Yuan Yang

Department of Mechanical Engineering, MIT
(650)384-5387
yuanyang@mit.edu
www.mit.edu/~yuanyang

Education

2007 – 2012 **Ph.D., Department of Materials Science and Engineering, Stanford University**
Advisor: Yi Cui

2003 – 2007 **B.S., Department of Physics, Peking University, China**

Research Experience

2012 – present **Postdoctoral Associate, Gang Chen Group, Department of Mechanical Engineering, MIT**

Projects: Waste heat recovery through electrochemical cycle
Effect of electrochemical reactions on thermal conductivity of materials

2007 – 2012 **Graduate Researcher, Yi Cui Group, Department of Materials Science and Engineering, Stanford University**

Projects: Li_2S and sulfur cathodes for rechargeable lithium-sulfur batteries
Lithium-polysulfide hybrid flow Batteries
Transparent Li-ion batteries
Conductive paper for applications in Li-ion batteries and electrochemical capacitors
Electrochemical and physical properties of $LiMn_2O_4$ and MnO_2 nanorods

2006 **Undergraduate Visiting Scholar, Chih-Huang Lai Group, Department of Materials Science and Engineering, National Tsinghua University, Taiwan**

Projects: Effects of oxidation time and annealing on magnetic tunneling junctions

2005 – 2007	**Undergraduate Researcher, Dapeng Yu Group, Department of Physics, Peking University, China**
Projects:	Synthesis and physical properties of Mn-doped AlN nanowires
	Electrical properties of AlN nanowires

Awards & Honors

2014	Best Poster Award, ASME International Mechanical Engineering Congress & Exposition
2012	Chinese Government Award for Outstanding Self-financed Students Abroad
2010	Dan Cubicciotti Award of Electrochemical Society (honor mention)
2010	O. Cutler Shepard Award at Stanford University
2009-2011	Stanford Graduate Fellowship
2007-2008	School of Engineering Fellowship of Stanford University
2007	Outstanding Graduate of Beijing
2005	Tri-A Student of Beijing
2005	Pacemaker of Tri-A Students of Peking University

Journal Publications

(Web of Science Total citation: > 4000 times H index: 27)

36. **Yang, Y.**; Zheng, G. Y.; Cui, Y. Nanostructured Sulfur Cathodes. ***Chemical Society Reviews*** 42, 3018-3032 (2013). **[Invited Review]** **(Cited 97 times)**
35. Lee, S. W.*; **Yang, Y.***; Lee. H. W.; Ghasemi, H.; Kraemer, D.; Chen, G.; Cui, Y. An Electrochemical System for Highly Efficient Harvesting of Low-grade Heat Energy. ***Nature Communications***, 5, 3942 (2014). Reported by **[Technology Review]**
34. **Yang, Y.***; Lee, S. W. *; Ghasemi, G.; Loomis, J.; Li X.B.; Kraemer, D; Zheng, G. Y.; Cui, Y.; Chen, G. A Charging-free Electrochemical System for Harvesting Low-grade Thermal Energy. ***PNAS***, Early Edition. DOI: 10.1073/pnas.1415097111
33. **Yang, Y.**; Jeong, S.; Hu, L. B.; Wu, H.; Lee, S. W.; Cui, Y. Transparent Lithium-ion Batteries. ***PNAS*** 108, 13013-13018 (2011). Reported by **[Technology Review]** **[Nature News]** **[Scientific American]**
32. Hu, L. B.*; Choi, J. W.*; **Yang, Y.***; Jeong, S.; La Mantia, F.; Cui, L. F.; Cui, Y. Highly Conductive Paper for Energy-storage Devices. ***PNAS*** 106, 21490-21494 (2009). Reported by **[New York Times]** **[Technology Review]** **[Scientific American]**

(Cited 323 times)

