

# Tao Zheng

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## EDUCATION

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- **University of Michigan** Ann Arbor, MI  
*PhD Program in Pharmaceutical Sciences; GPA: 4.00/4.00* 2019 – 2024(Expected)
- **Sichuan University** Chengdu, China  
*Master of Science in Pharmaceutics; GPA: 3.83/4.00* 2016 – 2019
- **Huazhong University of Science and Technology** Wuhan, China  
*Bachelor of Science in Pharmacy; GPA: 3.89/4.00; National Scholarship 2011-2012, 2013-2014* 2011 – 2016

## EXPERIENCE

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- **PhD candidate** Ann Arbor, MI  
*Advisor: Dr. Steven P. Schwendeman; College of Pharmacy* Sep. 2019 - 2024(expected)
  - **Levonorgestrel mass balance in *in vitro* release from microspheres:** Investigated the suspected mass loss of the contraceptive steroid Levonorgestrel encapsulated by poly(lactic-co-glycolic acid) (PLGA) microspheres in *in vitro* release. Previously the mass balance (cumulative released and unreleased) at endpoint was around 80% in repeated experiments by different colleagues. Investigated the possible degradation of Levonorgestrel by chromatography and mass spectrometry. Verified that the mass balance was 100% by optimizing the collecting protocol of remaining Levonorgestrel in PLGA microspheres.
  - ***In vivo* mechanistic study of contraceptive PLGA microneedles:** Thesis project includes studying the *in vivo* and *in vitro* correlation of PLGA matrix microneedles loading Levonorgestrel. The *in vivo* performance of such microneedles has not been systematically studied and correlated with *in vitro*. Establishing consistent *in vivo* assays to retrieve microneedles from rat skin. Pilot-studied several assays using fine surgical techniques and repurposed a cage system that was used in *in vivo* performance of microspheres for studying microneedles. Characterizing PLGA polymer and Levonorgestrel retrieved from rat skin.
  - **Microneedles encapsulating PLGA microspheres for versatile immunization:** Engineering PLGA microspheres that enable different release schemes of encapsulated antigens and combine them into microneedle arrays, in order to achieve desired release kinetics of antigens (peptides and proteins) for immunization purposes. Currently aiming to achieve the prime-boosts scheme of traditional vaccination by a single microneedle patch.
- **Master student** Chengdu, China  
*Advisor: Dr. Xun Sun; West China School of Pharmacy* Sep. 2016 - June 2019
  - **Microneedle:** Master's thesis project was to develop the microneedle technology in the laboratory from scratch, as a platform technology for delivering vaccines, nanoparticles and microparticles. The group had no prior knowledge and experience in making microneedles. Solved problems in every step of microneedle production, including custom master mold design and manufacturing, techniques in casting viscous solution into micro cavities, optimizing drying process and developing formulations. Produced microneedles with great consistency and dramatically shortened the production time needed. Applications for patents based on my work were filed.
  - **Vaccine Delivery:** Assisted in projects that used nanoparticles to deliver model antigen Ovalbumin and mRNA vaccines. Helped in cellular assays, formulation optimization and animal (mice) vaccination studies.
  - **Newton Advanced Fellowship:** The Newton Advanced Fellowships scheme was an initiative supported by The Royal Society of UK, in China partnered with The National Natural Science Foundation. The initiative was highly competitive and under the guidance of my advisor, wrote most parts of the proposal for the grant and proposal got funded.
- **Undergraduate student** Wuhan, China  
*Tongji School of Pharmacy* July 2014 - May 2015
  - **High-throughput preparation of PLGA nanoparticles:** Assembled a preliminary microfluidic system for the high-throughput preparation of PLGA nanoparticles and learned the characterization methods of nanoparticles.
  - **Toxicity of PEG-PCL micelles:** Thesis project systematically investigated the toxicity of PEG-PCL micelles on rat liver. Results provided useful feedback for optimizing the formulation.

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## SKILLS

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- **Laboratory skills:**

- **Experience with both small molecule and macromolecules:** Formulation development for small molecules such as Lidocaine, Bupivacaine and Levonorgestrel, modification (fluorescence labeling) and quantification (BCA assay, UPLC-UV, etc.) of proteins such as Ovalbumin, and modification of polymer (Hyaluronic acid and PLGA).
- **Cellular assays:** Culture of cells like HEK293, B16F10, DC2.4 etc., and cell characterization by confocal microscopy and flow cytometry.
- **Animal studies:** Experience with mice, rats, and rabbits. Collection of blood, tissue and organs. Histology assays, ELISA for measuring antibody titers, and intracellular cytokine staining, etc.
- **Analytical techniques:** HPLC-UV, UPLC-UV/MS, GPC, MS, NMR, SEM, confocal microscopy, flow cytometry, etc.

- **Programming:**

- **Python:** Wrote a python program that generates the random seating charts for all PharmD student exams each semester at the college; web scraping using Python for collecting pharmaceutical information, clinical trial progress and R&D updates; data analysis and plotting using Python.
- **R:** Basic statistical analysis and plotting using R.
- **Linux:** Set up and maintaining a Linux server to run automation scripts.

- **Language:** Fluent in English and native in Chinese (Mandarin).

- **Others:** MS Office, L<sup>A</sup>T<sub>E</sub>X (this resume was generated by L<sup>A</sup>T<sub>E</sub>X for better typesetting), Adobe Photoshop, and Blender 3D (create 3D illustration of cells, nanoparticles, microparticles, and experiment protocol processes, etc.).

## LEADERSHIP

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- **Volunteer for exchange students:** Helped exchange students adapt to living and studying in China. Organized various team activities. Learned and worked with cultural difference.
- **Teaching assistant:** Teaching assistant for undergraduate Pharmaceutics course. Facilitated in class discussion, assignments grading and discussion, and hosted office hours.
- **Graduate student instructor (GSI):** GSI for PharmD course Pharmacy 512 - Nonprescription Therapeutics and Self-Care. Coordinated with course lecture and facilitated in grading assignments and providing feedback.

## SELECTED COURSES

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| • <b>PHARMSCI 703:</b> Mass Transfer and Chemical Kinetics | • <b>PHARMSCI 760:</b> Advanced Pharmacokinetics and Biopharmaceutics |
| • <b>PHARMSCI 704:</b> Analytical Methods                  | • <b>BIOSTAT 501:</b> Introduction to Biostatistics                   |
| • <b>PHARMSCI 705:</b> Advanced drug delivery              | • <b>CHE 412:</b> Polymeric Materials                                 |
| • <b>PHARMSCI 717:</b> Biopharmaceutical Engineering       | • <b>STATS 507:</b> Data Science in Python                            |
| • <b>MICRBIOL 540:</b> Immunology                          | • <b>ENTR 560:</b> Project Management and Consulting                  |

## PUBLICATIONS

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- [1]: L. Tan, **T. Zheng**, M. Li, X. Zhong, Y. Tang, M. Qin, X. Sun, Optimization of an mRNA vaccine assisted with cyclodextrin-polyethyleneimine conjugates, Drug Deliv. and Transl. Res. 10 (2020) 678–689.
- [2]: L. Li, **T. Zheng**, T. Wang, Z. Zhang, T. Gong, X. Sun, Virus Envelope-Like Self-Assembled Nanoparticles Based on alpha-CD/PEG for Antigens Targeting to Dendritic Cells, J. Biomed. Nanotechnol. 13 (2017) 1490–1499.