

Jun Yao

Associate Professor
Armstrong Professional Development Professor
Department of Electrical and Computer Engineering,
Institute for Applied Life Sciences,
Department of Biomedical Engineering (Adjunct),
University of Massachusetts, Amherst, MA 01003
Email: juny@umass.edu Phone: 413-545-3324

Professional Preparation

B.S. Electrical Engineering, Fudan University, Shanghai, China
M.S. Physics, Fudan University, Shanghai, China
Ph.D. Applied Physics, Rice University, Houston, TX
Postdoc Chem. & Chem. Biol., Harvard University, MA

Appointments

2017.9 – 2023.6 *Assistant Professor*, Electrical & Computer Engineering,
Institute for Applied Life Sciences,
UMass Amherst
2023.6 – present *Associate Professor*, Electrical & Computer Engineering,
Institute for Applied Life Sciences,
UMass Amherst
2026.6 – present (*Armstrong Professional Development Professorship*)
2019 – present *Adjunct*, Department of Biomedical Engineering, UMass Amherst

Honors/Awards

- UMass Spotlight Scholar (Spring, 2026)
- Nanoscale Emerging Investigator, Royal Society of Chemistry (2023)
- Alfred P. Sloan Fellowship (2022)
- NIH (NIBIB) Trailblazer R21 Award (2022)
- Barbara H. & Joseph J. Goldstein Outstanding Junior Faculty Award, COE, UMass (2020-21)
- Sony Faculty Innovation Award, Sony Corporation (2021)
- Armstrong Fund for Science Award, UMass Amherst (2020)
- Manning/IALS Innovation Award, UMass Amherst (2019)
- NSF CAREER Award, National Science Foundation (2019)
- Technology Development Award by President Office, UMass Amherst (2018)

Publications (“#” corresponding author)

58. Siqi Wang, Xiaoyu Wang, Shuai Fu, Claire Senger, Jacob Pfund, Menka Jain, Reika Katsumata, **Jun Yao**[#], “A Biohybrid Mesh Harvester for Distributed Energy Harvesting in Living Tissues”. *Science Adv.* accepted (2026).

57. Zhenyu Lei, Xiaomeng Liu, Quan Zhang, VP Nguyen, Jun Yao, Deepak Ganesan, "WISP: Printable Graphene-Based Wearables for Force-Based Micro-Gesture Recognition", *Proceedings of the 2026 ACM/IEEE International Conference on Embedded Artificial Intelligence and Sensing Systems*. pp 531-544 (2026).
56. Shuai Fu, Hongyan Gao, Siqi Wang, Xiaoyu Wang, Trevor Woodard, Zhien Wang, Jing Kong, Derek R Lovley, **Jun Yao**[#], "Constructing artificial neurons with functional parameters comprehensively matching biological values". *Nature Commun.* 16, 8599 (2025).
55. **Jun Yao**[#], Yuhang Song, "Calling for sustainable mechanisms in moisture-based hydrovoltaic devices". *National Science Review* 12, nwaf315 (2025).
54. Jayesh M Sonawane, Eric Chia, Toshiyuki Ueki, Trevor Woodard, Jesse Greener, Stephen S Nonnenmann, **Jun Yao**, Derek R Lovley. "Sensing devices fabricated with Escherichia coli expressing genetically tunable nanowires incorporated into a water-stable polymer". *Biosens. Bioelectron.* 278, 117378 (2025).
53. Hongyan Gao, Zhien Wang, Feiyu Yang, Xiaoyu Wang, Siqi Wang, Quan Zhang, Xiaomeng Liu, Yubing Sun, Jing Kong, **Jun Yao**[#]. "Graphene-Integrated Mesh Electronics with Converged Multifunctionality for Tracking Multimodal Excitation-Contraction Dynamics in Cardiac Microtissues". *Nature Commun.* 16, 8599 (2024).
52. Tianda Fu, Shuai Fu, Siqi Wang, **Jun Yao**[#]. "Enabling Reliable Two-terminal Memristor Network by Exploiting the Dynamic Reverse Recovery in a Diode Selector", *Device* 2, 100329 (2024).
51. Shuai Fu, Ji-Hoon Park, Hongyan Gao, Tianyi Zhang, Xiang Ji, Tianda Fu, Lu Sun, Jing Kong, **Jun Yao**[#]. "Two-Terminal MoS₂ Memristor and the Homogeneous Integration with a MoS₂ Transistor for Neural Networks". *Nano. Lett.* 23, 5869-5876 (2023).
50. Xiaomeng Liu, Hongyan Gao, Lu Sun, **Jun Yao**[#]. "Generic Air-Gen Effect in Nanoporous Materials for Sustainable Energy Harvesting from Air Humidity". *Adv. Mater.* 36, 2300748 (2023).
49. Yassir Lekbach, Toshiyuki Ueki, Xiaomeng Liu, Trevor Woodard, **Jun Yao**, Derek R. Lovley. "Microbial Nanowires with Genetically Modified Peptide Ligands to Sustainably Fabricate Electronic Sensing Devices". *Biosens. Bioelectron.* 226, 115147 (2023).
48. Tianda Fu, Shuai Fu, **Jun Yao**[#]. (Review) "Recent Progress in Bio-voltage Memristors Working with Ultralow Voltage of Biological Amplitude". *Nanoscale*, 15, 4669-4681 (2023).
47. **Jun Yao**[#]. "Protein Nanowire Thin Films for the Potential of Constructing Green Electronic Devices". *Proc. SPIE (Society of Photo-optical Instrumentation Engineers)*, 124770J (2023). <https://doi.org/10.1117/12.2647424>