31. **Yang, Y.**; Loomis, J.; Ghasemi, G.; Lee, S. W.; Wang, J.; Cui, Y.; Chen, G. A Membrane-free Battery for Harvesting Low-grade Thermal Energy. ***Nano Letters*** 14, 6578–6583 (2014).
30. **Yang, Y.***; Zheng, G. Y.*; Cui, Y. A Membrane-free Lithium/polysulfides Semi-liquid Battery for Large-Scale Energy Storage. ***Energy & Environmental Sciences***, 6, 1552-1558 (2013). Reported by **[Science] [Technology Review] [EES Most Read Article]**
29. **Yang, Y.**; Zheng, G. Y.; Misra S.; Nelson, J.; Toney, M. F.; Cui, Y. High Capacity Micrometer-sized Li_2S Particles as Cathode Materials for Advanced Rechargeable Lithium Ion Batteries. ***JACS*** 134, 15387-94 (2012).
28. **Yang, Y.***; McDowell, M. T. *; Jackson, A. *; Cha, J. J.; Hong, S. S.; Cui, Y. New Nanostructured Li_2S/Silicon Rechargeable Battery with High Specific Energy. ***Nano Letters*** 10, 1486-1491 (2010). Reported by **[Technology Review] [Nano Lett. Most Read Article] (Cited 161 times)**
27. **Yang, Y.**; Xie, C.; Ruffo, R.; Peng, H. L.; Kim, D. K.; Cui, Y. Single Nanorod Devices for Battery Diagnostics: A Case Study on $LiMn_2O_4$. ***Nano Letters*** 9, 4109-4114 (2009).
26. **Yang, Y.** *; Yu, G. H. *; Cha, J. J.; Wu, H.; Vosgueritchian, M.; Yao, Y.; Bao, Z. N.; Cui, Y. Improving the Performance of Li-S Battery by Conductive Polymer Coating. ***ACS Nano*** 5, 9187–9193 (2011). **(Cited 157 times)**
25. **Yang, Y.**; Zhao, Q.; Zhang, X. Z.; Liu, Z. G.; Zou, C. X.; Shen, B.; Yu, D. P. Mn-doped AlN Nanowires with Room Temperature Ferromagnetic Ordering. ***Applied Physics Letters*** 90, 092118 (2007).
24. Wang, H. L.*; **Yang, Y.***; Liang, Y. Y.; Zheng, G. Y.; Li, Y. G.; Cui, Y.; Dai H. J. Rechargeable Li-O_2 Batteries with Covalently Coupled $MnCo_2O_4$-Graphene Hybrid as Oxygen Cathode Catalyst. ***Energy & Environmental Sciences*** 5, 7931-7935 (2012). **[EES High Impact Communication] [EES Most Read Article] (Cited 92 times)**
23. Nelson, J.*; Misra, S.*; **Yang, Y.***; Jackson, A.; Liu, Y. J.; Wang, H. L.; Dai H. J.; Andrews, J.C.; Cui, Y.; Toney, M.F. In operando X-ray Diffraction and Transmission X-ray Microscopy of Lithium Sulfur Batteries. ***JACS*** 134, 6337–6343 (2012).
22. Zheng, G. Y.*; **Yang, Y.***; Cha, J. J.; S, S. S.; Cui, Y. Hollow Carbon Nanofiber-Encapsulated Sulfur Cathodes for High Specific Capacity Lithium Batteries. ***Nano Letters*** 11, 4462-4467 (2011). **(Cited 235 times)**
21. Wang, H. L.*; **Yang, Y.***; Liang, Y.; Robinson, J. T.; Li, Y.; Jackson, A.; Cui, Y.; Dai, H. Graphene-Wrapped Sulfur Particles as a Rechargeable Lithium/sulfur Battery

Cathode Material with High Capacity and Cycling Stability. ***Nano Letters*** 11, 2644-2647 (2011). Reported by **[Technology Review] [Phys.Org] [Nano Lett. Most Read Article] (Cited 371 times)**

