Jun Yao

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

Education

2003	B.S.	Electrical Engineering, Fudan University, Shanghai, China
2006	M.S.	Physics, Fudan University, Shanghai, China
2012	Ph.D.	Applied Physics, Rice University, Houston, TX

Professional Appointments

2011.9 – 2017.8	*Postdoc researcher*, Chem. & Chem. Biol., Harvard University
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
2019 – present	*Adjunct*, Department of Biomedical Engineering, UMass Amherst

Honors and Awards

- *Nanoscale* Emerging Investigator, Royal Society of Chemistry (2023)
- Alfred P. Sloan Fellowship (2022)
- NIH Trailblazer R21 Award (2022)
- Barbara H. & Joseph J. Goldstein Outstanding Junior Faculty Award, COE, UMass (2021)
- 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)

Publications ("#" corresponding author)

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*. accepted (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*, accepted (2024).

51. Shuai Fu, Ji-Hoon Park, Hongyan Gao, Tianyi Zhang, Xiang Ji, Tianda Fu, Lu Sun, Jing Kong, **Jun Yao**#. "Two-Terminal MoS_2 Memristor and the Homogeneous Integration with a MoS_2 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.* 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. 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).

44. 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).

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 Biotechnol*. **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).

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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).

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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).

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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).

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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).
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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).
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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.
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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 SiO_2 substrates", *Small* 24, 2910-2915, 2009.
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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.

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Patents

12 **Jun Yao**, Hongyan Gao, "3D sensors for simultaneous detection of bioelectronic and biomechanical signals in tissue", application **63/334,426** filed Apr. 26, 2022.

11 **Jun Yao**, Xiaomeng Liu, "Devices and methods for energy harvesting from air humidity", application **63/363,515** filed Apr. 25, 2022.

10 **Jun Yao**, Derek R. Lovley, Xiaomeng Liu, "Electric power generation from ambient humidity using protein nanowires", application **62,738,320** filed Sep. 28, 2018, and **62,835,023** filed Apr 17, 2019.

9 **Jun Yao**, Derek R. Lovley, Tianda Fu, "Memristor device comprising protein nanowires", application **63,007,136**, filed Apr. 8, 2020.

8 **Jun Yao**, Derek R. Lovley, Alexander Smith, Xiaomeng Liu, "Sensors comprising electrically-conductive protein nanowires", application **63,014,043**, filed Apr. 22, 2020.

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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.