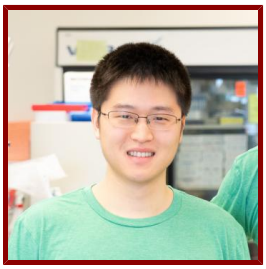
Stanford



Alex Gao

Assistant Professor of Biochemistry

Bio

ACADEMIC APPOINTMENTS

- Assistant Professor, Biochemistry
- Member, Bio-X

PROFESSIONAL EDUCATION

- Junior Fellow, Harvard Society of Fellows (2022)
- PhD, Massachusetts Institute of Technology , Biological Engineering (2020)
- MS, Stanford University , Electrical Engineering (2014)
- BS, Stanford University , Chemistry (2013)

LINKS

- Gao Lab: http://gaolab.bio

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Nature has created many powerful biomolecules that are hidden in organisms across kingdoms of life. Many of these biomolecules originate from microbes, which contain the most diverse gene pool among living organisms. We are integrating high-throughput computational and experimental approaches to harness the vast diversity of genes in microbes to develop new antibiotics and molecular biotechnology, and to investigate the evolution of proteins and molecular mechanisms in innate immunity.

Publications

PUBLICATIONS

- **Prokaryotic innate immunity through pattern recognition of conserved viral proteins** *SCIENCE*
  Gao, L., Wilkinson, M. E., Strecker, J., Makarova, K. S., Macrae, R. K., Koonin, E., Zhang, F.
  2022; 377 (6607): 726-+
- **UG/Abi: a highly diverse family of prokaryotic reverse transcriptases associated with defense functions** *NUCLEIC ACIDS RESEARCH*
  Rodriguez Mestre, M., Alex Gao, L., Shah, S. A., Lopez-Beltran, A., Gonzalez-Delgado, A., Martinez-Abarca, F., Iranzo, J., Redrejo-Rodriguez, M., Zhang, F., Toro, N.
  2022; 50 (11): 6084-6101
- **A highly homogeneous polymer composed of tetrahedron-like monomers for high-isotropy expansion microscopy** *NATURE NANOTECHNOLOGY*
  Gao, R., Yu, C., Gao, L., Piatkevich, K. D., Neve, R. L., Munro, J. B., Upadhyayula, S., Boyden, E. S.

2021; 16 (6): 698-+

- **Diverse enzymatic activities mediate antiviral immunity in prokaryotes** *SCIENCE*
  Gao, L., Altae-Tran, H., Bohning, F., Makarova, K. S., Segel, M., Schmid-Burgk, J. L., Koob, J., Wolf, Y. I., Koonin, E. V., Zhang, F.
  2020; 369 (6507): 1077-+

- **Highly Parallel Profiling of Cas9 Variant Specificity** *MOLECULAR CELL*
  Schmid-Burgk, J. L., Gao, L., Li, D., Gardner, Z., Strecker, J., Lash, B., Zhang, F.
  2020; 78 (4): 794-+

- **Computational identification of repeat-containing proteins and systems** *QRB DISCOVERY*
  Altae-Tran, H., Gao, L., Strecker, J., Macrae, R. K., Zhang, F.
  2020; 1: e10

- **Unexpected connections between type VI-B CRISPR-Cas systems, bacterial natural competence, ubiquitin signaling network and DNA modification through a distinct family of membrane proteins** *FEMS MICROBIOLOGY LETTERS*
  Makarova, K. S., Gao, L., Zhang, F., Koonin, E.
  2019; 366 (8)

- **Engineering of CRISPR-Cas12b for human genome editing** *NATURE COMMUNICATIONS*
  Strecker, J., Jones, S., Koopal, B., Schmid-Burgk, J., Zetsche, B., Gao, L., Makarova, K. S., Koonin, E. V., Zhang, F.
  2019; 10: 212

- **Engineered CRISPR-Cas9 nuclease with expanded targeting space** *SCIENCE*
  Nishimasu, H., Shi, X., Ishiguro, S., Gao, L., Hirano, S., Okazaki, S., Noda, T., Abudayyeh, O. O., Gootenberg, J. S., Mori, H., Oura, S., Holmes, B., Tanaka, et al
  2018; 361 (6408): 1259-1262

- **Effects of 3D culturing conditions on the transcriptomic profile of stem-cell-derived neurons** *NATURE BIOMEDICAL ENGINEERING*
  Tekin, H., Simmons, S., Cummings, B., Gao, L., Adiconis, X., Hession, C. C., Ghoshal, A., Dionne, D., Choudhury, S. R., Yesilyurt, V., Sanjana, N. E., Shi, X., Lu, et al
  2018; 2 (7): 540-554

- **Engineered Cpf1 variants with altered PAM specificities** *NATURE BIOTECHNOLOGY*
  Gao, L., Cox, D. T., Yan, W. X., Manteiga, J. C., Schneider, M. W., Yamano, T., Nishimasu, H., Nureki, O., Crosetto, N., Zhang, F.
  2017; 35 (8): 789-792

- **Structural Basis for the Altered PAM Recognition by Engineered CRISPR-Cpf1** *MOLECULAR CELL*
  Nishimasu, H., Yamano, T., Gao, L., Zhang, F., Ishitani, R., Nureki, O.
  2017; 67 (1): 139-+

- **BLISS is a versatile and quantitative method for genome-wide profiling of DNA double-strand breaks** *NATURE COMMUNICATIONS*
  Yan, W. X., Mirzazadeh, R., Garnerone, S., Scott, D., Schneider, M. W., Kallas, T., Custodio, J., Wernersson, E., Li, Y., Gao, L., Federova, Y., Zetsche, B., Zhang, et al
  2017; 8: 15058

- **Protein-retention expansion microscopy of cells and tissues labeled using standard fluorescent proteins and antibodies** *NATURE BIOTECHNOLOGY*
  Tillberg, P. W., Chen, F., Piatkevich, K. D., Zhao, Y., Yu, C., English, B. P., Gao, L., Martorell, A., Suk, H., Yoshida, F., DeGennaro, E. M., Roossien, D. H., Gong, et al
  2016; 34 (9): 987-+

- **Rationally engineered Cas9 nucleases with improved specificity** *SCIENCE*
  Slaymaker, I. M., Gao, L., Zetsche, B., Scott, D. A., Yan, W. X., Zhang, F.
  2016; 351 (6268): 84-88