

Jun Yao

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Professional Preparation

1999–2003	B.S.	Electrical Engineering, Fudan University, Shanghai, China
2003–2006	M.S.	Physics, Fudan University, Shanghai, China
2006–2011	Ph.D.	Applied Physics, Rice University, Houston, TX (Advisors: James M. Tour , Douglas Natelson , Lin Zhong)
2011-2017	Postdoc	Chemistry & Chemical Biology, with Charles M. Lieber , Harvard University, Cambridge, MA

Appointments

2017–present	<i>Assistant Professor</i> , Department of Electrical and Computer Engineering, Institute for Applied Life Sciences, University of Massachusetts at Amherst, MA
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Research Interest

Yao' research main interest includes the synthesis and electrical characterizations of nanomaterials; exploring novel nanoelectronic and bioelectronic devices and sensors; developing large-scale assembly techniques to integrate these nanoelements for functional systems such as computing circuits, biochips, and implantable biomedical devices. Some highlights include: discovery of the intrinsic *memristive* effect in silicon oxides leading to startup for commercial development; invention of combing technique achieving unprecedented improvement in nanowire assembly; construction of the first bottom-up nanowire nanocomputer; and developing plug-and-play interface for *syringe-injectable* electronics for neural interface.

Publications

1. 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)
2. 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).
3. [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).

4. Wooyoung Shim*, **Jun Yao***, and Charles M. Lieber, "Programmable resistive-switch nanowire transistor logic circuits", *Nano Lett.* 14, 5430-5436 (2014) (*equal contributors).
5. 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).
6. 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).
7. **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).
8. **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).
9. 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).
10. 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).
11. **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).
12. 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).
13. 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).
14. **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.
15. 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).
16. 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.
17. **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.

18. 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.
19. **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).
20. 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.
21. **Jun Yao**, Zhengzong Sun, Lin Zhong, Douglas Natelson, and James M. Tour, "Resistive switches from silicon oxide", *Nano Lett.* 10, 4105-4110, 2010. (**Front-page news of The New York Times on Aug. 31, 2010**).
22. 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.
23. 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.
24. **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.
25. **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.
26. 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.
27. **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.
28. 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.
29. **Jun Yao** and Zhongqin Yang, "Spin accumulation in a ballistic Rashba bar", *Phys. Rev. B* 73, 033314, 2006.
30. **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

1. 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.
2. 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.
3. 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.
4. 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
5. James M. Tour, **Jun Yao**, “Invisible/transparent nonvolatile memory”, US Patent Application **13/985,956**, filed Feb. 16, 2012.
6. 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.

Synergistic Activities

Six-year reviewing service for leading scientific journals including Nature Nanotechnology, Advanced Materials, Nano Letters, ACS Nano, etc; featured ‘*Behind the Scenes*’ discover story by NSF; Invited guest and speaker at Sandisk Inc. CA, 2010; invited talk, SPIE Proceedings–DSS, Baltimore, Spring 2014.

Honors

Nano Venture Forum Prize, Rice University (2011); 23th Quantum Institute Colloquium Award, Rice University (2009); Guanghua Fellowship, Fudan University (2004-05); People Scholarship, Fudan University (1999-2000, 2000-01).