

# Hangbo Zhao

Department of Aerospace and Mechanical Engineering  
University of Southern California  
3650 McClintock Ave, OHE 430S, Los Angeles, CA 90089  
hangbozh@usc.edu | <https://sites.usc.edu/zhaogroup/>

## EDUCATION

---

<b>Massachusetts Institute of Technology</b> Ph.D., Mechanical Engineering	Cambridge, MA 2017
<b>Massachusetts Institute of Technology</b> M.S., Mechanical Engineering	Cambridge, MA 2014
<b>Tsinghua University</b> B.S., Precision Instrument	Beijing, China 2011

## PROFESSIONAL APPOINTMENTS

---

<b>University of Southern California</b> , Los Angeles, CA Assistant professor, Department of Aerospace and Mechanical Engineering	2020-present
<b>Northwestern University</b> , Evanston, IL Postdoctoral fellow, Center for Bio-Integrated Electronics   Advisor: Prof. John A. Rogers	2017-2019
<b>Massachusetts Institute of Technology</b> , Cambridge, MA Postdoctoral associate, Department of Mechanical Engineering   Advisor: Prof. A. John Hart	2017

## AWARDS

---

ASME Haythornthwaite Foundation Research Initiation Award	2021
Charles Lee Powell Faculty Research Award	2021
Office of Naval Research DURIP Award	2020
Outstanding Poster Award, 31st International Conference of the Polymer Processing Society	2015
Best Poster Award, Materials Research Society (MRS) Fall Meeting	2014
Excellent Graduates Award, Tsinghua University	2011
National Scholarship, Chinese Ministry of Education	2009

## PUBLICATIONS

---

### Publications in Refereed Journals and Conferences

- [1] **H. Zhao**, X. Cheng, C. Wu, T.-L. Liu, Q. Zhao, S. Li, X. Ni, S. Yao, M. Han, Y. Huang, Y. Zhang, J. A. Rogers, "Mechanically guided hierarchical assembly of 3D mesostructures", *Advanced Materials*, 2109416, 2022.
- [2] T.-A. Truong, T.-K. Nguyen, **H. Zhao**, N.-K. Nguyen, T. Dinh, Y. Park, T. Nguyen, Y. Yamauchi, N.-T. Nguyen, H.-P. Phan, "Engineering stress in thin films: an innovative pathway toward 3D micro and nanosystems", *Small*, 2105748, 2021 (featured as Cover).
- [3] Y. Cai, Z. Han, T. Cranney, **H. Zhao**, S.K. Gupta, "Automated robotic assembly of 3D mesostructures via guided mechanical buckling", *IEEE International Conference on Automation Science and Engineering (CASE)*, 2098-2104, 2021.

