

YINING ZHU

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PROFESSIONAL APPOINTMENTS

Duke University, Durham, NC	02/2026 – current
• Postdoctoral Associate with <i>Prof. John W. Hickey</i>	
Johns Hopkins University, Baltimore, MD	10/2025 – 01/2026
• Postdoctoral Associate with <i>Prof. Hai-Quan Mao</i>	

EDUCATION

Johns Hopkins University, Baltimore, MD	07/2021 – 09/2025
• Ph.D. in Biomedical Engineering	
Duke University, Durham, NC	08/2024 – 09/2024
• Visiting Research Scholar in Biomedical Engineering	
Johns Hopkins University, Baltimore, MD	08/2019 – 05/2021
• M.S.E. in Biomedical Engineering	
Sichuan University, China	09/2015 – 06/2019
• B.S. in Pharmacy	

AWARDS & HONORS

Forbes 30 Under 30 honoree in Science, US	2026
Siebel Scholar, Siebel foundation, US	2025
Student Travel Achievement Recognition (STAR) award, Society for Biomaterials, US	2025
Meritorious Abstract Travel Award, American Society of Gene & Cell Therapy, US	2024
The Hans J. Prochaska Research Award, Johns Hopkins University, US	2024
Student Travel Achievement Recognition (STAR) award, Society for Biomaterials, US	2023
Outstanding Graduates Award in Sichuan Province, Sichuan Province, China	2019
‘Tang Lixin’ Scholarship, Sichuan University, China	2018
Top 100 Students Award, Sichuan University, China	2017
Outstanding Chairman of the Student Union, Sichuan University, China	2017
National Scholarship, Ministry of Education of China	2016; 2017; 2018

PUBLICATIONS

† Denotes equal contribution * Denotes corresponding author
(32 peer-reviewed journal publications in total; [Google Scholar](#))

First author publications:

12. Y Zhu†, C Wei†, et al., HQ Mao*. Engineering age-adaptive mRNA lipid nanoparticle cancer vaccines via reprogramming systemic gene expression. (*Nature Biomedical Engineering*, under review)
11. J Lin†, Y Zhu†, et al., HQ Mao*. Imidazolium lipid-based nanoparticles enable effective mRNA delivery and cellular immune response. (*Materials Today*, in revision)
10. C Wei†, Y Zhu†*, et al., SC Murphy*, HQ Mao*. Systemic trafficking of mRNA lipid nanoparticle vaccine following intramuscular injection generates potent tissue-specific T cell response. *Nature Biomedical Engineering*. (2026). (in press)
9. X Liu†, Y Zhu†, et al., HQ Mao*. Crosslinking of lipid nanoparticles enhances the delivery efficiency and efficacy of mRNA vaccines. *Nature Chemical Engineering*, (2026). (in press)
8. Y Zhu†, ZC Y†, S L†, et al., HQ Mao*. An mRNA lipid nanoparticle-incorporated nanofiber-hydrogel composite for cancer immunotherapy. *Nature Communications*, 16(1):5707, (2025).
7. X Lu†, Y Zhu†, et al., HQ Mao*. A multi-step platform identifies spleen-tropic lipid nanoparticles for in vivo T cell-targeted delivery of gene editing proteins. *Science Advances*, 11(43):eady5579, (2025).
6. Y Zhu, et al., SC Murphy*, HQ Mao*. Screening for lipid nanoparticles that modulate the immune activity of helper T cells towards enhanced antitumour activity. *Nature Biomedical Engineering*, 8 (5), 544-560, (2024).
5. Y Zhu†, S Cai†, et al., KW Leong*, HQ Mao*. Optimization of lipid nanoparticles for gene editing of the

liver via intraduodenal delivery. *Biomaterials*, 308:122559, (2024).

4. J Ma†, Y Zhu†, et al., SX Sun*, HQ Mao*. Tuning extracellular fluid viscosity for enhanced transfection efficiency in genetic cell engineering. *Nature Chemical Engineering*, 1(9): 576-587, (2024).
3. Y Zhu, et al., SC Murphy*, HQ Mao*. Multi-step screening of DNA/lipid nanoparticles and co-delivery with siRNA to enhance and prolong gene expression. *Nature Communications*, 13 (1), 4282, (2022).
2. Y Hu†, Y Zhu†, et al., HQ Mao*. Size-controlled and shelf-stable DNA particles for production of lentiviral vectors. *Nano Letters*, 21 (13), 5697-5705, (2021).
1. Y Zhu, et al., X Sun*. Albumin-biomaterialized nanoparticles to synergize phototherapy and immunotherapy against melanoma. *Journal of Controlled Release*, 322, 300-311, (2020).

