

Shiyu Sun

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EDUCATION

- **University of Michigan** Ann Arbor, MI
Ph.D. in Mechanical Engineering Sep 2020 - May 2025 (anticipated)
- **Shanghai Jiao Tong University** Shanghai, China
B.E. in Biomedical Engineering Sep 2016 - Jun 2020

PUBLICATIONS & PATENTS

- **S. Sun**, W. Liu, J. Yang, H. Wang, K. Qian. Nanoparticle assisted cation adduction and fragmentation of small metabolites. *Angew. Chem.* 2021. [DOI]
- **S. Sun**, R. Wang, Y. Huang, J. Xu, K. Yao, W. Liu, Y. Cao, K. Qian. Design of Hierarchical Beads for Efficient Label-Free Cell Capture. *Small* 2019 Aug;15(34):e1902441. [DOI]
- W. Liu, **S. Sun**, Y. Huang, R. Wang, J. Xu, X. Liu, K. Qian. Label-Free Detection of Transferrin Receptor by a Designed Ligand-Protein Sensor. *Chem. - Asian J.* 2020 Jan;15(1):56-60. [DOI]
- G. Ma, Y. Wang, Y. Hong, Z. Liang, **S. Sun**, S. Zheng, Q. Fang, Y. Ran, Z. Liu, C. Hsiao, B. Zhong, P. He, K. Zhang, R. Xia, W. Wu, K. Yao, L. He. Production of Recombinant Antibody Fusion Proteins for Specific Identification of Cancer Cells. China Patent 109651513A, 2019 Apr.
- **S. Sun**, R. Wang, Y. Huang, W. Liu. Preparation of Hierarchical Virus-Mimicking Microbeads for Efficient Cell Capture. China Patent 110628692A, 2019 Dec.

RESEARCH EXPERIENCE

- **Research Assistant, Tsinghua University** Beijing, China
Advisor: Yue Shao, Associate Professor of Aerospace Engineering, Tsinghua University; Jianping Fu, Professor of Mechanical Engineering, University of Michigan Sep 2020 - Present

Controlled gastrointestinal organoid generation

- Controlled generation of gastrointestinal organoid from human pluripotent stem cells in vitro with the assistance of engineering tools (such as micropattern, AggreWell).

- **Undergraduate Researcher, Shanghai Jiao Tong University** Shanghai, China
Advisor: Kun Qian, Professor of Biomedical Engineering Apr 2018 - Jun 2020

Nanoparticle assisted cation adduction and fragmentation of small metabolites

- A study on mechanisms of adduction and fragmentation for cation adducted metabolites based on nanoparticle assisted laser desorption/ionization mass spectrometry, aiming to metabolite identification toward profiling.
- Calculated the energy profiles in charge transfer and fragmentation by density-functional theory, to characterize cation-metabolite affinity and loss of given groups.
- Controlled metabolite fragmentation by selected and multiple adductions, to enhance the atomic/fragment coverage.

An Electrochemical Biosensor for Label-Free Detection of Transferrin Receptor

- An electrochemical biosensor (ITO-Chi-MWCNTs-TF-BSA) was fabricated through layer-by-layer method and the desirable linear range, sensitivity, specificity, reproducibility, and stability were verified for further real application.

Hierarchical Microbeads for Efficient Cell Capture

- Constructed hierarchical beads affording controlled surface topology by assembling nanoparticles, silica spheres, and microbeads. Functionalized hierarchical beads by hyaluronic acid and studied cell capture performance of prepared hierarchical beads indicating the beads affording high cell capture efficiency

- **Summer Intern, Johns Hopkins University** Baltimore, Maryland
Advisor: Joshua T. Vogelstein, Assistant Professor of Biomedical Engineering Jul 2019 - Aug 2019

Statistical Methods in Neural Data Analysis

- Optimized GraSPy, a Python package for graph statistical algorithms.
- Validated “two-truths” phenomenon for spectral graph clustering on stochastic block model (SBM) graphs.
- Performed the hypothesis testing on SBM to study the different performance of classic statistical tests on SBM graphs.

SELECTED AWARDS & HONORS

- Excellent graduates of Shanghai Colleges and Universities 2020
- Zhiyuan Honors Program of Shanghai Jiao Tong University in Biomedical Engineering 2020
- Zhiyuan Outstanding Student Scholarship of Shanghai Jiao Tong University 2020
- **Finalist** at the Mathematical Contest in Modeling (MCM) (*Awarded to Top 1% teams*) 2019
- **Outstanding Winner** at the 16th Challenge Cup National College Students' Extracurricular Academic Science and Technology Contest (*Awarded to Top 3% teams*) 2019
- Rongchang Scientific and Technological Innovation Scholarship 2019
- **China National Scholarship** (*Awarded to Top 0.2% nationwide university students*) 2017
- Zhiyuan Honors Scholarship of Shanghai Jiao Tong University 2016, 2017, 2018, 2019
- **1st Prize** (Undergraduate Group) at the National College Student Mathematical Modeling Competition 2017
- **1st Prize** (Undergraduate Group) at the Chinese Mathematical Competition in Shanghai Division 2017
- Academic Excellence Scholarship (First-Class) of Shanghai Jiao Tong University 2017, 2019

TECHNICAL SKILLS

- **Programming:** Python, R, MATLAB, C++, Assembly, Verilog HDL.
- **Software Applications:** Gaussian.

PROFESSIONAL ACTIVITIES

TEACHING EXPERIENCE

MENTORING EXPERIENCE

PROFESSIONAL AFFILIATIONS