- [4] **H. Zhao**, Y. Kim, H. Wang, X. Ning, C. Xu, J. Suh, M. Han, G.J. Pagan-Diaz, W. Lu, H. Li, W. Bai, O. Aydin, Y. Park, J. Wang, Y. Yao, Y. He, M.T.A. Saif, Y. Huang, R. Bashir, J.A. Rogers, “Compliant 3D frameworks instrumented with strain sensors for characterization of millimeter-scale-engineered muscle tissues”, *Proceedings of the National Academy of Sciences*, 118, e2100077118, 2021.
- [5] Y. Yang, M. Wu, A. Vázquez-Guardado, A.J. Wegener, J.G. Grajales-Reyes, Y. Deng, T. Wang, R. Avila, J.A. Moreno, S. Minkowicz, V. Dumrongprechachan, J. Lee, S. Zhang, A.A. Legaria, Y. Ma, S. Mehta, D. Franklin, L. Hartman, W. Bai, M. Han, **H. Zhao**, W. Lu, Y. Yu, X. Sheng, A. Banks, X. Yu, Z.R. Donaldson, R.W. Gereau IV, C.H. Good, Z. Xie, Y. Huang, Y. Kozorovitskiy, J.A. Rogers “Wireless multilateral devices for optogenetic studies of individual and social behaviors”, *Nature Neuroscience*, 24, 1035-1045, 2021.
- [6] H. Zhang, **H. Zhao**, X. Zhao, C. Xu, D. Franklin, A. Vázquez-Guardado, W. Bai, J. Zhao, K. Li, G. Monti, W. Lu, A. Kobeissi, L. Tian, X. Ning, X. Yu, S. Mehta, D. Chanda, Y. Huang, S. Xu, B. E. Perez White, J.A. Rogers, “Biocompatible light guide-assisted wearable devices for enhanced UV light delivery in deep skin”, *Advanced Functional Materials*, 31, 2100576, 2021.
- [7] Y. Park, C.K. Franz, H. Ryu, H. Luan, K.Y. Cotton, J.U. Kim, T.S. Chung, S. Zhao, A. Vazquez-Guardado, D.S. Yang, K. Li, R. Avila, J.K. Phillips, M.J. Quezada, H. Jang, S.S. Kwak, S.Min Won, K. Kwon, H. Jeong, A.J. Bhandodkar, M. Han, **H. Zhao**, G.R. Osher, H. Wang, K.H. Lee, Y. Zhang, Y. Huang, J.D. Finan, J.A. Rogers, “Three-dimensional, multifunctional neural interfaces for cortical spheroids and engineered assembloids”, *Science Advances*, 7, eabf9153, 2021 (featured as Cover).
- [8] W. Lu, W. Bai, H. Zhang, C. Xu, A.M. Chiarelli, A. Vazquez-Guardado, Z. Xie, H. Shen, K. Nandoliya, **H. Zhao**, K.H. Lee, Y. Wu, D. Franklin, R. Avila, S. Xu, A. Rwei, M. Han, K. Kwon, Y. Deng, X. Yu, E.B. Thorp, X. Feng, Y. Huang, J. Forbess, Z. Ge, J.A. Rogers, “Wireless implantable catheter-type oximeter designed for cardiac oxygen saturation”, *Science Advances*, 7, eabe0579, 2021.
- [9] W. Bai, W. Bai, M. Irie, Z. Liu, H. Luan, D. Franklin, K. Nandoliya, H. Guo, H. Zang, Y. Weng, D. Lu, D. Wu, Y. Wu, J. Song, M. Han, E. Song, Y. Yang, X. Chen, **H. Zhao**, W. Lu, G. Monti, I. Stepien, I. Kandela, C.R. Haney, C. Wu, S.M. Won, H. Ryu, A. Rwei, H. Shen, J. Kim, H.J. Yoon, W. Ouyang, Y. Liu, E. Suen, H. Chen, J. Okina, J. Liang, Y. Huang, G.A. Ameer, W. Zhou, J.A. Rogers, “Bioresorbable multilayer photonic cavities as temporary implants for tether-free measurements of regional tissue temperatures”, *BME Frontiers*, 8653218, 2021.
- [10] M. Han, L. Chen, K. Aras, C. Liang, X. Chen, **H. Zhao**, K. Li, N.R. Faye, B. Sun, J.-H. Kim, W. Bai, Q. Yang, Y. Ma, W. Lu, E. Song, J.M. Baek, Y. Lee, C. Liu, J.B. Model, G. Yang, R. Ghaffari, Y. Huang, I.R. Efimov, J.A. Rogers, “Catheter-integrated soft multilayer electronic arrays for multiplexed sensing and actuation during cardiac surgery”, *Nature Biomedical Engineering*, 4, 997-1009, 2020 (featured as Cover).
- [11] J. Jeon, J.E. Park, S. Won, **H. Zhao**, S. Kim, B.S. Shim, A. Urbas, A.J. Hart, Z. Ku, J.J. Wie, “Shape-programmed fabrication and actuation of magnetically active micropost arrays”, *ACS Applied Materials & Interfaces*, 12, 17113-17120, 2020 (featured as Cover).
- [12] Z. Fan, Y. Yang, F. Zhang, Z. Xu, **H. Zhao**, T. Wang, H. Song, Y. Huang, J.A. Rogers, Y. Zhang, “Inverse design strategies for 3D surfaces formed by mechanically guided assembly”, *Advanced Materials*, 32, 1908424, 2020 (featured as Frontispiece).