20. Wang, H. L.*; **Yang, Y.***; Liang, Y. Y.; Cui, L. F.; Casalongue, H. S.; Li, Y. G.; Hong, G. S.; Dai, H. J.; Cui, Y. $LiMn_{1-x}Fe_xPO_4$ Nanorods Grown on Graphene Sheets for Ultrahigh-Rate-Performance Lithium Ion Batteries. ***Angewandte Chemie-International Edition*** 50, 7364-7368 (2011). **(Cited 102 times)**
19. Li, W. Y.; Zheng, G. Y.; **Yang, Y.**; Seh, Z. W.; Liu, N.; Cui, Y. High-performance Hollow Sulfur Nanostructured Battery Cathode through a Scalable, Room Temperature, One-step, Bottom-up Approach. ***PNAS*** 110, 7148-7153 (2013).
18. Lin, Y.; **Yang, Y.**; Ma, H. W.; Cui, Y.; Mao, W. L. Compressional Behavior of Bulk and Nanorod $LiMn_2O_4$ under Nonhydrostatic Stress. ***Journal of Physical Chemistry C*** 115, 9844-9849 (2011).
17. Wang, H. L.; Cui, L. F.; **Yang, Y.**; Casalongue, H. S.; Robinson, J. T.; Liang, Y. Y.; Dai, H. J. et al. Mn_3O_4-Graphene Hybrid as a High-Capacity Anode Material for Lithium Ion Batteries. ***JACS*** 132, 13978-13980 (2010).
16. Cui, L. F.; **Yang, Y.**; Hsu, C. M.; Cui, Y. Carbon-Silicon Core-Shell Nanowires as High Capacity Electrode for Lithium Ion Batteries. ***Nano Letters*** 9, 3370-3374 (2009)
15. Zheng, J.; **Yang, Y.**; Yu, B.; Song, X. B.; Li, X. G. [0001] Oriented Aluminum Nitride One-dimensional Nanostructures: Synthesis, Structure Evolution, and Electrical Properties. ***ACS Nano*** 2, 134-142 (2008).
14. Zheng, G. Y.; Zhang, Q. F.; Cha, J. J.; **Yang, Y.**; Li, W. Y.; Seh, Z. W.; Cui, Y.; Amphiphilic Surface Modification of Hollow Carbon Nanofibers for Improved Cycle Life of Lithium Sulfur Batteries. ***Nano Letters***, 13, 1265–1270 (2013).
13. Zhou, J. G.; Wang, J.; Hu, Y. F.; Regier, T.; Wang H. L.; **Yang, Y.**; Cui, Y.; Dai, H. J. Imaging State of Charge and Its Correlation to Interaction Variation in an $LiMn_{0.75}Fe_{0.25}PO_4$ Nanorods–graphene Hybrid. ***Chemical Communications***, 49, 1765 -1767 (2013).
12. Seh, Z. W.; Li, W. Y.; Cha, J. J.; Zheng, G. Y.; **Yang, Y.**; McDowell, M. T.; Hsu, P. C.; Cui, Y. Sulphur–TiO_2 Yolk–shell Nanoarchitecture with Internal Void Space for Long-cycle Lithium–sulphur Batteries. ***Nature Communications***, 4, 1331 (2013).
11. Hsu, P. H.; Wu, H.; Carney, T. J.; McDowell, M. T.; **Yang, Y.**; Garnett, E.C.; Li, M.; Hu, L.B.; Cui, Y. Passivation Coating on Electrospun Copper Nanofibers for Stable Transparent Electrodes. ***ACS Nano*** 6, 5150–5156 (2012).
10. Wu, H.; Chan, G.; Choi J. W.; Ryu, I.; Yao, Y.; McDowell, M. T.; Lee, S. W.; Jackson, A.; **Yang, Y.**; Hu, L. B.; Cui, Y. Stable Cycling of Double-walled Silicon Nanotube

Battery Anodes through Solid–electrolyte Interphase Control. ***Nature Nanotechnology*** 7, 310-315 (2012).

9. Wu, H.; Zheng, G. Y.; Liu, N.; Carney, T. J.; **Yang, Y**.; Cui, Y. Engineering Empty Space between Si Nanoparticles for Lithium-Ion Battery Anodes. ***Nano Letters*** 12, 904-909 (2012).
8. Hu, L. B.; Chen, W.; Xie, X.; Liu, N.; **Yang, Y.**; Wu, H.; Yao, Y.; Pasta, M.; Alshareef, H. N.; Cui, Y. Symmetrical MnO_2-Carbon Nanotube-Textile Nanostructures for Wearable Pseudocapacitors with High Mass Loading. ***ACS Nano*** 5, 8904-8913 (2011).
7. Yu, G. H.; Hu, L. B.; Liu, N; Wang, H. L.; Vosgueritchian, M; **Yang, Y**.; Cui, Y.; Bao, Z. N. Enhancing the Supercapacitor Performance of Graphene/MnO_2 Nanostructured Electrodes by Conductive Wrapping. ***Nano Letters*** 11, 4438-4442 (2011).
6. Xie, X.; Pasta, M.; Hu, L. B.; **Yang, Y**.; McDonough, J.; Cha, J.; Criddle, C. S.; Cui, Y. Nano-structured Textiles as High-performance Aqueous Cathodes for Microbial Fuel Cells. ***Energy & Environmental Science*** 4, 1293-1297 (2011).
5. Hu, L. B.; Wu, H.; La Mantia, F.; **Yang, Y**.; Cui, Y. Thin, Flexible Secondary Li-Ion Paper Batteries. ***ACS Nano*** 4, 5843-5848 (2010).
4. Wu, H.; Hu, L. B.; Rowell, M. W.; Kong, D. S.; Cha, J. J.; McDonough, J. R.; Zhu, J.; **Yang, Y.**; McGehee, M. D.; Cui, Y. Electrospun Metal Nanofiber Webs as High-Performance Transparent Electrode. ***Nano Letters*** 10, 4242-4248 (2010).
3. McDonough, J. R.; Choi, J. W.; **Yang, Y.**; La Mantia, F.; Cui, Y.; Zhang, Y. G. Carbon Nanofiber Supercapacitors with Large Areal Capacitances. ***Applied Physics Letters*** 95, 243109 (2009).
2. Schoen, D. T.; Meister, S.; Peng, H. L.; Chan, C.; **Yang, Y.**; Cui, Y. Phase Transformations in One-dimensional Materials: Applications in Electronics and Energy sciences. ***Journal of Materials Chemistry*** 19, 5879-5890 (2009).
1. Kim, D. K.; Muralidharan, P.; Lee, H. W.; Ruffo, R.; Yang, Y.; Chan, C. K.; Peng, H.; Huggins, R. A.; Cui, Y. Spinel $LiMn_2O_4$ Nanorods as Lithium Ion Battery Cathodes. Nano Letters 8, 3948-3952 (2008).

