechnology*. 2023. Link

14. Johnstone, CP and **Galloway, KE**. Supercoiling-mediated feedback rapidly couples and tunes transcription.*Cell Reports*. 2022. Link

13. Cabera, A* , Edelstein, HI*, Glykofrydis, F*, Love, KS*, Palacios, S* Tycko, J*, Zhang, M*, Lensch, S, Shields, CE, Livingston, M, Weiss,R, Zhao, H, Haynes, KA, Morsut, L, Chen, YY, Khalil, AS, Wong, WW, Collins, JJ, Rosser, SJ, Karen Polizzi, K, Elowitz, MB, Fussenegger, M, Hilton, IB, Leonard, JN, Bintu, L, **Galloway, KE**, Deans, TL. The sound of silence: transgene silencing in mammalian cell engineering. *Cell Systems*. 2022. Link

12. Wang, NB and **Galloway, KE**. Evaluation of Lee et al.: Clarity and interpretation of mutual information in promoter transfer functions. *Cell Systems*. 2021. Link

11. Beitz, AM, Oakes, CG, and **Galloway, KE**. Synthetic gene circuits as tools for drug discovery. *Trends In Biotechnology*. 2021. Link

10. Johnstone, CP and **Galloway, KE**. Engineering cellular symphonies out of transcriptional noise. *Nature Reviews Molecular Cell Biology* 2021. Link

9. Johnstone, CP*, Wang, NB*, Sevier, SA, and **Galloway, KE**. Understanding and engineering chromatin as a dynamical system across length and time scales. *Cell Systems*. 2020. **These authors contributed equally to this work.* Link

8. Wang, NB, Beitz, AM, and **Galloway, KE**. Engineering cell fate: Applying synthetic biology to cellular reprogramming. *Current Opinion in Systems Biology*. 2020. Link

Postdoctoral

7. Babos, KN*, **Galloway, KE*,†**, Kisler, K, Zitting, M, Li, Y, Shi, Y, Quintino, B, Chow, RH, Zlokovic, BV, and Ichida, JK.† Mitigating antagonism between transcription and proliferation allows near-deterministic cellular reprogramming. *Cell Stem Cell*. 2019. **These authors contributed equally to this work.†Co-corresponding.* Link

6. Ichida, JK, Staats, KA, Davis-Dusenbery, BN, Clement, K, **Galloway, KE**, Babos, KN, Son, EY, Kiskinis, E, Atwater, N, Gu, H, Gnirke, A, Meissner, A, and Eggan, K. Comparative genomic analysis of embryonic, lineage-converted, and stem cell-derived motor neurons. *Development*. 2018. Link

5. **Galloway, KE** and Ichida, JK. Modeling neurodegenerative diseases and neurodevelopmental disorders with reprogrammed cells. Stem Cells, Tissue Engineering and Regenerative Medicine. D.A. Warburton, Ed. (World Scientific, New Jersey, 2015).

4. Franco, E and **Galloway, KE**. Feedback loops in biological networks. Computational Methods in Synthetic Biology. M. A. Marchisio, Ed. (Springer New York, 2015). Link

Graduate and Pre-graduate

3. **Galloway, KE**, Franco, E, and Smolke, CD. Dynamically reshaping signaling networks to program cell fate via genetic controllers. *Science*. 2013 Link

2. Chen, YY*, **Galloway, KE***, and Smolke, CD. Synthetic biology: advancing biological frontiers by building synthetic systems. *Genome Biology*. 2012. **These authors contributed equally to this work*. Link

1. Kostal, J, Mulchandani, A, **Gropp, KE**, and Chen, WA. Temperature Responsive Biopolymer for Mercury Remediation. *Environmental Science & Technology*. 2003. Link

Select Awards & Honors

2025	**MIND Prize Awardee**, Pershing Square Foundation
2024	**Frontiers of Engineering 2024 Selected Attendee** , National Academy of Engineering
2024	**C. Michael Mohr Award for Undergraduate Teaching**, MIT Chemical Engineering
2024	**NSF CAREER Award**, National Science Foundation
2023	**Dudley A. Saville Lecturer**, Department of Chemical and Biological Engineering, Princeton
2023	**Rosalind Franklin Medal Finalist**, Rosalind Franklin Society
2023	**Cellular and Molecular Bioengineering Rising Star**, Biomedical Engineering Society
2022-2025	**W. M. Keck Career Development Professor in Biomedical Engineering**, MIT ChemE
2017-2019	**Maggie McKnight Russell Memorial Postdoctoral Fellow Award**, ARCS
2011	**Everhart Lecturer**, Caltech Everhart Committee
	Caltech, Awarded yearly to three graduate students for research excellence
2006	**Honorable Mention**, National Science Foundation
	NSF, Graduate Research Fellowship Program
2001-2005	**Scholar**, Reagent's and Chancellor's Scholarship
	University of California, Berkeley, Top 1% of incoming students

Professional Activities

2022-2025	**Early Career Advisory Board**, Stem Cell Reports
2022-2025	**Founder and Organizer**, Boston Mammalian Synthetic Biology Symposium
2024	**Conference Chair**, Mammalian Synthetic Biology Workshop (mSBW)
2020-2025	**Organizing committee**, Mammalian Synthetic Biology Workshop (mSBW)
2022-2025	**Organizing committee**, Synthetic Biology, Evolution, Engineering, and Design (SEED)
2020-2023	**Organizing committee**, Epigenetics and Bioengineering (EpiBio)
2023	**Conference Chair**, International Conference on Biomolecular Engineering (ICBE)
2022-2025	**Organizing committee**, Synthetic Biology for Future Health-Wellcome Trust
2019-2023	**Theme and session chair**, AIChE Annual Meeting, Bioengineering (Division 15)
2021-2023	**Session chair**, American Chemical Society (ACS)-BIOT
2022-2025	**Advisory Board**, Cell Reports
	Ad hoc reviewer, Science, Cell, Nature Biotechnology, Cell Systems, Nucleic Acids
2019-2026	Research, PNAS, Nature Communications, Cell Chemical Biology, Science Advances, Cell Reports, ACS Synthetic Biology, eLife, Oxford Synthetic Biology