



Steven Banik

Assistant Professor of Chemistry

 Curriculum Vitae available Online

Bio

BIO

Steven Banik's research interests center on rewiring mammalian biology and chemical biotechnology development using molecular design and construction. Projects in the Banik lab combine chemical biology, organic chemistry, protein engineering, cell and molecular biology to precisely manipulate the biological machines present in mammalian cells. Projects broadly aim to perform new functions that shed light on regulatory machinery and the potential scope of mammalian biology. A particular focus is the study of biological mechanisms that can be coopted by synthetic molecules (both small molecules and proteins). These concepts are applied to develop new therapeutic strategies for treating aging-related disorders, genetic diseases, and cancer.

Prior to joining the faculty at Stanford, Steven was a NIH and Burroughs CASI postdoctoral fellow advised by Prof. Carolyn Bertozzi at Stanford. His postdoctoral research developed approaches for targeted protein degradation from the extracellular space with lysosome targeting chimeras (LYTACs). He received his Ph.D. from Harvard University in 2016, where he worked with Prof. Eric Jacobsen on synthetic methods for the selective, catalytic difluorination of organic molecules and new approaches for generating and controlling reactive cationic intermediates in asymmetric catalysis.

ACADEMIC APPOINTMENTS

- Assistant Professor, Chemistry
- Member, Bio-X
- Member, Wu Tsai Human Performance Alliance
- Institute Scholar, Sarafan ChEM-H
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Faculty Fellow, Stanford ChEM-H, (2021- present)

PROFESSIONAL EDUCATION

- Postdoc, Stanford University , Chemical Biology
- B.S., University of Wisconsin–Madison , Chemistry (2011)
- Ph.D., Harvard University , Chemistry (2017)

Teaching

COURSES

2025-26

- The Chemical Principles of Life II: CHEM 143 (Spr)

2024-25

- The Chemical Principles of Life II: CHEM 143 (Spr)

2023-24

- The Chemical Principles of Life II: CHEM 143 (Spr)

2022-23

- The Chemical Principles of Life II: CHEM 143 (Spr)

STANFORD ADVISEES

Med Scholar Project Advisor

Qusay Omran

Doctoral Dissertation Reader (AC)

Harrison Besser, Dayne Goss, Yuan Jia, Alby Joseph, Basel Karim, Christina Lee, Tara Lowensohn, Shadler Nguyen, Lisha Ou, Elizabeth Park, Daria Passow, Francesca Starvaggi

Postdoctoral Faculty Sponsor

Melissa Gray, Robert Lusi, Christine Ng, Jeonghye Yu

Doctoral Dissertation Advisor (AC)

Jennifer Co, Felix Majewski, Chris Matthews, Giovan McKnight, Corey Model, Salvador Moncayo von Hase, Qusay Omran, Katelyn Randal, Stephanie Robinson, Benjamin Rosenbluth, Cara Starnbach

Publications

PUBLICATIONS

- **Improved protein binder design using β -pairing targeted RFdiffusion.** *Nature communications*
Sappington, I., Toul, M., Lee, D. S., Robinson, S. A., Goreshnik, I., McCurdy, C., Chan, T. C., Buchholz, N., Huang, B., Vafeados, D., Garcia-Sanchez, M., Roullier, N., Glögl, et al
2026
- **Generating Surprisingly Powerful Pharmacology from Chemically Induced Protein Interactions.** *Accounts of chemical research*
Hinshaw, S. M., Banik, S. M., Gray, N. S.
2025
- **A β -hydroxybutyrate shunt pathway generates anti-obesity ketone metabolites.** *Cell*
Moya-Garzon, M. D., Wang, M., Li, V. L., Lyu, X., Wei, W., Tung, A. S., Raun, S. H., Zhao, M., Coassolo, L., Islam, H., Oliveira, B., Dai, Y., Spaas, et al
2024
- **Targeted protein relocalization via protein transport coupling.** *Nature*
Ng, C. S., Liu, A., Cui, B., Banik, S. M.
2024
- **Molecular glues and induced proximity: An evolution of tools and discovery.** *Cell chemical biology*
Robinson, S. A., Co, J. A., Banik, S. M.

