



Michael Christopher Jewett

Professor of Bioengineering

Bio

BIO

Michael Jewett is a Professor of Bioengineering at Stanford University. He received his B.S. from UCLA and PhD from Stanford University, both in Chemical Engineering. He completed postdoctoral studies at the Center for Microbial Biotechnology in Denmark and the Harvard Medical School. Jewett was also a guest professor at the Swiss Federal Institute of Technology (ETH Zurich). His research group focuses on advancing synthetic biology research to support planet and societal health, with applications in medicine, manufacturing, sustainability, and education.

ACADEMIC APPOINTMENTS

- Professor, Bioengineering
- Member, Bio-X

ADMINISTRATIVE APPOINTMENTS

- Professor, Bioengineering, (2023- present)

HONORS AND AWARDS

- American Institute of Chemical Engineers Division 15C Plenary Award, AIChE (2021)
- Finalist, Blavatnik National Awards for Young Scientists, Life Sciences Category, Blavatnik Awards for Young Scientists (2019)
- Biochemical Engineering Journal Young Investigator Award, BEJ (2018)
- American Chemical Society Biological Technologies Division Young Investigator Award, ACS (2017)
- Camille Dreyfus Teacher-Scholar Award, The Dreyfus Foundation (2015)
- 3M Non-tenured Faculty Grant, 3M (2012)
- David and Lucile Packard Fellowship for Science and Engineering, The Packard Foundation (2011)
- Defense Advanced Research Projects Agency Young Faculty Award, DARPA (2011)
- Agilent Early Career Professor Award, Agilent (2011)
- NIH Pathway to Independence Award, National Institutes of Health (2008)

PROFESSIONAL EDUCATION

- Ph.D., Stanford University , Chemical Engineering (2005)
- M.S., Stanford University , Chemical Engineering (2001)
- B.S., University of California, Los Angeles , Chemical Engineering (1999)

Teaching

COURSES

2023-24

- Principles of Synthetic Biology: BIOE 240 (Aut)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Natalie Kolber

Postdoctoral Faculty Sponsor

Sam Crowe, John Lazar

Doctoral Dissertation Advisor (AC)

Ravalika Damerla, Laura Guerrero, Brenda Wang, Kyle Zolkin

Doctoral (Program)

Veronica Bot, Brian Kang

Publications

PUBLICATIONS

- **Carbon-negative production of acetone and isopropanol by gas fermentation at industrial pilot scale** *NATURE BIOTECHNOLOGY*
Liew, F., Nogle, R., Abdalla, T., Rasor, B. J., Canter, C., Jensen, R. O., Wang, L., Strutz, J., Chirania, P., De Tissera, S., Mueller, A. P., Ruan, Z., Gao, et al
2022; 40 (3): 335-+
- **On-demand biomanufacturing of protective conjugate vaccines** *SCIENCE ADVANCES*
Stark, J. C., Jaroentomeechai, T., Moeller, T. D., Hershewe, J. M., Warfel, K. F., Moricz, B. S., Martini, A. M., Dubner, R. S., Hsu, K. J., Stevenson, T. C., Jones, B. D., DeLisa, M. P., Jewett, et al
2021; 7 (6)
- **In vitro prototyping and rapid optimization of biosynthetic enzymes for cell design.** *Nature chemical biology*
Karim, A. S., Dudley, Q. M., Juminaga, A., Yuan, Y., Crowe, S. A., Heggestad, J. T., Garg, S., Abdalla, T., Grubbe, W. S., Rasor, B. J., Coar, D. N., Torculas, M., Krein, et al
2020; 16 (8): 912-919
- **BioBits (TM) Bright: A fluorescent synthetic biology education kit** *SCIENCE ADVANCES*
Stark, J. C., Huang, A., Nguyen, P. Q., Dubner, R. S., Hsu, K. J., Ferrante, T. C., Anderson, M., Kanapskyte, A., Mucha, Q., Packett, J. S., Patel, P., Patel, R., Qaq, et al
2018; 4 (8): eaat5107
- **Cell-free protein synthesis from genomically recoded bacteria enables multisite incorporation of noncanonical amino acids** *NATURE COMMUNICATIONS*
Martin, R. W., Des Soye, B. J., Kwon, Y., Kay, J., Davis, R. G., Thomas, P. M., Majewska, N. I., Chen, C. X., Marcum, R. D., Weiss, M., Stoddart, A. E., Amiram, M., Charna, et al
2018; 9: 1203
- **Single-pot glycoprotein biosynthesis using a cell-free transcription-translation system enriched with glycosylation machinery.** *Nature communications*
Jaroentomeechai, T. n., Stark, J. C., Natarajan, A. n., Glasscock, C. J., Yates, L. E., Hsu, K. J., Mrksich, M. n., Jewett, M. C., DeLisa, M. P.
2018; 9 (1): 2686
- **Protein synthesis by ribosomes with tethered subunits** *NATURE*
Orelle, C., Carlson, E. D., Szal, T., Florin, T., Jewett, M. C., Mankin, A. S.
2015; 524 (7563): 119-U289

