

Yan Yao, PH.D.**Assistant Professor**

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Affiliated Faculty with

Materials Engineering Program
 Texas Center for Superconductivity

a. Education and Training

Stanford University	Materials Sci. & Eng.	Postdoc, 2010-2012
University of California, Los Angeles	Materials Sci. & Eng.	Ph.D., 2008
Fudan University	Materials Science	M.S., 2003
Fudan University	Materials Science	B.S., 2000

b. Appointments

2012-present Assistant Professor of Electrical & Computer Engineering, University of Houston

2012-present Assistant Professor Courtesy of Materials Engineering, University of Houston

2012-2014 Roberts A. Welch Professorship, Texas Center of Superconducting at UH

2008-2010 Senior Research Scientist, Polyera Corporation, Skokie, IL

Yao's research group focuses on the materials and devices for energy storage and conversion: understanding the structure-property-performance relationship at the atomic level and designing nanostructured materials for advanced lithium batteries, solar cells, and catalysts. <http://yao.ee.uh.edu>

c. Peer-Reviewed Journal Publications (citation: 5500+)

1. Yao, Y.; Yao, J.; Narasimhan, V. K.; Ruan, Z.; Xie, C.; Fan, S.; Cui, Y. Broadband Light Management Using Low-Q Whispering Gallery Modes in Spherical Nanoshells. *Nature Communications* **2012**, *4*, 664. Highlighted in *Nature* **2012**, *482*, 278.
2. Wu, H.; Chan, G.; Choi, J. W.; Ryu, I.; Yao, Y.; McDowell, M. T.; Lee, S. W.; Jackson, A.; Yang, Y.; Hu, L.; others Stable cycling of double-walled silicon nanotube battery anodes through solid-electrolyte interphase control. *Nature Nanotechnology* **2012**, *7*, 310–315.
3. Yao, Y.; Liu, N.; McDowell, M. T.; Pasta, M.; Cui, Y. Improving the cycling stability of silicon nanowire anodes with conducting polymer coatings. *Energy Environ. Sci.* **2012**, *5*, 7927–7930.
4. Liu, N.; Wu, H.; McDowell, M. T.; Yao, Y.; Wang, C.; Cui, Y. A Yolk-Shell Design for Stabilized and Scalable Li-Ion Battery Alloy Anodes. *Nano Letters* **2012**, *12*, 3315–3321.
5. Liu, N.; Yao, Y.; Cha, J. J.; McDowell, M. T.; Han, Y.; Cui, Y. Functionalization of silicon nanowire surfaces with metal-organic frameworks. *Nano Research* **2012**, *5*, 109–116.
6. Yao, Y.; McDowell, M. T.; Ryu, I.; Wu, H.; Liu, N.; Hu, L.; Nix, W. D.; Cui, Y. Interconnected silicon hollow nanospheres for lithium-ion battery anodes with long cycle life. *Nano Letters* **2011**, *11*, 2949–54.
7. Yao, Y.; Huo, K.; Hu, L.; Liu, N.; Cha, J. J.; McDowell, M. T.; Chu, P. K.; Cui, Y. Highly Conductive, Mechanically Robust, and Electrochemically Inactive TiC/C Nanofiber Scaffold for High-Performance Silicon Anode Batteries. *ACS Nano* **2011**, *5*, 8346–8351.
8. Choi, N.-S.; Yao, Y.; Cui, Y.; Cho, J. One dimensional Si/Sn - based nanowires and nanotubes for lithium-ion energy storage materials. *Journal of Materials Chemistry* **2011**, *21*, 9825.

