

Corinna Torabi

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EDUCATION

Johns Hopkins University, Baltimore, MD

August 2018 – October 2024

Ph.D. in Mechanical Engineering

- Dissertation title: Optimization of Multiscale Compartmentalization Methods for Biotechnologies

M.S. in Mechanical Engineering

- Recipient of Carl E. Heath Fellowship for the Support of Graduate Women in Engineering

University of Massachusetts Amherst, Amherst, MA

August 2014 – May 2018

B.S. in Mechanical Engineering

ENGINEERING RESEARCH EXPERIENCE

Ph.D. Researcher – Johns Hopkins University, Baltimore, MD

August 2018 – Present

Department of Mechanical Engineering

Electroporation loading of gene therapy agents into cell-derived nanoparticles subpopulations

- Engineered a novel immunoprecipitation-based method for electroporation-mediated loading of microRNA into cell-derived nanoparticles (extracellular vesicles) for improved clinical efficacy.
- Developed experimental methods to improve sample purity, and time and cost savings, for manufacturing of therapeutic nanoparticles, achieving 80% reduction in processing time.
- Designed microfluidic device for on-chip microscale electroporation and sorting of extracellular vesicles subpopulations to achieve high throughput production of therapeutic nanoparticles.
- Utilized molecular biology and biochemistry techniques (e.g., RT-PCR, immunoprecipitation, Western blotting, RNA/DNA purification) to design and validate engineered solutions.

Microfluidic generation of uniform hydrogel microdroplets for cell encapsulation

- Designed, fabricated, and characterized microfluidic droplet generation devices for production of hydrogel microdroplets encapsulating cells for tissue engineering, single cell screening, and implantable hydrogel-integrated cell therapy.
- Integrated hydrogels with microfluidic operation by optimizing surface treatment, fluid flow rates, injection and collection methods, and incorporation of biological assays and detection methods.
- Utilized soft lithography and novel 3D printing techniques for rapid prototyping of microfluidic devices.

Project Management and Communication

- Communicated experimental and analytical findings to a range of academic, professional, and non-academic audiences.
- Collaborated with multidisciplinary teams to achieve project objectives efficiently through effective knowledge sharing and by working both independently and in a team.
- Utilized project planning tools to plan, track, and achieve individual and team project progress, establishing effective management of multiple concurrent projects.

SKILLS

- **Device Fabrication:** photolithography, soft lithography, additive manufacturing (3D printing), subtractive manufacturing (e.g. machining, milling), electrical circuitry
- **Biological:** gel electrophoresis, Western/Immunoblotting, DNA/RNA extraction and purification, polymerase chain reaction (reverse transcriptase (RT-PCR), real time (rt-PCR), quantitative (qPCR)), bacteria/cell culture, hydrogel materials optimization, size-exclusion chromatography, immunofluorescence, immunoprecipitation
- **Microscopy and Characterization Techniques:** light microscopy (brightfield, fluorescence, confocal), scanning electron microscope (SEM), atomic force microscopy (AFM), dynamic light scattering (DLS), nanoparticle tracking analysis (NTA), absorbance spectroscopy, highspeed camera data collection/analysis
- **Software:** MATLAB, ANSYS, Creo, SolidWorks, CAD Product Data Management, COMSOL simulation, AutoCAD, Python, ImageJ/Fiji, Adobe Illustrator, experimental documentation, statistical data analysis, Microsoft 365, Benchling, Trello, Google Workspace

PUBLICATIONS

Torabi, C.; Choi S.; Pisanic T. R.; Paulaitis, M.; Hur, S. C.; *Streamlined miRNA loading of surface protein-specific extracellular vesicle subpopulations through electroporation. Accepted. 2024.*

Ambrozaite, O.*; **Torabi, C.*;** Van Damme, N.*; Velez, D.*; Wallemacq, M.*; Standardization of Turbine Design and Installation Vessels to Accelerate the Offshore Wind Industry in the United States. *JSPG* **25**, (2024).

Kalyan, S.*; **Torabi, C.*;** Khoo, H.*; Sung, H. W.; Choi, S.-E.; Wang, W.; Treutler, B.; Kim, D.; Hur, S. C. Inertial Microfluidics Enabling Clinical Research. *Micromachines* 2021, *12* (3), 257. *co-first authors

CONFERENCE PRESENTATIONS

Torabi, C.; Hur, S.C. Streamlined Extracellular Vesicle Loading: Harnessing Protein-Specific Subpopulations Through Direct Electroporation. Poster presented at: Society for Laboratory Automation and Screening (SLAS) Microscale Innovation in Life Sciences Symposium; September 15, 2023; La Jolla, CA.

Torabi, C.; Hur, S.C. Loading Exosomes with Therapeutic Agents Through Dielectric Enhanced Electroporation. Poster presented at: Johns Hopkins Department of Medicine & Whiting School of Engineering Research Retreat; February 28, 2020; Baltimore, MD.

TEACHING EXPERIENCE

Teaching Assistant – Johns Hopkins University, Department of Mechanical Engineering

- Supported faculty instructor for courses in Heat Transfer and Fundamentals, Principles, and Applications of Microfluidic Systems by writing and grading assignments and hosting weekly office hours.

Research Mentor – Johns Hopkins University

- Mentored high school, undergraduate, and graduate students in achieving their research goals, displaying a passion for supporting colleagues and trainees in their education and research.
- Provided laboratory and data analysis instruction to trainees, demonstrating a depth of understanding.

WORK EXPERIENCE

Mechanical Engineering Intern – Raytheon Company, Integrated Defense Systems

Antenna Systems Department, Mechanical Engineering Directorate *May – August 2018*

- Utilized Creo software to accurately model all circuit card elements, successfully optimizing component spatial layout for maximum utilization and performance for the Power Systems Team.
- Achieved top honors in departmental Intern Presentation Competition, showcasing effective communication and presentation skills.

Microelectronics Engineering and Technologies Department

May – August 2017

- Characterized semi-conductor performance through testing electrical and mechanical properties to confirm quality adherence to company standards.
- Analyzed photoresist from external supplier to validate performance for photolithography applications.

ADDITIONAL RESEARCH ACTIVITIES

Undergraduate Researcher – University of Massachusetts Amherst, Amherst, MA *January 2017 – May 2018*
Department of Mechanical Engineering

Ultrasonic whistle for bat deterrence on winds farms

- Developed a passive flow-driven ultrasonic whistle to deter bats from wind farms using engineering principles to experimentally test various device characteristics (material, tension, flow angle).
- Analyzed device frequency response in MATLAB to optimize interference with bat communication.

Energy extraction from flow-induced vibrations

- Investigated power extraction from oscillating cylinder in uniform flow using water tunnel.
- Analyzed voltage and position data in MATLAB to assess efficiency and power output for various flows.

OTHER

- Science Policy Coordinator for Johns Hopkins Science Policy and Diplomacy Group (2023-Present): organized and led programs for graduate students, including science policy memo writing workshop and U.S. Congressional Visit Day to advocate for science policy initiatives in Congressional offices.
- Interests: swimming, triathlon, rock climbing, disc golf, drawing, painting, needlework, sewing, hiking
- Languages: English (native, fluent), German (native, advanced non-technical skills)