

Saurabh Malani, PhD

Co-Founder and CTO, Fermeate | Activate Fellow, Cyclotron Road at Berkeley Lab

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PROFILE

Co-founder and CTO of Fermeate, a Princeton University spin-out that uses light in place of chemical inducers to control precision fermentation. Chemical engineer by training (PhD, Princeton; BS, UC Berkeley; A*STAR National Science Scholar) working across synthetic biology, optogenetics, bioprocess engineering, and physics-informed machine learning. 2026 Activate Fellow and Cyclotron Road Entrepreneurial Fellow at Lawrence Berkeley National Laboratory.

ENTREPRENEURSHIP

Co-Founder and Chief Technology Officer

Nov 2024 – Present

Fermeate

San Francisco, CA

Uses light to control engineered microbes, raising yield and lowering the cost of precision fermentation for food, materials, and medicine. Spun out of doctoral research at Princeton, and the first company to apply optogenetics to microbial biomanufacturing.

- Built and lead a team of seven across light-responsive strain engineering, light-delivery hardware for bioreactors, and model-based process control.
- Raised \$2M from SOSV SF (formerly IndieBio), Newfund, Ajinomoto Group Ventures, Plug and Play, and other investors.
- Won non-dilutive funding from DARPA and the ReFED Catalytic Grant Fund.
- Won the 2025 Sustainable Protein Startup Competition, run by Enterprise Singapore and the Bezos Centre for Sustainable Protein at NUS.
- Selected for the SOSV SF program and the BEAM Circular 2026 Accelerator.

Activate Fellow and Cyclotron Road Entrepreneurial Fellow

Jun 2026 – Present

Lawrence Berkeley National Laboratory

Berkeley, CA

Two-year fellowship for science entrepreneurs, hosted at Berkeley Lab and supported by the U.S. Department of Energy Lab-Embedded Entrepreneurship Program. Activate's 2026 cohort has 50 fellows nationwide, 10 of them at Berkeley.

EDUCATION

PhD, Chemical and Biological Engineering

2024

Princeton University

Princeton, NJ

Dissertation: *Data-Driven and Mechanistic Modeling for the Optogenetic Control of Microbial Consortia*

Advisors: José L. Avalos (Princeton) and Yannis G. Kevrekidis (Johns Hopkins)

MA, Chemical and Biological Engineering

2021

Princeton University

Princeton, NJ

BS, Chemical Engineering, Highest Honors

2018

University of California, Berkeley

Berkeley, CA

Dean's List, five semesters

HONORS AND AWARDS

National Science Scholarship (BS-PhD)

2015 – 2024

Agency for Science, Technology and Research (A*STAR), Singapore

Singapore government scholarship for undergraduate and doctoral study in science and engineering.

RESEARCH EXPERIENCE

Doctoral Researcher

Sep 2019 – Nov 2024

Princeton University, Avalos and Kevrekidis Groups

Princeton, NJ

- Built a closed-loop optogenetic bioreactor platform: 3D-printed LED arrays driven by Arduino, automated sampling to a flow cytometer, and software linking instruments for real-time feedback control.
- Demonstrated closed-loop control of population ratios in optogenetically controlled yeast-yeast consortia for chemical production.
- Developed grey-box (physics-informed) neural networks that enforce known physical constraints and learn interpretable quantities, such as reaction and growth rates, from partially observed data.
- Built mechanistic models of *S. cerevisiae* metabolism and characterized optogenetic dose response and kinetics of engineered strains in continuous bioreactors, with HPLC and flow cytometry analysis.

Research Officer

Jul 2018 – Jul 2019

Biotransformation Innovation Platform, A*STAR (now SIFBI)

Singapore

- Modeled stirred-tank fermentation bioreactors in OpenFOAM and COMSOL to characterize industrial-scale vessels and support a digital twin for scale-up and scale-down.
- Tuned PID controllers for fermentation tanks.

Undergraduate Researcher

Aug 2016 – May 2018

University of California, Berkeley, Ager Group

Berkeley, CA

- Modeled a coaxial cylindrical reactor in MATLAB and COMSOL for two-stage electrochemical reduction of CO₂ to C-C coupled products on spatially separated catalysts.
- Derived dimensionless groups to guide scale-up of the reactor design. Work contributed to a paper in *ACS Applied Energy Materials*.

Research Intern

2015 – 2016

A*STAR

Singapore

- **Institute of Chemical and Engineering Sciences**, now ISCE2 (2016): studied potassium-doped iron-based metal-organic frameworks as Fischer-Tropsch catalysts. Ran furnaces and a fixed-bed reactor, and imaged samples by SEM.
- **Experimental Therapeutics Centre**, now EDDC (2015): synthesized and purified small-molecule anticancer candidates, characterized by HPLC and NMR.

PUBLICATIONS

Five peer-reviewed articles, 150+ citations (Google Scholar).