9. Yang, Y.; Yu, G.; Cha, J. J.; Wu, H.; Vosgueritchian, M.; Yao, Y.; Bao, Z.; Cui, Y. Improving the Performance of Lithium-Sulfur Batteries by Conductive Polymer Coating. *ACS Nano* **2011**, *5*, 9187–9193.
10. Hu, L.; Chen, W.; Xie, X.; Liu, N.; Yang, Y.; Wu, H.; Yao, Y.; Pasta, M.; Alshareef, H. N.; Cui, Y. Symmetrical MnO₂-Carbon Nanotube-Textile Nanostructures for Wearable Pseudocapacitors with High Mass Loading. *ACS Nano* **2011**, *5*, 8904–8913.
11. Bagnis, D.; Beverina, L.; Huang, H.; Silvestri, F.; Yao, Y.; Yan, H.; Pagani, G. A.; Marks, T. J.; Facchetti, A. Marked alkyl-vs alkenyl-substituent effects on squaraine dye solid-state structure, carrier mobility, and bulk-heterojunction solar cell efficiency. *Journal of the American Chemical Society* **2010**, *132*, 4074–4075.
12. Motiei, L.; Yao, Y.; Choudhury, J.; Yan, H.; Marks, T. J.; Boom, M. E.; Facchetti, A. Self-Propagating Molecular Assemblies as Interlayers for Efficient Inverted Bulk-Heterojunction Solar Cells. *Journal of the American Chemical Society* **2010**, *132*, 12528–12530.
13. Yao, Y.; Hou, J.; Xu, Z.; Li, G.; Yang, Y. Effects of Solvent Mixtures on the Nanoscale Phase Separation in Polymer Solar Cells. *Advanced Functional Materials* **2008**, *18*, 1783–1789.
14. Hou, J.; Park, M.-H.; Zhang, S.; Yao, Y.; Chen, L.-M.; Li, J.-H.; Yang, Y. Bandgap and Molecular Energy Level Control of Conjugated Polymer Photovoltaic Materials Based on Benzo[1,2-*b*:4,5-*b'*]dithiophene. *Macromolecules* **2008**, *41*, 6012–6018.
15. Lei, B.; Yao, Y.; Kumar, A.; Yang, Y.; Ozolins, V. Quantifying the relation between the morphology and performance of polymer solar cells using Monte Carlo simulations. *Journal of Applied Physics* **2008**, *104*, 024504
16. Xi, D.; Shi, C.; Yao, Y.; Yang, Y.; Pei, Q. Nanostructured polymer solar cells. In *Reliability Physics Symposium, 2008. IRPS 2008. IEEE International*; **2008** 178–180.
17. Yao, Y.; Chen, H. Y.; Huang, J.; Yang, Y. Low voltage and fast speed all-polymeric optocouplers. *Applied physics letters* **2007**, *90*, 53509.
18. Yao, Y.; Liang, Y.; Shrotriya, V.; Xiao, S.; Yu, L.; Yang, Y. Plastic Near-Infrared Photodetectors Utilizing Low Band Gap Polymer. *Advanced Materials* **2007**, *19*, 3979–3983.
19. Li, G.; Yao, Y.; Yang, H.; Shrotriya, V.; Yang, G.; Yang, Y. “Solvent Annealing” Effect in Polymer Solar Cells Based on Poly(3-hexylthiophene) and Methanofullerenes. *Advanced Functional Materials* **2007**, *17*, 1636–1644.
20. Sista, S.; Yao, Y.; Yang, Y.; Tang, M. L.; Bao, Z. Enhancement in open circuit voltage through a cascade-type energy band structure. *Applied Physics Letters* **2007**, *91*, 223508.
21. Li, G.; Shrotriya, V.; Yao, Y.; Huang, J.; Yang, Y. Manipulating regioregular poly(3-hexylthiophene): [6,6]-phenyl-C61-butyric acid methyl ester blends—route towards high efficiency polymer solar cells. *Journal of Materials Chemistry* **2007**, *17*, 3126.
22. Shi, C.; Yao, Y.; Yang, Y.; Pei, Q. Regioregular copolymers of 3-alkoxythiophene and their photovoltaic application. *Journal of the American Chemical Society* **2006**, *128*, 8980–6.
23. Yao, Y.; Shi, C.; Li, G.; Shrotriya, V.; Pei, Q.; Yang, Y. Effects of C[₇₀] derivative in low band gap polymer photovoltaic devices: Spectral complementation and morphology optimization. *Applied Physics Letters* **2006**, *89*, 153507.
24. Shrotriya, V.; Li, G.; Yao, Y.; Yang, Y. Tandem stacking structure for polymer solar cells by using semi-transparent electrodes. In *Optics & Photonics*; 2006; p. 633416.
25. Shrotriya, V.; Li, G.; Yao, Y.; Moriarty, T.; Emery, K.; Yang, Y. Accurate Measurement and Characterization of Organic Solar Cells. *Advanced Functional Materials* **2006**, *16*, 2016–2023.
26. Shrotriya, V.; Li, G.; Yao, Y.; Chu, C.-W.; Yang, Y. Transition metal oxides as the buffer layer for polymer photovoltaic cells. *Applied Physics Letters* **2006**, *88*, 073508.

