

Kate E Galloway

SYNTHETIC BIOLOGY · REPROGRAMMING · MOLECULAR SYSTEMS BIOLOGY

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Biography

Katie Galloway is the W. M. Keck Career Development Professor in Biomedical Engineering and Chemical Engineering at the Massachusetts Institute of Technology. Her lab focuses on developing integrated gene circuits and elucidating the systems-level principles that govern cell-fate transitions with the goal of engineering cell and gene therapies. Galloway earned a PhD and an MS 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 the University of Southern California. Her research has been featured in *Science*, *Cell Stem Cell*, *Cell Systems*, *Cell Reports*, and *Development*. She has won multiple fellowships and awards including the NSF CAREER, the BMES Cellular and Molecular Bioengineering Rising Star Award, Princeton's CBE Saville Lecture Award, NIH Maximizing Investigators' Research Award, the NIH F32, 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

17. Peterman, EL, Ploessl, DS, and **Galloway, KE**. Accelerating diverse cell-based therapies through scalable design. *Annual Review of Chemical and Biomolecular Engineering*. (In press) 2024. [Link](#)
16. **Galloway, KE**. Changes in cell-cycle rate drive diverging cell fates. *Nature Reviews Genetics*. 2024. [Link](#)
15. 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. *bioRxiv*. 2023. [Link](#) *In revision at Cell Systems*.
14. Takahashi, K, and **Galloway, KE**. RNA-based controllers for engineering gene and cell therapies. *Current Opinion in Biotechnology*. 2023. [Link](#)
13. Johnstone, CP and **Galloway, KE**. Supercoiling-mediated feedback rapidly couples and tunes transcription. *Cell Reports*. 2022. [Link](#)
12. 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](#)
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](#)

Awards & Honors

- 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
- 2019-2022 **Charles and Hilda Roddey Career Development Chair**, MIT ChemE
- 2017-2019 **Maggie McKnight Russell Memorial Postdoctoral Fellow Award**, ARCS
ARCS, Awarded to one outstanding USC postdoctoral scholar
- 2018 **2nd Place at the Annual UCI Postdoctoral Symposium**, University of California, Irvine
UCI, TED talk-style competition for open to all Southern California postdocs
- 2017 **1st Place at the Annual Postdoctoral Symposium**, USC Postdoctoral Association
USC, TED talk-style competition
- 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
- 2001-2005 **Most Valuable Student**, Elks Foundation
Elks National Foundation, Top 500 students nationally

Professional Memberships

American Chemical Society
American Institute of Chemical Engineers
Biomedical Engineering Society
Society for Biological Engineering
International Society for Stem Cell Research

Professional Activities

2022-2024 **Founder and Organizer**, Boston Mammalian Synthetic Biology Symposium
2022-2024 **Advisory Board**, Cell Reports
2022-2024 **Early Career Advisory Board**, Stem Cell Reports
2020-2024 **Organizing committee**, Mammalian Synthetic Biology Workshop (mSBW)
2020-2023 **Organizing committee**, Epigenetics and Bioengineering (EpiBio)
2022-2023 **Conference Chair**, International Conference on Biomolecular Engineering (ICBE)
2022-2023 **Organizing committee**, Synthetic Biology, Evolution, Engineering, and Design (SEED)
2022-2024 **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
Adhoc reviewer, Science, PNAS, Cell Systems, Nucleic Acids Research, Nature
2019-2023 Communications, Cell Chemical Biology, Science Advances, Cell Reports, ACS Synthetic Biology, eLife, Oxford Synthetic Biology, Current Opinion in Biomedical Engineering

Teaching Experience

2019-2024 **10.10: Introduction to Chemical Engineering**, Instructor, 6.5/7 *MIT*
2021-2022 **10.521: Design Principles in Mammalian Systems + Synthetic Biology**, Instructor, 6.5/7 *MIT*
2020-2024 **UROP: "How to Science" + Computational modeling of gene circuits**, Instructor *MIT*

Outreach

2021-2024 **Faculty Host**, Graduate Women in Chemical Engineering (GWICHE) monthly coffee hour
2019-2024 **Mentor**, MIT Chemical Engineering Rising Stars Program
2020-2024 **Developer and instructor**, Tutorial series: Modeling gene circuits + basic research methods
2020-2024 **STEM Speaker**, Warren High School AVID club; college-prep for first-gen students