46. Tianda Fu, Shuai Fu, Lu Sun, Hongyan Gao, **Jun Yao**[#]. “An Effective Sneak-Path Solution Based on a Transient-Relaxation Device”. *Adv. Mater.* 35, 2207133 (2023).
45. Xiaomeng Liu, Toshiyuki Ueki, Hongyan Gao, Trevor L. Woodard, Kelly P. Nevin, Tianda Fu, Shuai Fu, Lu Sun, Derek R. Lovley[#], **Jun Yao**[#], “Microbial Biofilms for Electricity Generation from Water Evaporation and Power to Wearables”, *Nature Commun.*, 13, 4369 (2022).
44. Hongyan Gao, Feiyu Yang, Kianoosh Sattari, Xian Du, Tianda Fu, Shuai Fu, Xiaomeng Liu, Jian Lin, Yubing Sun, **Jun Yao**[#], “Bioinspired Two-in-One Nanotransistor Sensor for the Simultaneous Measurements of Electrical and Mechanical Cellular Responses”, *Science Adv.*, 8, eabn2485 (2022).
43. Tianda Fu, Xiaomeng Liu, Shuai Fu, Trevor Woodard, Hongyan Gao, Derek R. Lovley, **Jun Yao**[#], “Self-sustained Green Neuromorphic Interfaces”, *Nature Commun.* 12, 3351 (2021).
42. Derek R. Lovley, **Jun Yao**. “(Review) Intrinsically Conductive Microbial Nanowires for ‘Green’ Electronics with Novel Functions”, *Trends in Biotechnology* 39, 940-952 (2021).
41. Xiaomeng Liu, Tianda Fu, Joy Ward, Hongyan Gao, Bing Yin, Trevor Woodard, Derek R. Lovley, **Jun Yao**[#], “Multifunctional Protein-Nanowire Humidity Sensors for Green Wearable Electronics”, *Adv. Electron. Mater.* 6, 2000721 (2020).
40. Jian Sun, Russell S. Deacon, Xiaochi Liu, **Jun Yao**, Koji Ishibashi, “Spin Filtering in Germanium/Silicon Core/Shell Nanowires with Pseudo-helical Gap”, *Appl. Phys. Lett.* 117, 052403 (2020).
39. Alexander Smith, Xiaomeng Liu, Trevor Woodward, Todd Emrick, Juan Jimenez, Derek R. Lovley[#], **Jun Yao**[#], “Bioelectronic Protein Nanowire Sensors for Ammonia Detection”, *Nano Research* 13, 1479–1484 (2020).
38. Xiaomeng Liu, Hongyan Gao, Joy Ward, Xiaorong Liu, Bing Yin, Tianda Fu, Jianhan Chen, Derek R. Lovley, **Jun Yao**[#], “Power Generation from Ambient Humidity Using Protein Nanowires”, *Nature* 578, 550-554 (2020).
37. Tianda Fu, Xiaomeng Liu, Hongyan Gao, Joy Ward, Xiaorong Liu, Bing Yin, Zhongrui Wang, Ye Zhuo, David Walker, J. Joshua Yang, Jianhan Chen, Derek R. Lovley, **Jun Yao**[#], “Bioinspired Bio-Voltage Memristors”, *Nature Commun.* 11, 1861 (2020).
36. Masiar Sistani, Jovian Delaforce, Roman B. G. Kramer, Nicolas Roch, Minh Anh Luong, Martien I. den Hertog, Eric Robin, Jürgen Smoliner, **Jun Yao**, Charles M. Lieber, Cecile Naud, Alois Lugstein, Olivier Buisson, “Highly Transparent Contacts to the 1D Hole Gas in Ultrascaled Ge/Si Core/Shell Nanowires”, *ACS Nano* 13, 14145-14151 (2019).