Selective collaborative publications:

- B Torkzaban, Y Zhu, et al., J Collier*. Use of poly adenosine tail mimetics to enhance mRNA expression from genes associated with haploinsufficiency disorders. *Molecular Therapy Nucleic Acids*, 36 (1), 102453, (2025).
- L Cheng, Y Zhu, et al., HQ Mao*. Machine learning elucidates design features of plasmid deoxyribonucleic acid lipid nanoparticles for cell type-preferential transfection. *ACS nano*, 18 (42), 28735-28747, (2024).
- W Chen, Y Zhu, et al., J He*. Potentiating the systemic immunity by bacteria-delivered STING activation in a tumor microenvironment. *Advanced Functional Materials*, 33 (52), 2307001, (2023).
- Z Guo, Y Zhu, et al., X Sun*. Rapid development of a subunit nano-vaccine against drug-resistant *Pseudomonas aeruginosa* with effective cross-protection. *Nano Today*, 43, 101398, (2022).
- J Xue, Y Zhu, et al., X Sun*. Nanoparticles with rough surface improve the therapeutic effect of photothermal immunotherapy against melanoma. *Acta Pharmaceutica Sinica B*, 12 (6), 2934-2949, (2022).
- ZC Yao, YH Yang, J Kong, Y Zhu, et al., HQ Mao*. Biostimulatory micro-fragmented nanofiber-hydrogel composite improves mesenchymal stem cell delivery and soft tissue remodeling. *Small*, 18 (36), 2202309, (2022).
- S Bai, H Jiang, Y Song, Y Zhu, et al., X Sun*. Aluminum nanoparticles deliver a dual-epitope peptide for enhanced anti-tumor immunotherapy. *Journal of Controlled Release*, 344, 134-146, (2022).
- W Chen, Z Guo, Y Zhu, et al., X Sun*. Combination of bacterial-photothermal therapy with an anti-PD-1 peptide depot for enhanced immunity against advanced cancer. *Advanced Functional Materials*, 30 (1), 1906623, (2020).

Reviews:

- W Chen, Y Zhu, et al., X Sun*. Path towards mRNA delivery for cancer immunotherapy from bench to bedside. *Theranostics*, 14 (1), 96, (2024).
- W Chen, Y Zhu, et al., X Sun*. Advances in Salmonella Typhimurium-based drug delivery system for cancer therapy. *Advanced Drug Delivery Reviews*, 185, 114295, (2022).
- S Huang, Y Zhu, et al., Z Zhang*. Recent advances in delivery systems for genetic and other novel vaccines. *Advanced Materials*, 34 (46), 2107946, (2022).

PATENTS

1. Y Zhu, X Liu, H Mao. Compositions and methods of preparing RNA lipid nanoparticles with enhanced stability and transfection efficiency. US Provisional Patent Application; Filed 7/19/2025.
2. Y Zhu, C Wei, H Mao. Lipid nanoparticles with integrated glycolipid adjuvant to promote tissue-specific cellular immunity. US Provisional Patent Application; Filed 2/18/2025.
3. Y Zhu, C Wei, D Yu, H Mao. Lipid nanoparticle formulations capable of migrating to systemic organs following intramuscular administration. US Provisional Patent Application; Filed 1/28/2025.
4. Y Zhu, X Lu, H Mao. Composition screening of lipid nanoparticle for intracellular delivery of gene-editing proteins. PCT/US2025/023531; Filed 4/7/2025.
5. Y Zhu, C Wei, J Ma, H Mao, et al. A mRNA lipid nanoparticle incorporated nanofiber-hydrogel composite to generate a local immunostimulatory niche for immunotherapy. PCT/US2025/023530; Filed 4/7/2025.
6. Y Zhu, J Ma, H Mao, et al. Composition of media with defined fluid viscosity for enhancing intracellular delivery of nanoparticles and viral vectors, and methods of use. PCT/US2024/039036; Filed 7/22/2024.
7. Y Zhu, H Mao, et al. Compositions of Lipid Nanoparticles for Plasmid DNA Delivery to the Liver and Methods for Preparing the Same. PCT/US2023/016938; Filed 3/30/2023.
8. Y Zhu, Y Hu, H Mao. Methods for preparation of plasmid DNA/lipid particles with defined size for in vitro and in vivo transfection. PCT/US2023, 18/546,221; Filed 8/11/2023.