- [13] **H. Zhao**, Y. Lee, M. Han, B.K. Sharma, X. Chen, J.-H. Ahn, J.A. Rogers, “Nanofabrication approaches for functional three-dimensional architectures”, *Nano Today*, 30, 1000825, 2020.
- [14] S. Kim, Y. Jiang, K. Towell, M.S.H. Boutilier, N. Nayakanti, C. Chen, C. Jacob, **H. Zhao**, K.T. Turner, A.J. Hart, “Soft nanocomposite electroadhesives for digital micro- and nanotransfer printing”, *Science Advances*, 5, eaax4790, 2019 (featured on MIT News).
- [15] **H. Zhao**, S. Dash, N.S. Dhillon, S. Kim, B. Lettiere, K.K. Varanasi, A.J. Hart, “Microstructured ceramic-coated carbon nanotube surfaces for high heat flux pool boiling”, *ACS Applied Nano Materials*, 2, 5538-5545, 2019.
- [16] Y. Park, H. Luan, K. Kwon, S. Zhao, D. Franklin, H. Wang, **H. Zhao**, W. Bai, J.U. Kim, W. Lu, J.-H. Kim, Y. Huang, Y. Zhang, J.A. Rogers, “Transformable, freestanding 3D mesostructures based on transient materials and mechanical interlocking”, *Advanced Functional Materials*, 29, 1903181, 2019 (featured as Cover).
- [17] **H. Zhao**, K. Li, M. Han, F. Zhu, A. Vázquez-Guardado, P. Guo, Z. Xie, Y. Park, L. Chen, X. Wang, H. Luan, Y. Yang, H. Wang, C. Liang, Y. Xue, R.D. Schaller, D. Chanda, Y. Huang, Y. Zhang, J.A. Rogers, “Buckling and twisting of advanced materials into morphable 3D mesostructures”, *Proceedings of the National Academy of Sciences*, 116, 13239-13248, 2019 (highlighted in PNAS).
- [18] D. Mariappan, S. Kim, M.S.H. Boutilier, J. Zhao, **H. Zhao**, J. Beroz, U. Muecke, H. Sojoudi, K.K. Gleason, P.-T. Brun, A.J. Hart, “Dynamics of liquid transfer from nanoporous stamps in high-resolution flexographic printing”, *Langmuir*, 35, 7659-7671, 2019.
- [19] **H. Zhao**, S. Park, B.R. Solomon, S. Kim, D. Soto, A.T. Paxson, K.K. Varanasi, A.J. Hart, “Synthetic butterfly scale surfaces with compliance-tailored anisotropic droplet adhesion”, *Advanced Materials*, 31, 1807686, 2019.
- [20] H. Zhang, P. Gutruf, K. Meacham, M.C. Montana, X. Zhao, A.M. Chiarelli, A. Vazquez-Guardado, A. Norris, L. Lu, Q. Guo, C. Xu, Y. Wu, **H. Zhao**, X. Ning, W. Bai, I. Kandela, C.R. Haney, D. Chanda, R.W. Gereau IV, J.A. Rogers, “Wireless, battery-free optoelectronic systems as subdermal implants for local tissue oximetry”, *Science Advances*, 5, eaaw0873, 2019.
- [21] N. Zheng, J. Hou, **H. Zhao**, J. Wu, Y. Luo, H. Bai, J.A. Rogers, Q. Zhao, T. Xie, “Mechano-plastic pyrolysis of dynamic covalent polymer network toward hierarchical 3D ceramics”, *Advanced Materials*, 31, 1807326, 2019.
- [22] M. Han, H. Wang, Y. Yang, C. Liang, W. Bai, Z. Yan, H. Li, Y. Xue, X. Wang, B. Akar, **H. Zhao**, H. Luan, J. Lim, I. Kandela, G.A. Ameer, Y. Zhang, Y. Huang, J.A. Rogers, “Three-dimensional piezoelectric polymer microsystems for multifunctional, multistimuli-responsive and in vivo biomechanical energy harvesting”, *Nature Electronics*, 2, 26-35, 2019 (featured as Cover and highlighted in *Nature Electronics*).
- [23] N.T. Dee, M. Bedewy, A. Rao, J. Beroz, B. Lee, E.R. Meshot, C.A.C. Chazot, P.R. Kidambi, **H. Zhao**, T. Serbowicz, K. Teichert, P.K. Purohit, A.J. Hart, “*In Situ* mechanochemical modulation of carbon nanotube forest growth”, *Chemistry of Materials*, 31, 407-418, 2019.
- [24] K. Cui, P. Lemaire, **H. Zhao**, T. Savas, G. Parsons, A.J. Hart, “Tungsten-carbon nanotube composite photonic crystals as thermally stable spectral-selective absorbers and emitters for thermophotovoltaics”, *Advanced Energy Materials*, 8, 1801471, 2018.