27. Shrotriya, V.; Wu, E. H.-E.; Li, G.; Yao, Y.; Yang, Y. Efficient light harvesting in multiple-device stacked structure for polymer solar cells. *Applied Physics Letters* **2006**, *88*, 064104.
28. Shrotriya, V.; Yao, Y.; Li, G.; Yang, Y. Effect of self-organization in polymer/fullerene bulk heterojunctions on solar cell performance. *Applied Physics Letters* **2006**, *89*, 063505.
29. Li, G.; Shrotriya, V.; Huang, J.; Yao, Y.; Moriarty, T.; Emery, K.; Yang, Y. High-efficiency solution processable polymer photovoltaic cells by self-organization of polymer blends. *Nature Materials* **2005**, *4*, 864–868.
30. Li, G.; Shrotriya, V.; Huang, J.; Yao, Y.; Yang, Y. Polymer self-organization enhances photovoltaic efficiency. *J. Appl. Phys* **2005**, *98*, 43704.
31. Li, G.; Shrotriya, V.; Yao, Y.; Yang, Y. Investigation of annealing effects and film thickness dependence of polymer solar cells based on poly(3-hexylthiophene). *Journal of Applied Physics* **2005**, *98*, 043704.
32. Fan, Z.; Mo, X.; Lou, C.; Yao, Y.; Wang, D.; Chen, G.; Lu, J. G. Structures and electrical properties of Ag-tetracyanoquinodimethane organometallic nanowires. *Nanotechnology, IEEE Transactions on* **2005**, *4*, 238–241.
33. Fan, Z.; Wang, D.; Lu, J. G.; Mo, X.; Lou, C.; Yao, Y.; Chen, G. Silver-tetracyanoquinodimethane (Ag-TCNQ) nanostructures and nanodevice. In *Nanotechnology, 2003. IEEE-NANO 2003*. 588–591.

d. Patents

1. Z. Zhu, M. Drees, H. Pan, Y. Yao, H. Yan, S. Lu, and A. Facchetti, Conjugated polymers and their use in optoelectronic devices, EP 2432817, WO/2010/135701, 2012.
2. H. Pan, H. Yan, Y. Yao, S. Lu, Z. Zhu, A. Facchetti, Conjugated polymers and their use in optoelectronic devices, US Patent App. 13/301680, WO/2010/135723, 2011.
3. H. Pan, M. Drees, Z.G. Zhu, Y. Yao, S. Lu, A. Facchetti, Conjugated polymers and their use in optoelectronic devices, US Patent App. 13/304379, 2011.
4. S. Lu, A. Facchetti, Y. Yao, M. Drees, H. Yan, Pyrrolo[3,2-b]pyrrole semiconducting compounds and devices incorporating same, WO/2011/119446, 2011.
5. H. Yan, Y. Yao, S. Lu, A. Facchetti, Conjugated polymers and their use in optoelectronics devices, U.S. Provisional Patent 61/180256, 2011.
6. Y. Yang, Y. Yao, J. Hou, Efficient polymer solar cells using dissimilar solvent mixture, U.S. Provisional Patent 61/000734, 2009.
7. Y. Yao, J. Yao, Y. Cui, Broadband light trapping using low quality factor whispering gallery modes enhanced absorption, U.S. Provisional Patent 61/561074, 2011.