2024

- **Elucidating the cellular determinants of targeted membrane protein degradation by lysosome-targeting chimeras.** *Science (New York, N.Y.)*
Ahn, G., Riley, N. M., Kamber, R. A., Wisnovsky, S., Moncayo von Hase, S., Bassik, M. C., Banik, S. M., Bertozzi, C. R.
2023; 382 (6668): eadf6249
- **An exercise-inducible metabolite that suppresses feeding and obesity.** *Nature*
Li, V. L., He, Y., Contrepois, K., Liu, H., Kim, J. T., Wiggenhorn, A. L., Tanzo, J. T., Tung, A. S., Lyu, X., Zushin, P. H., Jansen, R. S., Michael, B., Loh, et al
2022
- **CRISPR-Suppressor Scanning Unsticks Molecular Glues.** *ACS central science*
Robinson, S. A., Banik, S. M.
2022; 8 (4): 408-411
- **Recent advances in induced proximity modalities.** *Current opinion in chemical biology*
Ng, C. S., Banik, S. M.
1800; 67: 102107
- **Taming transcription factors with TRAFACs.** *Cell chemical biology*
Ng, C. S., Banik, S. M.
2021; 28 (5): 588-590
- **LYTACs that engage the asialoglycoprotein receptor for targeted protein degradation.** *Nature chemical biology*
Ahn, G., Banik, S. M., Miller, C. L., Riley, N. M., Cochran, J. R., Bertozzi, C. R.
2021
- **Degradation from the outside in: targeting extracellular and membrane proteins for degradation through the endolysosomal pathway.** *Cell chemical biology*
Ahn, G., Banik, S. M., Bertozzi, C. R.
2021
- **Spreading of a mycobacterial cell surface lipid into host epithelial membranes promotes infectivity.** *eLife*
Cambier, C. J., Banik, S. M., Buonomo, J. A., Bertozzi, C. R.
2020; 9
- **Lysosome-targeting chimaeras for degradation of extracellular proteins.** *Nature*
Banik, S. M., Pedram, K., Wisnovsky, S., Ahn, G., Riley, N. M., Bertozzi, C. R.
2020
- **Membrane-tethered mucin-like polypeptides sterically inhibit binding and slow fusion kinetics of influenza A virus.** *Proceedings of the National Academy of Sciences of the United States of America*
Delaveris, C. S., Webster, E. R., Banik, S. M., Boxer, S. G., Bertozzi, C. R.
2020
- **A Plasma Protein Network Regulates PM20D1 and N-Acyl Amino Acid Bioactivity.** *Cell chemical biology*
Kim, J. T., Jedrychowski, M. P., Wei, W., Fernandez, D., Fischer, C. R., Banik, S. M., Spiegelman, B. M., Long, J. Z.
2020
- **Catalytic, Enantioselective 1,2-Difluorination of Cinnamamides** *ORGANIC LETTERS*
Haj, M. K., Banik, S. M., Jacobsen, E. N.
2019; 21 (13): 4919-23
- **Lysosome Targeting Chimeras (LYTACs) for the Degradation of Secreted and Membrane Proteins** *ChemRxiv*
Banik, S. M., Pedram, K., Wisnovsky, S., Riley, N. M., Bertozzi, C. R.
2019
- **Catalytic Diastereo- and Enantioselective Fluoroamination of Alkenes** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Mennie, K. M., Banik, S. M., Reichert, E. C., Jacobsen, E. N.
2018; 140 (14): 4797-4802

- **Lewis acid enhancement by hydrogen-bond donors for asymmetric catalysis** *SCIENCE*
Banik, S. M., Levina, A., Hyde, A. M., Jacobsen, E. N.
2017; 358 (6364): 761-764
- **Lewis acid enhancement by hydrogen-bond donors for asymmetric catalysis** *Science*
Banik, S. M., Levina, A., Hyde, A. M., Jacobsen, E. N.
2017; 358: 761-764
- **Catalytic 1,3-Difunctionalization via Oxidative C–C Bond Activation** *Journal of the American Chemical Society*
Banik, S. M., Mennie, K. M., Jacobsen, E. N.
2017; 139 (27): 9152-9155
- **Catalytic, asymmetric difluorination of alkenes to generate difluoromethylated stereocenters** *Science*
Banik, S. M., Medley, J. W., Jacobsen, E. N.
2016; 353 (6294): 51-54
- **Catalytic, Diastereoselective 1,2-Difluorination of Alkenes** *Journal of the American Chemical Society*
Banik, S. M., Medley, J. W., Jacobsen, E. N.
2016; 138 (15): 5000-5003
- **Chemoselective pd-catalyzed oxidation of polyols: synthetic scope and mechanistic studies.** *Journal of the American Chemical Society*
Chung, K., Banik, S. M., De Crisci, A. G., Pearson, D. M., Blake, T. R., Olsson, J. V., Ingram, A. J., Zare, R. N., Waymouth, R. M.
2013; 135 (20): 7593-7602