- **Cell-Free Systems for the Production of Glycoproteins.** *Methods in molecular biology (Clifton, N.J.)*
Bidstrup, E. J., Kwon, Y. H., Kim, K., Bandi, C. K., Aw, R., Jewett, M. C., DeLisa, M. P.
2024; 2762: 309-328
- **Improving Cell-Free Expression of Model Membrane Proteins by Tuning Ribosome Cotranslational Membrane Association and Nascent Chain Aggregation.** *ACS synthetic biology*
Steinkuhler, J., Peruzzi, J. A., Kruger, A., Villasenor, C. G., Jacobs, M. L., Jewett, M. C., Kamat, N. P.
2023
- **Establishing a versatile toolkit of flux enhanced strains and cell extracts for pathway prototyping.** *Metabolic engineering*
Yi, X., Rasor, B. J., Boadi, N., Louie, K., Northen, T. R., Karim, A. S., Jewett, M. C., Alper, H. S.
2023
- **At-Home, Cell-Free Synthetic Biology Education Modules for Transcriptional Regulation and Environmental Water Quality Monitoring.** *ACS synthetic biology*
Jung, J. K., Rasor, B. J., Rybnicky, G. A., Silverman, A. D., Standeven, J., Kuhn, R., Granito, T., Ekas, H. M., Wang, B. M., Karim, A. S., Lucks, J. B., Jewett, M. C.
2023
- **A Cell-Free Protein Synthesis Platform to Produce a Clinically Relevant Allergen Panel.** *ACS synthetic biology*
Thames, A. H., Rische, C. H., Cao, Y., Krier-Burris, R. A., Kuang, F. L., Hamilton, R. G., Bronzert, C., Bochner, B. S., Jewett, M. C.
2023
- **Glycovaccinology: The design and engineering of carbohydrate-based vaccine components.** *Biotechnology advances*
Hulbert, S. W., Desai, P., Jewett, M. C., DeLisa, M. P., Williams, A. J.
2023: 108234
- **A rapid cell-free expression and screening platform for antibody discovery.** *Nature communications*
Hunt, A. C., Vögeli, B., Hassan, A. O., Guerrero, L., Kightlinger, W., Yoesep, D. J., Krüger, A., DeWinter, M., Diamond, M. S., Karim, A. S., Jewett, M. C.
2023; 14 (1): 3897
- **Rapid biosynthesis of glycoprotein therapeutics and vaccines from freeze-dried bacterial cell lysates.** *Nature protocols*
Stark, J. C., Jaroentomeechai, T., Warfel, K. F., Hershewe, J. M., DeLisa, M. P., Jewett, M. C.
2023
- **Point-of-Care Peptide Hormone Production Enabled by Cell-Free Protein Synthesis** *ACS SYNTHETIC BIOLOGY*
DeWinter, M. A., Thames, A., Guerrero, L., Kightlinger, W., Karim, A. S., Jewett, M. C.
2023; 12 (4): 1216-1226
- **Community science designed ribosomes with beneficial phenotypes.** *Nature communications*
Kruger, A., Watkins, A. M., Wellington-Oguri, R., Romano, J., Kofman, C., DeFoe, A., Kim, Y., Anderson-Lee, J., Fisker, E., Townley, J., Eterna Participants, d'Aquino, A. E., Das, R., et al
2023; 14 (1): 961
- **At-home, cell-free synthetic biology education modules for transcriptional regulation and environmental water quality monitoring.** *bioRxiv : the preprint server for biology*
Jung, K. J., Rasor, B. J., Rybnicky, G. A., Silverman, A. D., Standeven, J., Kuhn, R., Granito, T., Ekas, H. M., Wang, B. M., Karim, A. S., Lucks, J. B., Jewett, M. C.
2023
- **A low-cost recombinant glycoconjugate vaccine confers immunogenicity and protection against enterotoxigenic Escherichia coli infections in mice.** *Frontiers in molecular biosciences*
Williams, A. J., Warfel, K. F., Desai, P., Li, J., Lee, J., Wong, D. A., Nguyen, P. M., Qin, Y., Sobol, S. E., Jewett, M. C., Chang, Y., DeLisa, M. P.
2023; 10: 1085887
- **Computationally-guided design and selection of high performing ribosomal active site mutants.** *Nucleic acids research*
Kofman, C., Watkins, A. M., Kim, D. S., Willi, J. A., Wooldredge, A. C., Karim, A. S., Das, R., Jewett, M. C.
2022
- **Three-dimensional structure-guided evolution of a ribosome with tethered subunits.** *Nature chemical biology*
Kim, D. S., Watkins, A., Bidstrup, E., Lee, J., Topkar, V., Kofman, C., Schwarz, K. J., Liu, Y., Pintilie, G., Roney, E., Das, R., Jewett, M. C.