35. Hongyan Gao, Bing Yin, Siyu Wu, Xiaomeng Liu, Tianda Fu, Cheng Zhang, Jian Lin, **Jun Yao**[#], “Deterministic Assembly of Three-Dimensional Suspended Nanowire Structures”, *Nano Lett.* 19, 5647-5652 (2019).
34. Rui Wang, Russell S. Deacon, Jian Sun, **Jun Yao**, Charles M. Lieber, Koji Ishibashi, “Gate Tunable Hole Charge Qubit Formed in a Ge/Si Nanowire Double Quantum Dot Coupled to Microwave Photons”, *Nano Lett.* 19, 1052-1060 (2019).
33. M. Sistani, M. A. Luong, M. I. den Hertog, E. Robin, M. Spies, B. Fernandez, **Jun Yao**, E. Bertagnolli, A. Lugstein, “Monolithic Axial and Radial Metal-Semiconductor Nanowire Heterostructures”, *Nano Lett.* 18, 7692-7697 (2018).
32. Bing Yin, Xiaomeng Liu, Hongyan Gao, Tianda Fu, **Jun Yao**[#], “Bioinspired and Bristled Microparticles for Ultrasensitive Pressure and Strain Sensors”, *Nature Commun.* 9, 5161 (2018).
31. Jian Sun, Russell S. Deacon, Rui Wang, **Jun Yao**, Charles M. Lieber, Koji Ishibashi, “Helical Hole State in Multiple Conduction Modes in Ge/Si Core/Shell Nanowire”, *Nano Lett.* 18, 6144-6149 (2018).

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30. Thomas Schuhmann*, **Jun Yao***, Guosong Hong, Tianming Fu and Charles M. Lieber, “Syringe-injectable electronics with a plug-and-play input/output interface,” *Nano Lett.* 17, 5836-5842 (2017). (* equal contributors)
28. Yunlong Zhao*, **Jun Yao***, Lin Xu, Max Mankin, Yinbo Zhu, Heng-An Wu, Liqiang Mai, Qingjie Zhang, Charles M. Lieber, “Shape-controlled deterministic assembly of nanowire”, *Nano Lett.* 16, 2644-2650 (2016) (*equal contributors).
29. **Jun Yao**, Hao Yan, Shamik Das, James Klemic, James Ellenbogen, and Charles M. Lieber, “Nanowire nanocomputer as a finite-state machine”, *Proc. Natl. Acad. Sci. USA* 111, 1259-1264 (2014).
27. Wooyoung Shim*, **Jun Yao***, and Charles M. Lieber, “Programmable resistive-switch nanowire transistor logic circuits”, *Nano Lett.* 14, 5430-5436 (2014) (*equal contributors).
26. Andrew P. Higginbotham, F. Kuemmeth, T. W. Larsen, **Jun Yao**, Hao Yan, Charles M. Lieber, and Charles M. Marcus, “Antilocalization of coulomb blockage in a Ge/Si nanowire”, *Phys. Rev. Lett.* 112, 216806 (2014).
25. Andrew P. Higginbotham, T. W. Larsen, **Jun Yao**, Hao Yan, Charles M. Lieber, and Charles M. Marcus, “Hole spin coherence in a Ge/Si heterostructure nanowire”, *Nano Lett.* 14, 3582-3586 (2014).
24. **Jun Yao**, Hao Yan, and Charles M. Lieber, “A nanoscale combing technique for the large-scale assembly of highly aligned nanowires”, *Nature Nanotechnol.* 8, 329-335 (2013).
23. **Jun Yao***, Jian Lin*, Yanhua Dai, Gedeng Ruan, Zheng Yan, Lei Li, Zhong Lin, Douglas Natelson, and James M. Tour, “Highly transparent nonvolatile resistive