9. **Y Zhu**, Y Hu, H Mao. Composition of shelf-stable plasmid DNA/PEI particles with defined sizes for virus production and method for preparation of the same. PCT/US2023, 18/546,222, Filed 8/11/2023.
10. **Y Zhu**, Y Hu, H Mao. Methods for preparation of shelf-stable plasmid DNA/polycation particles with defined sizes for cell transfection. PCT/US2022, 18/261,944; Filed 7/18/2023.

CONFERENCE PRESENTATIONS

1. **Zhu Y**, Ma J, *et al.*, Mao HQ. Enhancing Cell Transfection Efficiency via Modulation of Extracellular Fluid Viscosity. *Society of Biomaterials Annual Meeting and Exposition*. 2025. **Oral Presentation.**
2. **Zhu Y**, Yao Z-C, Li S, *et al.*, Mao HQ. mRNA lipid nanoparticle-incorporated nanofiber-hydrogel composite generates a local immunostimulatory niche for cancer immunotherapy. *Society of Biomaterials Annual Meeting and Exposition*. 2025. **Oral Presentation & Student Travel Achievement Recognition (STAR) award.**
3. **Zhu Y**, Yao Z-C, Li S, *et al.*, Mao HQ. Engineering A Biomaterials-based Lymphoid Niche for mRNA Lipid Nanoparticle Cancer Vaccines. *Biomedical Engineering Society Annual Meeting*. 2024. **Oral Presentation.**
4. **Zhu Y**, Yao Z-C, Li S, *et al.*, Mao HQ. A mRNA lipid nanoparticle incorporated nanofiber-hydrogel composite generates a local immunostimulatory niche for cancer immunotherapy. *American Society of Gene & Cell Therapy Annual Meeting*. 2024. **Oral Presentation & Meritorious Abstract Travel Award.**
5. **Zhu Y**, Ma J, Shen R, Vuong I, Mao HQ. Lipid Nanoparticle Composition Shapes Immune Response to mRNA Vaccine and Potency of Anticancer Immunity. *Society of Biomaterials Annual Meeting and Exposition*. 2023. **Oral Presentation & Student Travel Achievement Recognition (STAR) award.**
6. **Zhu Y**, Ma J, Shen R, Vuong I, Mao HQ. Compositional Optimization of mRNA Lipid Nanoparticles to Modulate Th1/Th2 Immune Activation Profile and Potentiate Anticancer Immunity. *American Society of Gene & Cell Therapy Annual Meeting*. 2023. **Poster Presentation.**
7. **Zhu Y**, Shen R, Vuong I, Hu Y, Mao HQ. Multi-step Screening and Composition Optimization of Lipid Nanoparticles for Liver-targeted Plasmid DNA Delivery. *Society of Biomaterials Annual Meeting and Exposition*. 2022. **Oral Presentation.**

PROFESSIONAL MEMBERSHIPS

- **Society for Biomaterials** 2021 – Present
- **American Society of Gene & Cell Therapy** 2021 – Present
- **Biomedical Engineering Society** 2024 – Present

TEACHING EXPERIENCE

- **EN.580.109.12 | Introduction to Nanomedicine** 01/2023, 01/2024
JHU Intersession Course Instructor
Introduced and offered a comprehensive view of nanomedicine, including the physical and chemical basis of biomaterials in the nano-size range, bio-interactions governing efficacy and side effects, conventional and advanced design strategies to overcome biological barriers, and examples in diverse applications.
- **EN.580.453 | Immunoengineering: Principles and Applications** 09/2024 – 12/2024
JHU Teaching Assistant
Offered insightful explanations and practical demonstrations in class, fostering a collaborative learning environment that supported students in mastering the fundamental principles of immunoengineering.
- **EN.580.642 | Tissue Engineering** 09/2022 – 12/2022
JHU Teaching Assistant
Provided insightful explanations and practical demonstrations in classes. Helped create a collaborative learning environment to assist students in learning the fundamental principles in tissue engineering.

LEADERSHIP & PROFESSIONAL SERVICES

- **Lab Manager**, Mao Laboratory, Johns Hopkins University 2021/09 – 2025/05
- **Peer Health Navigators**, Johns Hopkins University 2023/09 – 2024/09
- **Intern Pharmacist**, West China Hospital, Sichuan University 2018/07 – 2018/08
- **President, Student Union of West China School of Pharmacy**, Sichuan University 2015/05 – 2018/05
- **Journal Reviewer**
 - Serve as reviewers for *Biomaterials*, *Journal of Controlled Release*, *Cancer Nanotechnology*, *iScience*, *Pharmaceutical Research*, *Bioengineering & Translational Medicine*, *Journal of Drug Delivery Science and Technology*, *Journal of Liposome Research*, *Scientific Reports*, *Discover Chemistry*, *Journal of Nanobiotechnology*.