PEER-REVIEWED ARTICLES

1. T. Kichuk, S. Dhamankar, **S. Malani**, W. A. Hofstadter, S. A. Wegner, I. M. Cristea, J. L. Avalos (2024). [Using MitER for 3D analysis of mitochondrial morphology and ER contacts](#). *Cell Reports Methods* 4(1), 100692.
2. W. Benman, S. Datta, D. Gonzalez-Martinez, ..., **S. Malani**, ..., L. J. Bugaj (2023). [High-throughput feedback-enabled optogenetic stimulation and spectroscopy in microwell plates](#). *Communications Biology* 6, 1192.
3. **S. Malani**, T. Bertalan, T. Cui, J. L. Avalos, M. Betenbaugh, I. G. Kevrekidis (2023). [Some of the variables, some of the parameters, some of the times, with some physics known: Identification with partial information](#). *Computers & Chemical Engineering* 178, 108343.
4. F. P. Kemeth, T. Bertalan, N. Evangelou, T. Cui, **S. Malani**, I. G. Kevrekidis (2021). [Initializing LSTM internal states via manifold learning](#). *Chaos: An Interdisciplinary Journal of Nonlinear Science* 31(9), 093111.

5. Gurudayal, D. Perone, **S. Malani**, Y. Lum, S. Haussener, J. W. Ager (2019). [Sequential cascade electrocatalytic conversion of carbon dioxide to C–C coupled products](#). *ACS Applied Energy Materials* 2(6), 4551-4559.

PREPRINTS AND MANUSCRIPTS IN PREPARATION

6. K. Xu*, A. Giannakopoulou*, V. Jiang*, **S. Malani**, M. T. Walls, C. P. Brangwynne, J. L. Avalos (2026). [Enhanced GPP synthesis by Erg20p-peptide fusions and biomolecular condensates boosts monoterpene production in yeast](#). *bioRxiv*. **SUBMITTED** *Co-first authors
7. **S. Malani** et al. Multi-modal optogenetic control of microbial consortia. *In preparation*.

DISSERTATION

8. **S. Malani** (2024). Data-driven and mechanistic modeling for the optogenetic control of microbial consortia. *PhD dissertation, Princeton University*.

PRESENTATIONS

- 2026 Bioeconomy: Capital, Community and Connections. *SF Climate Week*. **PANELIST**
- 2024 **S. Malani**, S. A. García-Echauri, Y. G. Kevrekidis, J. L. Avalos. Closed-loop control of microbial population ratio in optogenetically controlled yeast-yeast consortia. *U.S. DOE Genomic Science Program Annual PI Meeting*. **POSTER**
- 2023 **S. Malani**, T. Bertalan, T. Cui, M. Betenbaugh, J. L. Avalos, I. G. Kevrekidis. Some of the variables, some of the times, with some things known: Identification with partial information. *Machine Learning and Dynamical Systems Seminar, The Alan Turing Institute*. **INVITED TALK**
- 2023 **S. Malani**, S. A. García-Echauri, J. L. Avalos. Optogenetic control of a yeast-yeast consortium for chemical production. *U.S. DOE Genomic Science Program Annual PI Meeting*. **POSTER**
- 2022 **S. Malani**, T. Bertalan, T. Cui, M. Betenbaugh, J. L. Avalos, I. G. Kevrekidis. Some of the variables, some of the times, with some things known: Identification with partial information. *AIChE Annual Meeting*. **TALK**
- 2022 **S. Malani**, I. G. Kevrekidis, J. L. Avalos. Optogenetic strategies for the control and optimization of microbial consortia. *3rd Optogenetic Technologies and Applications Conference*. **TALK**
- 2021 F. P. Kemeth, **S. Malani**, T. Bertalan, N. Evangelou, T. Cui, I. G. Kevrekidis. Initializing the internal states of LSTM neural networks via manifold learning. *AIChE Annual Meeting*. **TALK**

TEACHING AND MENTORING

Graduate Mentor, iGEM Team UPenn

2021

International Genetically Engineered Machine Competition

Advised an undergraduate team that built an open-source optogenetic plate reader, later published in *Communications Biology* (2023). The team won Best Foundational Advance, Best Hardware, and Best Presentation, and placed in the top 10 undergraduate teams worldwide.

SKILLS

Company building	Fundraising and investor relations, customer development and partnerships, technoeconomic modeling
Bioprocess and lab	Fermentation and continuous bioreactors, optogenetics, strain and enzyme engineering, HPLC, flow cytometry, closed-loop process control
AI and machine learning	Physics-informed (grey-box) neural networks, recurrent networks and manifold learning, system identification. Daily use of AI coding agents (Claude Code) to build software, lab tools, and analysis pipelines
Modeling	Mechanistic metabolic models, model predictive control, CFD (OpenFOAM, COMSOL Multiphysics)
Programming	Python, MATLAB, R, Java
Hardware	Custom electronics and PCB design, Arduino, 3D printing, welding and fabrication, lab and pilot equipment builds