- memory devices from silicon oxide and graphene", *Nature Commun.* 3, 1101 (2012) (*equal contributors).
22. Lei Ren, Qi Zhang, **Jun Yao**, Zhengzong Sun, Ryosuke Kaneko, Zheng Yan, Sebastien Nanot, Zhong Jin, Iwao Kawayama, Masayoshi Tonouchi, James M. Tour, and Junichiro Kono, "Terahertz and infrared spectroscopy of gated large-area graphene", *Nano Lett.* 12, 3711-3715 (2012).
 21. Zheng Yan, **Jun Yao**, Zhengzong Sun, Yu Zhu, and James M. Tour, "Controlled ambipolar-to-unipolar conversion in graphene field-effect transistor through surface coating with poly(ethylene imine)/poly(ethylene glycol) films", *Small* 8, 59-62 (2012).
 20. **Jun Yao**, Lin Zhong, Douglas Natelson, and James M. Tour, "In situ probing of the conducting filament in a silicon oxide resistive switch", *Sci. Rep.* 2, 242 (2012).
 19. Zhengzong Sun, Cary L. Pint, Daniela C. Marcano, Chenguang Zhang, **Jun Yao**, Gedeng Ruan, Zheng Yan, Yu Zhu, Robert H. Hauge, and James M. Tour, "Toward hybrid superlattices in graphene", *Nature Commun.* 2, 559 (2011).
 18. Zheng Yan, Zhiwei Peng, Zhengzong Sun, **Jun Yao**, Yu Zhu, Zheng Liu, Pulickel M. Ajayan, and James M. Tour, "Growth of bilayer graphene on insulating substrates", *ACS Nano* 5, 8187-8192 (2011) .
 17. **Jun Yao**, Lin Zhong, Douglas Natelson, and James M. Tour, "Silicon oxide: a non-innocent surface for molecular electronics and nanoelectronics", *J. Am. Chem. Soc.* 133, 941-948, 2011.
 16. Zhong Jin, **Jun Yao**, Carter Kittrell, and James M. Tour, "Large-Scale growth and characterizations of nitrogen-doped monolayer graphene sheets", *ACS Nano* 5, 4112-4117, (2011).
 15. Zheng Yan, Zhengzong Sun, Wei Lu, **Jun Yao**, Yu Zhu, and James M. Tour, "Controlled modulation of electronic properties of graphene by self-assembled monolayers on SiO₂ substrates", *ACS Nano* 5, 1535-1540, 2011.
 14. **Jun Yao**, Lin Zhong, Douglas Natelson, and James M. Tour, "Intrinsic resistive switching and memory effects in silicon oxide", *Appl. Phys. A* 102, 835-839, 2011.
 13. Yu Zhu, Wei Lu, Zhengzong Sun, Dmitry V. Kosynkin, **Jun Yao**, and James M. Tour, "High throughput preparation of large area transparent electrodes using non-functionalized graphene nanoribbons", *Chem. Mater.* 23, 935-939, 2011.
 12. **Jun Yao**, Lin Zhong, Douglas Natelson, and James M. Tour, "Making memory out of silicon oxide filaments", *EE Times Europe*, December 2010, p 11 (magazine article).
 11. Zhengzong Sun, Zheng Yan, **Jun Yao**, Elvira Beitler, Yu Zhu, and James M. Tour, "Growth of graphene from solid carbon source", *Nature* 468, 549-552, 2010.
 10. **Jun Yao**, Zhengzong Sun, Lin Zhong, Douglas Natelson, and James M. Tour, "Resistive switches from silicon oxide", *Nano Lett.* 10, 4105-4110, 2010.