e. Invited Talks

1. Department of Mechanical Engineering, University of Houston, January 17th, 2013.
2. Workshop on Materials Science and Materials Chemistry for Energy, Peking University, September 17th, 2012.
3. Department of Materials Science and Engineering, Beijing Institute of Technology, Beijing, September 19th, 2012.
4. Department of Mechanical Engineering and Materials Science, Yale University, May 2nd, 2012.
5. Department of Materials Science and Engineering, University of Virginia, April 30th, 2012.
6. Thayer School of Engineering, Dartmouth College, April 26th, 2012.
7. Department of Mechanical Engineering, University of Washington, April 16th, 2012.
8. Department of Materials Science and Engineering, University of Wisconsin, April 5th, 2012.
9. Department of Electrical and Computer Engineering, University of Houston, April 2nd, 2012.
10. Department of Mechanical Engineering, Chinese University of Hong Kong, March 27th, 2012.
11. Suzhou Institute of Nano-Tech and Nano-Bionics, CAS, Suzhou, March 23, 2012.

12. Department of Materials Science, Nanjing University, Nanjing, March 20th, 2012.
13. FIST, Xi'an Jiaotong University, Xi'an, China, March 19th, 2012.
14. School of Engineering, EPFL, Switzerland, March 6th, 2012.
15. Department of Chemical and Biomolecular Engineering, Johns Hopkins University, February 16th, 2012.
16. Institute of Materials Research and Engineering, Singapore, February 3rd, 2012.
17. Nanyang Technological University, Singapore, February 1st, 2012.
18. Department of Mechanical Engineering, University of Texas, San Antonio, January 24th, 2012.
19. Department of Materials Science and Engineering, Drexel University, December 12nd, 2011.
20. Masterclass Lecture, Printed Electronics Conference 2011, December 2nd, 2011.
21. Institute of Chemistry, Chinese Academy of Science, Beijing, September 21st, 2011.
22. Department of Materials Science, Fudan University, Shanghai, September 16th, 2011.

f. Awards and Honors

2012, Roberts A. Welch Endowed Professorship
 2008, Excellence in Graduate Polymer Science Research
 2007, Chinese Government Award for Outstanding Students Abroad
 2007, ICI Student Award Finalist in Applied Polymer Science
 2007, UCLA Dissertation Year Fellowship

g. Professional Memberships:

Materials Research Society, American Chemical Society, Electrochemical Society

h. Collaborators:

Dr. Lars Grabow, Dr. Allan Jacobson, Dr. Zhifeng Ren (University of Houston)

i. Graduate and Postdoctoral Advisors and Advisees:

Ph.D advisor: Yang Yang, University of California, Los Angeles
 Postdoc advisor: Yi Cui, Stanford University
 Graduate Student Assistants: Yifei Li, Yan Jing
 Postdoctoral Fellow: Yanliang Liang

j. Teaching

ECE5397/6397: Advanced batteries: principles, materials, devices and systems
 (undergraduate/graduate, new course)

k. Service

Department, College, and University

- Served as a judge for ECE Capstone Design Conference, December 5th, 2012.
- Presented at the exhibition booth on **Houston Energy Day** for STEM educational and interactive activity organized by UH, October 20th, 2012.
- Served as a Ph.D. Qualify exam committee member (Yang Li, Electrical & Computer Engineering, Advisor: Jiming Bao, passed 2012).

Professional/Academic Discipline

- **Regular reviewer** for Nano Letters, ACS Nano, Nano Energy, Macromolecules, Applied Physical Letters, Journal of Materials Chemistry, Nanotechnology, etc.
- **Panel reviewer** for National Science Foundation twice on December 17-18, 2012 and January 15-16, 2013.
- **Technical session chair** of the Lithium-Ion Batteries Session of the 222nd Electrochemical Society Conference (Honolulu, HI) on October 11th, 2012.