Sheng MAO

(+86) 15700047798 | +1 (607) 262-6103 | maosheng@westlake.edu.cn | sheng.mao@arcinstitute.org

Education

Westlake University — *Hangzhou, China*

Biological Sciences — *August 2022 - Present*

- Current GPA: 3.879

Cornell University — *Ithaca, NY, USA*

Biometry and Statistics — *2024 Fall*

- CALS AG exchange program GPA: 4.131

Research Interest

Single-cell/Spatial genomics • Statistical genetics • Genomic language model • Synthetic biology

Research Experience

Jingtian Zhou's Lab, Arc Institute — *Palo Alto, CA, USA*

Undergraduate Research Fellow — *Aug. 2025 – Present*

- **Bolero — DNA Regulatory Syntax Modeling.** Developed deep learning architecture integrating DNA sequence with single-cell embedding across 10M+ cells to predict chromatin accessibility/gene expression and extract interpretable regulatory syntax. Demonstrated generalization to unseen sequences, cell types, brain regions, and developmental stages through systematic benchmarking.
- **Prostate Cancer Chromatin Architecture.** Analyzed single-nucleus methylome and chromatin conformation (snm3C-seq) data from prostate cancer samples to investigate chromatin compartmentalization and extrachromosomal DNA dynamics.

Ayshwarya Subramanian's Lab, Cornell University — *Ithaca, NY, USA*

Undergraduate Researcher — *Aug. 2024 – Present*

- **Sex-Specific Immune Dysregulation in ME/CFS.** Independently designed and implemented a computational pipeline to identify sex-biased transcriptional programs in ME/CFS, incorporating Poisson linear mixed-effect models for population-level differential expression. Discovered immune cell populations with amplified sexual dimorphism in patients versus controls

Jianyang Zeng's Lab, Westlake University — *Hangzhou, China*

Undergraduate Researcher — *Jun. 2024 – Aug. 2025*

- **SpaTranslator: Universal Spatial Multi-Omics Translation.** Led development of graph neural network-based generative framework for cross-modality prediction in spatial omics. Introduced spatial-aware architecture with contrastive batch correction, enabling first universal translator across transcriptome-epigenome and transcriptome-proteome modalities.
- **STARNet: Spatially Resolved Gene Regulatory Networks.** Co-developed representation learning framework integrating heterogeneous hypergraph modeling with graph neural networks to infer tissue-domain-specific gene regulatory networks from spatial multi-omics data. Implemented self-supervised contrastive learning to preserve molecular features and spatial context, achieving state-of-the-art GRN reconstruction.

Jian Yang's Lab, Westlake University — *Hangzhou, China*

Undergraduate Researcher — *Aug. 2022 – Aug. 2024*

- **PanCell-eQTL: Cell-Type-Specific Genetic Regulation Atlas.** Contributed to the construction of the largest single-cell eQTL resource to date, integrating 27M+ cells across diverse populations. Performing direct genotype inference from scRNA-seq reads to recover donor genotypes for population-scale mapping. Developed a high-throughput integration and QC workflow that enabled the first unified cross-tissue analysis of cell-type–specific genetic regulation.
- **AD GWAS-eQTL Colocalization.** Performed Bayesian colocalization of Alzheimer's disease GWAS with brain eQTLs to identify causal genes and regulatory mechanisms underlying disease risk.

Yajie Wang's Lab, Westlake University — *Hangzhou, China*

Undergraduate Researcher — *Aug. 2023 – Aug. 2024*

- **Machine Learning for Enzyme Discovery.** Developed a protein classification and search model to identify novel PET hydrolases. Validated ESM-Ezy predictions through structural alignment and phylogenetic analysis, and designed a high-throughput HPLC assay to screen top candidates. Identified one novel enzyme with superior PET hydrolysis activity at 50°C compared to all reported wild-type PETases.

Publications

- Lei Hu, Shichen Zhang, Xuting Zhang, Yihai Luo, Haoteng Gu, Peng Liu, **Sheng Mao**, Li Chen, Yuhao Xia, Minghao Yang, Sai Zhang, Yaosen Min, Han Li, Peizhuo Wang, Hongtao Yu, Jianyang Zeng

STARNet enables spatially resolved inference of gene regulatory networks from spatial multi-omics data. *bioRxiv, in Major Revision at Nature Methods*, 2025.

- Chang Chen, Liyang Song, Wenhao Chen, Jinpan Hu, **Sheng Mao**, Shuaiyao Wang, Minmin Guo, Junren Hou, Wen Yang, Feifei Cheng, Jian Yang
  Single-cell eQTL mapping in multiple tissues and ancestries by repurposing public single-cell transcriptomes from 5,828 individuals. *Under Review By Cell*, 2025.

- Hongyu Dong†, **Sheng Mao**†, Tian Tian, Lihua Zhang, Juanshu Wu, Shichen Zhang, Peng Jiang, Danqing Yin, Yukuan Liu, Jun Xia, Xudong Xing, Peizhuo Wang, Han Li
  SpaTranslator: A deep generative framework for universal spatial multi-omics cross-modality translation. *bioRxiv, Under Review By Nature Communications*, 2025.
  †Co-first author

- Yuxuan Wang, Shijie He, Yuheng Chang, **Sheng Mao**, Binbin Chen, Hongxun Gao, Mingchun Xu, Chenxu Liu, Yajie Wang*
  Deep learning-driven discovery and engineering of an efficient PETase for depolymerization and detoxification of PET microplastics under physiological conditions. *Under Review By Angewandte Chemie*, 2025.

Presentations

- **SpaTranslator: A deep generative framework for universal spatial multi-omics cross-modality translation**.

  Poster presentation at

  Scverse Conference, Palo Alto, USA, 2025

  National Conference on Artifitial Intelligence Biology, Hangzhou, China, 2025

Skills

Computational: Python(Pytorch) • R • C++ • Shell • LaTeX

Experimental: Molecular cloning • Cell culture • Cell transfection • Flow cytometry • Protein purification • Western blot

Honors & Awards

2025	**Arc Research Fellowship**, Arc Institute	*Palo Alto, CA, USA*
2024	**Dean's Award**, Westlake University	*Hangzhou, China*
2024	**Zhejiang Provincial Government Scholarship**, Zhejiang Province	*Hangzhou, China*
2022-2023	**Undergraduate Hongyi Scholarship**, Westlake University	*Hangzhou, China*
2022-2023	**Outstanding Undergraduate Scholarship**, Westlake University	*Hangzhou, China*
2023	**Leadership Award**, Westlake University	*Hangzhou, China*

Extracurricular Activity

Biology Track, Westlake University — *Hangzhou, China*
Program Assistant / Team Leader, Pre-college Program — *2023/2024 Summer*
Assisted in organizing and running summer program activities and laboratory sessions.

School of Life Sciences, Westlake University — *Hangzhou, China*
Volunteer, 'Frontiers of Life Sciences' International Undergraduate Summer School — *2024/2025 Summer*
Supported program coordination and facilitated learning experiences for international students.

China Exploration and Research Society — *Shangri-La, China*
Field Study Summer Internship — *2023 Summer*
Participated in field-based research and conservation activities in high-altitude ecosystems.

In Transcription
in-transcription.org — *Hangzhou, China*
Founder, Westlake University Chapter of In Transcription — *December 2024 – Present*
Established a platform to connect life sciences undergraduates with researchers and entrepreneurs.