* : equal contribution

Book Chapter

1. **Yang, Y.**; Choi, J. W.; Cui, Y.; Oxide Nanostructures for Energy Storage, *Functional Metal Oxide Nanostructures*, Edited by Junqiao Wu, Jinbo Cao, Wei-Qiang Han, Anderson Janotti, Ho-Cheol Kim, Springer, 2012

Patents Applications

4. **Yang, Y.;** Hu, L. B.; Cui, Y.; Jeong, S.; "Transparent electrochemical energy storage devices", US 13/551,749 (2013)
3. **Yang, Y.**; McDowell, M.; Jackson, A.; Cui, Y.; "Device and electrode having nanoporous graphite with lithiated sulfur for advanced rechargeable batteries", US 12/914,876 (2013)
2. Li, W. Y.; Cui, Y.; Seh, Z. W.; Zheng, G. Y.; **Yang**, Y.; "Encapsulated sulfur cathodes for rechargeable lithium batteries" US 13/612,493 (2013)
1. Hu, L. B.; Choi, J. W.; **Yang**, Y.; Cui, Y.; "Conductive fibrous materials", PCT/US2010/054776 (2011)

Selected Presentations

14. Efficient Electrochemical System for Waste Heat Recovery, Oral Presentation at 2013 MRS Fall Meeting – Boston, Dec 3, 2013
13. Efficient Electrochemical System for Low-Grade Heat Recovery, 224th Electrochemical Society (ECS) Meeting, Oct 30, 2013
12. A Membrane-Free Lithium/Polysulfide Semi-Liquid Battery for Large-Scale Energy Storage, 224th Electrochemical Society (ECS) Meeting, Oct 30, 2013
11. Rechargeable Batteries and Beyond, College of Engineering, Nanjing University, China, Sep 9, 2013 **(Invited)**
10. Rechargeable Batteries and Beyond, Department of Chemistry, Peking University, China, Aug 27, 2013 **(Invited)**
9. Advanced Batteries: Materials Development and Device Fabrication. Oral Presentation in Mechanical Engineering, MIT, Mar 20, 2013 **(Invited)**
8. High-capacity Li_2S Cathode for Next-generation Rechargeable Li-ion Batteries. Oral Presentation at 2012 MRS Fall Meeting – Boston, Nov 27, 2012.
7. Transparent Batteries for Future Transparent Electronics. Oral Presentation at Printed Electronics & Photovoltaics USA 2011 – Santa Clara, CA, Dec 1, 2011 (**Invited**)
6. Designing Nanostructures for High Performance Batteries and Supercapacitors. Oral Presentation at 2011 AIChE annual meeting – Minneapolis, MN, Oct 17, 2011
5. Improved Performance of Sulfur-lithium Batteries by Coating and Modifying the Electrolyte. Oral Presentation at 2011 MRS Spring Meeting – San Francisco, CA, April 28, 2011.
4. Paper and Textile for Energy Storage. Oral Presentation at Printed Electronics & Photovoltaics USA 2010 – Santa Clara, CA, Dec 1, 2011 (Invited)

3. Nanostructured High-energy and Low-cost Batteries. 2010 User Meeting for the Molecular Foundry & the National Center for The Molecular Foundry & the National Center for Electron Microscopy – Berkeley, CA, Oct 1, 2010
2. A Nanostructured Li_2S/Silicon Rechargeable Battery with High Specific Energy. Oral Presentation at 217th ECS Meeting - Vancouver, Canada, April 27, 2010.
1. Electrochemical and Electrical Properties of $LiMn_2O_4$ and Doped $LiMn_2O_4$ Nanorods. Oral Presentation at 215th ECS Meeting - San Francisco, CA, May 28, 2009.

Teaching & Service Experience

Jul 2014	Speaker for Center for MSE Teacher Workshop, MIT
Jun 2014	Teaching certificate, MIT
Apr 2011 – Jun 2011	Teaching assistant, *Nanoscale Science, Engineering and Technology*, Department of Materials Science and Engineering, Stanford
May 2010	Interpreter for Intel International Science and Engineering Fair (ISEF), San Jose, California

Professional Activities

Journal Reviewer: Nano Letters; Energy & Environmental Science; Chemical Communications; Journal of Materials Chemistry; Nano research; Nano energy; Langmuir; RSC Advance; Physical Chemistry Chemical Physics; RSC Advances;

Memberships: Materials Research Society; American Society of Mechanical Engineers