

## EDUCATION

### B.S. Biological Science (Poling Class)

2018 – 2023

Nankai University, Advisor: Prof. Xinglu Huang

Poling Honors Degree, GPA:3.64/4

## EXPERIENCE

### Research Assistant

2022 – 2023

National Engineering Lab for Neuromodulation, Tsinghua University

Advisor: Prof. Yanan Sui

### Visiting Student

2021 – 2022

Institute for Human Genetics, University of California, San Francisco

Advisor: Prof. Yin Shen

### Intern

2021

National Engineering Lab for Neuromodulation, Tsinghua University

## RESEARCH INTERESTS

Genomics (Functional, Computational), Epigenomics, Bioinformatics, Development and Application of Sequencing Techniques

## PUBLICATIONS

- [1] Sun W, Wang N, **Liu H**, Yu B, Jin L, Ren X, Shen Y, Wang L. Genetically Encoded Chemical Cross-linking of RNA in vivo. *Nat Chem* 2023;15(1):21–32.
  - Designed the end-to-end analysis pipeline for GECX-RNA with immunoprecipitation sequencing (GRIP-seq), covering the entire process from raw sequencing data to RNA m6A sites with single-nucleotide resolution. <https://github.com/Shall-We-Dance/GRIP-seq>
  - Uploaded the sequencing data to NCBI SRA under the accession number PRJNA797913.
  - Computed minimum free energy (MFE) of RNA secondary structure for evaluation purposes.
  - My main contributions included Fig.6, Extended Data Fig. 3, Fig.S7, Table S2, Table S3 and the writing of the methods section detailing the data analysis for GRIP-seq.
- [2] Yang X, Wen J, Yang H, Jones IR, Zhu X, Liu W, Li B, Clelland CD, Luo W, Wong MY, Ren X, Cui X, Song M, **Liu H**, Chen C, Eng N, Ravichandran M, Sun Y, Lee D, Van Buren E, Jiang MZ, Chan CSY, Ye CJ, Perera RM, Gan L, Li Y, Shen Y. Functional characterization of Alzheimer's disease genetic variants in microglia. *Nat Genet* 2023;1–10.
  - Performed computational analysis. My main contributions included RNA-seq data process, Extended Data Fig. 2 and the writing of the methods section.
- [3] Yang, J, Chung, C, Koach, J, **Liu H**, Navalkar A, Zhao Q, Yang X, He L, Mittag T, Shen Y, Weiss WA, Shu X. Phase separation of Myc differentially modulates the transcriptome. *bioRxiv* 2022.06.28.498043; [Preprint]
  - Processed and analyzed all RNA-seq data in this study.
  - My main contributions included Fig. 7, Fig. S12, Fig. S13 and the writing of the methods section.
- [4] Wei Y, Wu J, Wu Y, **Liu H**, Meng F, Liu Q, Midgley AC, Zhang X, Qi T, Kang H, Chen R, Kong D, Zhuang J, Yan X, Huang X. Prediction and Design of Nanozymes using Explainable Machine Learning. *Advanced Materials* 2022;34(27):2201736.
  - Collected and organized data by grouping various factors.
  - Conducted initial statistical analysis to substantiate the hypothesis.
  - Contributed to the design of this neural network.

- [5] Sun Z, Liu Q, Wang X, Wu J, Hu X, Liu M, Zhang X, Wei Y, Liu Z, **Liu H**, Chen R, Wang F, Midgley AC, Li A, Yan X, Wang Y, Zhuang J, Huang X. Bioorthogonal catalytic nanzyme-mediated lysosomal membrane leakage for targeted drug delivery. *Theranostics* 2022;12(3):1132–47.
- Conducted molecular cloning for ferritin synthesis.
  - Illustrated the schemes, including Scheme 1, Fig. 1c, Fig. 4c, Fig. 6a.

## SELECTED RESEARCH EXPERIENCE

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### End-to-End Design of GRIP-seq: A Novel Sequencing Technique for Detecting RNA m6A Sites with Single-nucleotide Resolution Using Unnatural Amino Acids

Advisor: Prof. Yin Shen & Prof. Lei Wang

*Institute for Human Genetics, UCSF*

*Dec. 2021 – Jul. 2022*

*available on GitHub*

### The Analysis of Multiple Sequencing Libraries: scRNA-seq, ATAC-seq, RNA-seq, ChIP-seq, CLIP-seq, Hi-C, CRISPR, etc.

Advisor: Prof. Yin Shen

*Institute for Human Genetics, UCSF*

*Oct. 2021 – Jul. 2022*

### Evaluation of AlphaFold2 Algorithms and Improvements for Enhanced Predictions

Advisor: Prof. Yanan Sui

*National Engineering Lab for Neuromodulation, Tsinghua University*

Website Available: <https://alphafold.lnsgroup.cc:5001>

*Jul. 2021 – Sept. 2021*

*available on GitHub*

### Analyzing Nanodrug Delivery Efficiency in Tumors Using Machine Learning

Advisor: Prof. Xinglu Huang

*State Key Laboratory of Medicinal Chemical Biology, Nankai University*

*Sept. 2020 – Jun. 2021*

### Designed Protein Nanocage H2E-FTn for Enhanced Lysosomal Escape In Vitro: Adding Short Repeats of HHE Oligopeptide at the N-terminal of Human H Ferritin

Advisor: Prof. Xinglu Huang

*State Key Laboratory of Medicinal Chemical Biology, Nankai University*

*Sept. 2020 – Dec. 2020*

## AWARDS

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Poling Honors Degree, Nankai University

Distinguished Undergraduate Thesis, Nankai University

Scholarship of Academic Progress, Nankai University

Third Prize in Innovative Scientific Research for Undergraduates of Nankai University

## SKILLS

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### Programming

R, Python, Shell, HTML, CSS, Markdown,  $\LaTeX$

### Libraries

Flask, Seurat, ggplot2, dplyr, edgeR, AlphaFold2, STAR, fastp, etc.

### Software

Ai, VSCode, RStudio, Nginx, IGV, PyMOL, ImageJ, Zotero, Benchling, Conda, Docker, SnapGene, etc.

### Wet Lab

Molecular Clone, Cell Culture, ATAC-seq, Smart-seq2, mRNA Display, CRISPR Screen, Mutagenesis, Lentivirus, etc.

Please visit my homepage for more information: <https://cv.greymsea.cc>