2022

- **In vitro ribosome synthesis and evolution through ribosome display.** *Nature communications*
Hammerling, M. J., Fritz, B. R., Yoesep, D. J., Kim, D. S., Carlson, E. D., Jewett, M. C.
2020; 11 (1): 1108
- **Expanding the limits of the second genetic code with ribozymes.** *Nature communications*
Lee, J., Schwieter, K. E., Watkins, A. M., Kim, D. S., Yu, H., Schwarz, K. J., Lim, J., Coronado, J., Byrom, M., Anslyn, E. V., Ellington, A. D., Moore, J. S., Jewett, et al
2019; 10 (1): 5097
- **Engineered ribosomes with tethered subunits for expanding biological function.** *Nature communications*
Carlson, E. D., d'Aquino, A. E., Kim, D. S., Fulk, E. M., Hoang, K., Szal, T., Mankin, A. S., Jewett, M. C.
2019; 10 (1): 3920
- **Computational design of three-dimensional RNA structure and function.** *Nature nanotechnology*
Yesselman, J. D., Eiler, D. n., Carlson, E. D., Gotrik, M. R., d'Aquino, A. E., Ooms, A. N., Kladwang, W. n., Carlson, P. D., Shi, X. n., Costantino, D. A., Herschlag, D. n., Lucks, J. B., Jewett, et al
2019
- **Cell-free biomanufacturing** *CURRENT OPINION IN CHEMICAL ENGINEERING*
Bundy, B. C., Hunt, J., Jewett, M. C., Swartz, J. R., Wood, D. W., Frey, D. D., Rao, G.
2018; 22: 177–83
- **How many human proteoforms are there?** *Nature chemical biology*
Aebersold, R. n., Agar, J. N., Amster, I. J., Baker, M. S., Bertozzi, C. R., Boja, E. S., Costello, C. E., Cravatt, B. F., Fenselau, C. n., Garcia, B. A., Ge, Y. n., Gunawardena, J. n., Hendrickson, et al
2018; 14 (3): 206–14
- **A Pressure Test to Make 10 Molecules in 90 Days: External Evaluation of Methods to Engineer Biology.** *Journal of the American Chemical Society*
Casini, A. n., Chang, F. Y., Eluere, R. n., King, A. M., Young, E. M., Dudley, Q. M., Karim, A. n., Pratt, K. n., Bristol, C. n., Forget, A. n., Ghodasara, A. n., Warden-Rothman, R. n., Gan, et al
2018
- **Precise Manipulation of Chromosomes in Vivo Enables Genome-Wide Codon Replacement** *SCIENCE*
Isaacs, F. J., Carr, P. A., Wang, H. H., Lajoie, M. J., Sterling, B., Kraal, L., Tolonen, A. C., Gianoulis, T. A., Goodman, D. B., Reppas, N. B., Emig, C. J., Bang, D., Hwang, et al
2011; 333 (6040): 348-353
- **Continued Protein Synthesis at Low [ATP] and [GTP] Enables Cell Adaptation during Energy Limitation** *JOURNAL OF BACTERIOLOGY*
Jewett, M. C., Miller, M. L., Chen, Y., Swartz, J. R.
2009; 191 (3): 1083-1091
- **An integrated cell-free metabolic platform for protein production and synthetic biology** *MOLECULAR SYSTEMS BIOLOGY*
Jewett, M. C., Calhoun, K. A., Voloshin, A., Wu, J. J., Swartz, J. R.
2008; 4
- **Metabolic modeling of cell-free protein synthesis reactions.** *229th National Meeting of the American-Chemical-Society (ACS)*
Calhoun, K. A., Varner, J., Jewett, M. C., Swartz, J. R.
AMER CHEMICAL SOC.2005: U194–U194
- **Substrate replenishment extends protein synthesis with an in vitro translation system designed to mimic the cytoplasm** *BIOTECHNOLOGY AND BIOENGINEERING*
Jewett, M. C., Swartz, J. R.
2004; 87 (4): 465-472
- **Mimicking the Escherichia coli cytoplasmic environment activates long-lived and efficient cell-free protein synthesis** *BIOTECHNOLOGY AND BIOENGINEERING*
Jewett, M. C., Swartz, J. R.
2004; 86 (1): 19-26

- **Using cell-free biology to study systems biology.** *227th National Meeting of the American-Chemical Society*
Swartz, J. R., Calhoun, K. A., Jewett, M. C.
AMER CHEMICAL SOC.2004: U255–U255
- **Systems approach to translation: Defining the protein production rate dependence on cell extract concentration.**
Jewett, M. C., Underwood, K. A., Swartz
AMER CHEMICAL SOC.2004: U131
- **Rapid expression and purification of 100 nmol quantities of active protein using cell-free protein synthesis** *BIOTECHNOLOGY PROGRESS*
Jewett, M. C., Swartz, J. R.
2004; 20 (1): 102-109
- **Cell-free protein synthesis with prokaryotic combined transcription-translation.** *Methods in molecular biology (Clifton, N.J.)*
Swartz, J. R., Jewett, M. C., Woodrow, K. A.
2004; 267: 169-182