- [25] Y. Li, Y. Ma, C. Wei, H. Luan, S. Xu, M. Han, **H. Zhao**, C. Liang, Q. Yang, Y. Yang, K.E. Crawford, X. Feng, Y. Huang, J.A. Rogers, “Thin, millimeter scale fingernail sensors for thermal characterization of nail bed tissue”, *Advanced Functional Materials*, 28, 1801380, 2018.
- [26] H. Sojoudi, S. Kim, **H. Zhao**, R.K. Annavarapu, D. Mariappan, A. J. Hart, G.H. McKinley, K.K. Gleason, “Stable wettability control of nanoporous microstructures by iCVD coating of carbon nanotubes”, *ACS Applied Materials & Interfaces*, 9, 43287-43299, 2017 (featured as Cover).
- [27] S. Kim, H. Sojoudi, **H. Zhao**, D. Mariappan, G.H. McKinley, K.K. Gleason, A. J. Hart, “Ultrathin high-resolution flexographic printing using nanoporous stamps”, *Science Advances*, 2, e1601660, 2016 (highlighted in *Nature Nanotechnology* and *MIT News*).
- [28] **H. Zhao**, C. Jacob, H.A. Stone, A. J. Hart, “Liquid imbibition in ceramic-coated carbon nanotube films”, *Langmuir*, 32, 12686-12692, 2016.
- [29] **H. Zhao**, J. Wie, D. Copic, C.R. Oliver, A. Orbaek White, S. Kim, A. J. Hart, “High-fidelity replica molding of glassy liquid crystalline polymer microstructures”, *ACS Applied Materials & Interfaces*, 8, 8110-8117, 2016.
- [30] S. Park, **H. Zhao**, S. Kim, M. De Volder, A. J. Hart, “Predictive synthesis of freeform carbon nanotube microarchitectures by strain-engineered chemical vapor deposition”, *Small*, 12, 4393-4403, 2016.
- [31] S.C. Tan, **H. Zhao**, C.V. Thompson, “Fabrication of high aspect ratio AFM probes with different materials inspired by TEM ‘lift-out’ method”, *Journal of Vacuum Science and Technology B*, 34, 051805, 2016.

### Book Chapters

**H. Zhao**, M. Han, H. Zhang, “Flexible and stretchable devices from unconventional 3D structural design” (invited book chapter in “Flexible and Stretchable Triboelectric Nanogenerator Devices: Toward Self-powered Systems”), Wiley-VCH, 2019.

## PROFESSIONAL ACTIVITIES

---

### **Reviewer for journals**

Reviewer Editor: *Frontiers in Electronics*

Reviewer: *Science Advances*, *Advanced Materials*, *Advanced Science*, *ACS Applied Materials & Interfaces*, *Langmuir*, *Extreme Mechanics Letters*, *Scientific Reports*, *ACS Applied Electronic Materials*, *Microsystems & Nanoengineering*, *Nanotechnology*, *Chemical Engineering Science*, *IEEE Transactions on Nanotechnology*, *Micromachines*

### **Reviewer for conferences**

ASME Manufacturing Science and Engineering Conference (MSEC) 2020 & 2021

### **Membership**

Materials Research Society, American Society of Mechanical Engineers, Society of Manufacturing Engineers