9. Zhengzong Sun, Everett C. Salas, **Jun Yao**, James M. Tour, and Andreas Lüttge, "Microbially mediated transformation of graphene oxide", *GeoChimica et Cosmochimica Acta* 74, A1009, 2010.
8. Noe T. Alvarez, Christopher E. Hamilton, Cary L. Pint, Alvin Orbaek, **Jun Yao**, Andrew L. Frosinini, Andrew R. Barron, James M. Tour, and Robert H. Hauge, "Wet catalyst-support films for production of vertical aligned carbon nanotubes", *ACS Appl. Mater. Interfaces* 2, 1851-1856, 2010.
7. **Jun Yao**, Zhong Jin, Lin Zhong, Douglas Natelson, and James M. Tour, "Two-terminal nonvolatile memories from single-walled carbon nanotubes", *ACS Nano* 12, 4122-4126, 2009.
6. **Jun Yao**, Lin Zhong, Zengxing Zhang, Tao He, Patrick J. Wheeler, Douglas Natelson, and James M. Tour, "Resistive switching in nanogap systems on SiO₂ substrates", *Small* 24, 2910-2915, 2009.
5. Zengxing Zhang, Zhengzong Sun, **Jun Yao**, and James M. Tour, "Transforming carbon nanotube devices into nanoribbon devices", *J. Am. Chem. Soc.* 131, 13460-13463, 2009.
4. **Jun Yao**, Lin Zhong, Douglas Natelson, and James M. Tour, "Etching-dependent reproducible memory switching in vertical SiO₂ structures", *Appl. Phys. Lett.* 93, 253101, 2008.
3. Tao He, Meng Lu, **Jun Yao**, and James M. Tour, "Reversible modulation of conductance in silicon device via UV/Visible-light irradiation", *Adv. Mater.* 20, 4541-4546, 2008.
2. **Jun Yao** and Zhongqin Yang, "Spin accumulation in a ballistic Rashba bar", *Phys. Rev. B* 73, 033314, 2006.
1. **Jun Yao**, Yu-Chang Chen, Massimiliano Di Ventra, and Zhongqin Yang, "Effect of atomic geometry on shot noise in aluminum quantum point contacts", *Phys. Rev. B* 73, 233407, 2006.

Patents

- 12 **Jun Yao**, Hongyan Gao, "3D sensors for simultaneous detection of bioelectronic and biomechanical signals in tissue", application **18/306,664** filed Apr. 26, 2022.
- 11 **Jun Yao**, Xiaomeng Liu, "Devices and methods for energy harvesting from air humidity", US patent **12,549,114**, issued 2/10, 2026.
- 10 **Jun Yao**, Derek R. Lovley, Xiaomeng Liu, "Electric power generation from ambient humidity using protein nanowires", US patent **12,451,821**, issued 10/21, 2025.
- 9 **Jun Yao**, Derek R. Lovley, Tianda Fu, "Memristor device comprising protein nanowires", US patent **11,631,824**, issued 4/18, 2023.

- 8 **Jun Yao**, Derek R. Lovley, Alexander Smith, Xiaomeng Liu, “Sensors comprising electrically-conductive protein nanowires”, US patent **11,982,637**, issued 5/14, 2024.

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- 7 Charles M. Lieber, Thomas G. Schuhmann, **Jun Yao**, Guosong Hong, Tian-ming Fu, Jungmin Lee, Hong-Gyu Park “Interfaces for syringe-injectable electronics”, US Patent application **15,977,710**, filed May 11, 2018.
- 6 James M. Tour, **Jun Yao**, Jian Lin, Gunuk Wang, Krishna Palem, “Addressable SiO_x memory array with incorporated diodes”, US Patent **9,385,163**, issued Jul. 5, 2016.
- 5 James M. Tour, **Jun Yao**, Douglas Natelson, Lin Zhong, Tao He, “Electronic devices containing switchable conductive silicon oxide as a switching element and methods for production and use thereof”, US Patent **9,129,676**, issued Sep. 8, 2015.
- 4 James M. Tour, Yubao Li, Alexander Sinitskii, Lin Zhong, Mian Dong, **Jun Yao**, “Vertically-stacked electronic devices having conductive carbon films”, US Patent **8,395,901**, issued Mar. 12, 2013.
- 3 Zvi Or-Bach, James M. Tour, **Jun Yao**, Brian Cronquist, “Method for fabrication of a semiconductor element and structure thereof”, US Patent **7,973,559**, issued Jul. 5, 2011
- 2 James M. Tour, **Jun Yao**, “Invisible/transparent nonvolatile memory”, US Patent Application **13/985,956**, filed Feb. 16, 2012.
- 1 James M. Tour, **Jun Yao**, Burt Fowler, Glenn Mortland, “SiO_x-based nonvolatile memory architecture”, US Patent Application **13/821,632**, filed Sep. 8, 2011.