TAO ZHOU, Ph.D.

Pennsylvania State University
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University Park, PA 16802

Assistant Professor
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EDUCATION

Harvard University — Cambridge, MA
Ph.D., Chemical Physics — 2019.03

Tsinghua University — Beijing, China
M.S., Chemistry — 2013.07

Tsinghua University — Beijing, China
B.S., Major: Chemistry — 2011.07
Minor: Computer Science

EMPLOYMENT

Pennsylvania State University — University Park, PA
Assistant Professor
Department of Engineering Science and Mechanics
Center for Neural Engineering
Materials Research Institute
Huck Institutes of the Life Sciences — 2022-current

Massachusetts Institute of Technology — Cambridge, MA
Postdoctoral Associate, Department of Mechanical Engineering — 2020-2022

Harvard University — Cambridge, MA
Postdoctoral Fellow, Department of Chemistry and Chemical Biology — 2019-2020

RESEARCH EXPERIENCE

Soft materials, addictive manufacturing & hydrogel electronics

- Highly tough and conductive conducting polymer hydrogel materials
- 3D printing fabrication of hydrogel bioelectronic devices with novel soft materials
- Chronic *in vivo* electrophysiological recording and stimulation of rat spinal cord, sciatic nerve, and heart

Implantable micro/nano electronics for minimally invasive brain-machine interface

- Design, fabrication, and implantation of novel materials and electronics
- Design and fabrication of mesh-like and neuron-like macro or nano electrical devices
- Novel bioelectronics for chronically seamless integration with *in vivo* brain
- Stable long-term chronic brain mapping at the single neuron level
- Minimal invasive implantation methodology and *in vivo* functional electrical stimulations of mouse spinal cord with ultra-conformal mesh-like electronic devices for neural prostheses

DNA nanotechnology and materials

- pH-responsive DNA dendrimer
- DNA tetrahedron for gold nanoparticle assembly
- Stimuli responsive DNA nanostructures (*i*-motif, G-quadruplex, aptamer, etc.)

PUBLICATIONS

 # indicates co-first author

Manuscripts in revision or submission

1. **T. Zhou#,** H. Yuk#, F. Hu, J. Wu, F. Tian, H. Roh, Z. Shen, G. Gu, J. Xu, B. Lu, and X. Zhao, "Bi-Continuous Conducting Polymer Hydrogel for Bioelectronics." ***Nature Materials*** (in revision)
2. **T. Zhou,** H. Yuk, J. Wu, and X. Zhao, "Hybrid nanofiber electronics." *TBD* (in preparation)
3. **T. Zhou#**, R. Viveros#, X. Yang#, J.M. Lee#, G. Hong, T.-M. Fu, H.-G. Park and C.M. Lieber, "Chronic recording and modulation of intact mouse spinal cord in vivo with an implanted tissue-like electronics interface." (in revision)
4. X. Kuang, M. Arıcan, **T. Zhou**, X. Zhao, S.Y. Zhang, "Functional Tough Hydrogels: Design, Processing, and Biomedical Applications." ***Accounts of Materials Research*** (submitted)

