

Yuan Yang

Assistant Professor,
Department of Applied Physics and Applied Mathematics,
Columbia University
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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**

Professional Experience

- 2015 –present **Assistant Professor, Materials Science and Engineering,
Department of Applied Physics and Applied Mathematics,
Columbia University**
- 2012 –2015 **Postdoctoral Associate, Gang Chen Group, Department of
Mechanical Engineering, MIT**

Awards & Honors

- 2015 MRS Postdoctoral Award for 2015 Spring Meeting
- 2014 World Changing Ideas Selected by *Scientific American*
- 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 Stanford Graduate Fellowship

2007

Outstanding Graduate of Beijing

Journal Publications

(Web of Science Total citation: > 6000 times H index: 29)

38. **Yang, Y.**; Zheng, G. Y.; Cui, Y. Nanostructured Sulfur Cathodes. *Chemical Society Reviews* 42, 3018-3032 (2013).
37. 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).
36. **Yang, Y.***; Lee, S. W. *; Ghasemi, G.; Loomis, J.; Li X.B.; Kraemer, D; Zheng, G. Y.; Cui, Y.; Chen, G. Charging-free Electrochemical System for Harvesting Low-grade Thermal Energy. *PNAS*, 111, 17011–17016 (2014)
35. **Yang, Y.**; Jeong, S.; Hu, L. B.; Wu, H.; Lee, S. W.; Cui, Y. Transparent Lithium-ion Batteries. *PNAS* 108, 13013-13018 (2011).
34. 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).
33. **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).
32. **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).
31. **Yang, Y.**; Zheng, G. Y.; Misra S.; Nelson, J.; Toney, M. F.; Cui, Y. High Capacity Micrometer-sized Li₂S Particles as Cathode Materials for Advanced Rechargeable Lithium Ion Batteries. *JACS* 134, 15387-94 (2012).
30. **Yang, Y.***; McDowell, M. T. *; Jackson, A. *; Cha, J. J.; Hong, S. S.; Cui, Y. New Nanostructured Li₂S/Silicon Rechargeable Battery with High Specific Energy. *Nano Letters* 10, 1486-1491 (2010).
29. **Yang, Y.**; Xie, C.; Ruffo, R.; Peng, H. L.; Kim, D. K.; Cui, Y. Single Nanorod Devices for Battery Diagnostics: A Case Study on LiMn₂O₄. *Nano Letters* 9, 4109-4114 (2009).
28. **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).

27. **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).
26. Wang, H. L.*; **Yang, Y.***; Liang, Y. Y.; Zheng, G. Y.; Li, Y. G.; Cui, Y.; Dai H. J. Rechargeable Li-O₂ Batteries with Covalently Coupled MnCo₂O₄-Graphene Hybrid as Oxygen Cathode Catalyst. *Energy & Environmental Sciences* 5, 7931-7935 (2012).
25. 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).
24. 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).
23. 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).
22. 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_xPO₄ Nanorods Grown on Graphene Sheets for Ultrahigh-Rate-Performance Lithium Ion Batteries. *Angewandte Chemie-International Edition* 50, 7364-7368 (2011).
21. Wang, J.; Feng, S. P.; **Yang, Y.**; Hau, N.; Munro, M.; Yang, E. F.; Chen, G.; “Thermal Charging” Phenomenon in Electrical Double Layer Capacitors, *Nano Letters*, DOI: 10.1021/acs.nanolett.5b01761 (2015).
20. Wang, C.; Wang, X. S.; **Yang, Y.**; Kushima, A.; Chen, J. T.; Huang, Y. H.; Li, J.; Slurryless Li₂S/Reduced Graphene Oxide Cathode Paper for High-Performance Lithium Sulfur Battery, *Nano Letters*, 15, 1796-1802 (2015).
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 LiMn₂O₄ 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. Mn₃O₄-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 $\text{LiMn}_{0.75}\text{Fe}_{0.25}\text{PO}_4$ 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

15. Electrochemical Materials and Devices for Energy Storage and Conversion, Department of Materials Science and Engineering, Columbia University, Feb 6, 2015 **(Invited)**

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

- | | |
|-----------------|---|
| 7/2014 | Speaker for Center for MSE Teacher Workshop, MIT |
| 6/2014 | Teaching certificate, MIT |
| 4/2011 – 6/2011 | Teaching assistant, <i>Nanoscale Science, Engineering and</i> |

Technology, Department of Materials Science and Engineering,
Stanford

5/2010

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