WEITAO WANG

Department of Mechanical Engineering
Carnegie Mellon University

Email: weitaowa@andrew.cmu.edu
Web: sites.google.com/view/wtwang/

ACADEMIC EMPLOYMENT

Post-doctoral researcher — *Oct. 2023 - Present*
Department of Mechanical Engineering, Carnegie Mellon University — *Advisor: Rebecca E. Taylor*

EDUCATION

Carnegie Mellon University — *Aug. 2019 - Spet. 2023*
Ph.D. candidate in Mechanical Engineering — *Advisor: Rebecca E. Taylor, Xi Ren*
Thesis: Structural DNA nanotechnology for cell membrane engineering

University of Notre Dame — *Jan. 2018 - May. 2019*
Master of Science in Mechanical Engineering — *Advisor: Zhangli Peng*
Thesis: Coarse-grained molecular simulations of erythrocyte membrane skeleton

Shanghai Jiao Tong University — *Sept. 2013 - Jun. 2017*
Bachelor of Science in Mechanical Engineering

HONORS AND AWARDS

Dowd Fellowship (2022) — Carnegie Mellon University
Mechanical Engineering Collaborative Fellowship (2019, 2020) — Carnegie Mellon University
Departmental Fellowship (2018) — University of Notre Dame
Honor Degree, Bachelor (2017) — Shanghai Jiao Tong University
National Scholarship (2014, 2015) — Shanghai Jiao Tong University

PUBLICATIONS

1. **Wang, W.**, Taylor, R. E.* Observation of DNA origami-cell membrane interactions using scanning ion conductance microscopy. (*In preparation*)
   - *We utilize scanning ion conductance microscopy to visualize the surface topology of DNA origami-attached cell membranes. We found that the DNA origami-induced endocytic pits appeared to exhibit cooperative behavior.*
2. **Wang, W.**, Ren, X., & Taylor, R. E.* DNA origami assembly on cell surface induces membrane phase separation. (*In preparation*)
   - *We show that the crosslinking of cell-surface attached DNA origami that forms higher order structures triggers membrane phase separation and cytoskeleton reorganization, resulting in significant heterogeneity in membrane biophysical properties.*
3. **Wang, W.**, Chopra, B., Walawalkar V., Liang, Z., Adams, R., Deserno, M., Ren, X., & Taylor, R. E.* Cell-surface Binding of DNA Nanostructures for Enhanced Intracellular and Intranuclear Delivery. (*preprint on bioRxiv, under review at ACS Appl. Mater. Interfaces.*) [Link]
   - *We demonstrated a strategy to significantly enhance the intracellular and intranuclear delivery of DNA nanostructures within a 0.5 hour timeframe, by attaching them to lipid membranes via cholesterol tags or to cell-surface glycocalyx via click chemistry.*
4. **Wang, W.**, Haynes, P., Ren, X.*, & Taylor, R. E.* Synthetic cell armor made of DNA origami. ***Nano Lett.*** 2023, 23, 15, 7076–7085 [Link] [Nature Research Highlights]

- *We demonstrated a modular and programmable approach to build temporal nanoshells by assembling DNA nanorods on living cell membranes. The nanoshell served as protective cellular armor to rescue cell viability against challenging environment and modulate membrane biophysics.*

5. Xing, Y., Yerneni, S. S., **Wang, W.**, Taylor, R. E.* & Ren, X.* (2022). Engineering pro-angiogenic biomaterials via chemoselective extracellular vesicle immobilization. ***Biomaterials*** 281:121357. [Link]

6. Wijesekara, P., Liu, Y., **Wang, W.**, Johnston, E. K., Sullivan, M. L., Taylor, R. E.*, & Ren, X.* (2021). Accessing and Assessing the Cell-Surface Glycocalyx Using DNA Origami. ***Nano Lett.*** 21, 11, 4765–4773. [Link]

   - *We showed that glycocalyx presented steric hindrance that prevented DNA origami from accessing cell membranes. This finding provided an effective functional measure of the glycocalyx integrity.*

7. Liu, Y., Wijesekara, P., Kumar, S., **Wang, W.**, Ren, X.*, & Taylor, R. E.* (2021). The effects of overhang placement and multivalency on cell labeling by DNA origami. ***Nanoscale*** 13(14), 6819-6828. [Link]

8. **Wang, W.**, Arias, D. S., Deserno, M., Ren, X.*, & Taylor, R. E.* (2020). Emerging applications at the interface of DNA nanotechnology and cellular membranes: Perspectives from biology, engineering, and physics. ***APL Bioeng.*** 4(4), 041507. [Link] [Featured Article]

   - *The review introduced the basics of structural DNA nanotechnology, the structure and biophysics of cell plasma membranes, programmed delivery of DNA nanostructures, emerging applications at the interface of DNA nanotechnology and cellular membranes, and challenges and opportunities.*

CONFERENCES AND SEMINARS

1. **Wang, W.**, Chopra, B., Walawalkar V., Liang, Z., Adams, R., Deserno, M., Ren, X., & Taylor, R. E. Membrane and glycocalyx tethering of DNA nanostructures for enhanced uptake. *20th Annual Conference on the Foundations of Nanoscience*, Snowbird, UT, Apr, 2023.

2. **Wang, W.**, Hayes, P. R., Ren, X. & Taylor, R. E. A DNA origami nanoshell stabilizes cellular membranes. *19th Annual Conference on the Foundations of Nanoscience*, virtual, Apr, 2022.

3. **Wang, W.**, Ren, X. & Taylor, R. E. A DNA nanoshell for encapsulation and protection for cells. *Carnegie Mellon Forum on Biomedical Engineering*, virtual, Sept, 2021.

4. Liu, Y., Wijesekara, P., **Wang, W.**, Ren, X. & Taylor, R. E. The Effects of Overhang Placement and Multivalency on Cell Labeling by DNA Origami. *18th Annual Conference on the Foundations of Nanoscience: Self-Assembled Architectures and Devices (FNANO Oral Presentation)*. pp. 25, 2021.

5. Beltrán, S., **Wang W.**, McGaughey, A., LeDuc, P. R. & Taylor, R. E. DNA Nanostructures for Mechanosensation. *Society of Engineering Science*, Saint Louis, MO, Oct, 2019.

PATENTS

- Taylor, R., Ren, X. and **Wang, W**. "Modular DNA nanoshells for cell encapsulation and ruggedization" Intellectual Property Disclosure no. 2023-063 Provisional application date: 2022/09/06

INVITED TALKS AND WORKSHOP PRESENTATIONS

- *Molecular machines made of DNA*, guest lecturer invited by Prof. Tzahi Cohen-Karni for **Bionanotechnology: Princes and Applications**, Carnegie Mellon University, Pittsburgh, PA, Nov, 2023

REFERENCES

Rebecca E. Taylor
Associate Professor
Mechanical Engineering
Carnegie Mellon University
Email: bex@andrew.cmu.edu

Xi (Charlie) Ren
Associate Professor
Biomedical Engineering
Carnegie Mellon University
Email: xir@andrew.cmu.edu

Philip LeDuc
Professor
Mechanical Engineering
Carnegie Mellon University
Email: prl@andrew.cmu.edu

Markus Deserno
Professor
Physics
Carnegie Mellon University
Email: deserno@andrew.cmu.edu