Peer reviewed publications

5. C. Wang#, X. Chen#, L. Wang, M. Makihata, H. Liu, **T. Zhou** and X. Zhao, "Bioadhesive Ultrasound for Long-term Continuous Imaging of Diverse Organs." ***Science*** 377, (2022): 517-523.
6. R.D. Viveros#, **T. Zhou#**, G. Hong, T.-M. Fu, H.Y.G. Lin and C.M. Lieber, "Advanced one- and two-dimensional mesh designs for injectable electronics." ***Nano Letters*** 19, (2019): 4180−4187.
7. X. Yang#, **T. Zhou#**, T. Zwang#, G. Hong, Y. Zhao, R. Viveros, T.-M. Fu, T. Gao, and C.M. Lieber, "Bioinspired neuron-like electronics." ***Nature Materials*** 18, (2019): 510–517.
8. T.G. Schuhmann, **T. Zhou**, G. Hong, J.M. Lee, T.-M. Fu, H.-G. Park and C.M. Lieber, "Syringe-injectable mesh electronics for stable chronic rodent electrophysiology." ***Journal of Visualized Experiments*** 137, (2018): e58003.
9. G. Hong#, T.-M. Fu#, M. Qian#, R.D. Viveros, X. Yang, **T. Zhou**, J.M. Lee, H.-G. Park, J.R. Sanes and C.M. Lieber, "A method for single-neuron chronic recording from the retina in awake mice." ***Science*** 360, (2018): 1447-1451.
10. G. Hong, X. Yang, **T. Zhou** and C.M. Lieber, "Mesh electronics: a new paradigm for tissue-like brain probes." ***Current Opinion in Neurobiology*** 50, (2018): 33–41.
11. **T. Zhou**, G. Hong, T. -M. Fu, X. Yang, T. G. Schuhmann, R. D. Viveros, and C. M. Lieber. "Syringe-injectable mesh electronics integrate seamlessly with minimal chronic immune response in the brain." ***PNAS*** 114, (2017): 5894-5899.
12. T.-M. Fu#, G. Hong#, R. Viveros, **T. Zhou** and C.M. Lieber, "Highly scalable multichannel mesh electronics for stable chronic brain electrophysiology." ***PNAS*** 114, (2017): E10046-E10055.
13. T.-M. Fu#, G. Hong#, **T. Zhou#**, T. G. Schuhmann, R. D. Viveros, and C. M. Lieber. "Stable long-term chronic brain mapping at the single-neuron level." ***Nature Methods*** 13, (2016): 875–882.
14. P. Chen, T. Zhang, **T. Zhou**, and D. Liu. "Number-controlled spatial arrangement of gold nanoparticles with DNA dendrimers." ***RSC Advances*** 6, (2016): 70553-70556.
15. L. Niu, X. Yang, W. Pan, **T. Zhou**, D. Liu, C. Mao, and D. Liang. "Effects of structural flexibility on the kinetics of DNA Y-junction assembly and gelation." ***Langmuir*** 32, (2016): 12862-12868.
16. G. Hong#, T.-M. Fu#, **T. Zhou**, T. G. Schuhmann, J. Huang, and C. M. Lieber. "Syringe injectable electronics: precise targeted delivery with quantitative input/output connectivity." ***Nano Letters*** 15, (2015): 6979-6984.
17. J. Liu#, T.-M. Fu#, Z. Cheng#, G. Hong, **T. Zhou**, L. Jin, M. Duvvuri, Z. Jiang, P. Kruskal, C. Xie, Z. Suo, Y. Fang, and C. M. Lieber. "Syringe-injectable electronics." ***Nature Nanotechnology*** 10, (2015): 629-636.
18. **T. Zhou**, Y. Wang, Y. Dong, C. Chen, D. Liu, and Z. Yang. "Tetrahedron DNA dendrimers and their encapsulation of gold nanoparticles." ***Bioorganic & Medicinal Chemistry*** 22, (2014): 4391-4394.
19. Y. Dong, Y. Sun, L. Wang, D. Wang, **T. Zhou**, Z. Yang, Z. Chen, Q. Wang, Q. Fan, and D. Liu. "Frame-Guided Assembly of Vesicles with Programmed Geometry and Dimensions." ***Angewandte Chemie International Edition*** 53, (2014): 2607-2610.
20. J. Jin, Y. Xing, Y. Xi, X. Liu, **T. Zhou**, X. Ma, Z. Yang, S. Wang, and D. Liu. "A triggered DNA hydrogel cover to envelop and release single cells." ***Advanced Materials*** 25, (2013): 4714-4717.
21. **T. Zhou#**, P. Chen#, L. Niu, J. Jin, D. Liang, Z. Li, Z. Yang, and D. Liu. "pH-Responsive Size-Tunable Self-Assembled DNA Dendrimers." ***Angewandte Chemie International Edition*** 124, (2012): 11433-11436.

ISSUED PATENTS

1. C. M. Lieber, J. Liu, Z. Cheng, G. Hong, T.-M. Fu, and **T. Zhou**, "Systems and methods for injectable devices" US Patent App. 15/301,792, 2017.
2. C. M. Lieber, G. Hong, T.-M. Fu, J. Huang, and **T. Zhou**, "Techniques and systems for injection and/or connection of electrical devices." US Patent App. 15/749,617, 2018.

SELECTED CONFERENCE TALKS

- The 2022 MRS Spring Meeting 2022
  Oral-"Soft, stretchable, and conformable bioelectronic device for neural modulation"
- The 2021 MRS Fall Meeting 2021
  Oral- "Additive Manufacturing of Hydrogel Bioelectronic Interfaces"
- The 2020 MRS Spring/Fall Meeting 2020
  Oral- "Chronic In Vivo Recording and Modulation of Intact Mouse Spinal Cords with Implanted Tissue-Like Electronics"
- The 2017 MRS Fall Meeting 2017
  Oral- "Syringe-Injectable Mesh Electronics Integrate Seamlessly with Minimal Chronic Immune Response in Central Nervous System"

SELECTED AWARDS AND HONORS

- MRS Best Oral Presentation Award 2020
- MRS Travel Award 2017
- Harvard CBI Simmons Awards 2015
- National Scholarship for Graduate Students 2013
- Distinguished Graduates of Beijing 2013
- Tsinghua University First Class Scholarship 2012
- Tsinghua University Laboratory Construction Award 2008

PROFESSIONAL ACTIVITIES

Reviewer for Peer-Reviewed Journals including but not limited to

- *Nano Letters*
- *Science Advances*
- *Advanced Healthcare Materials*
- *Small*
- *ACS Applied Materials & Interfaces*
- *ACS Biomaterials Science & Engineering*
- *Advanced Materials Technologies*
- *Advanced Biosystems*
- *Advanced Science*
- *Applied Nanoscience*

Reviewer for Fellowships

- American Society for Engineering Education eFellows Program

Invited Session Chair for Conference

- The 2021 MRS Fall Meeting Symposium SF03

Editorial Board Member

- Editorial Board of *Micromachines*