Yuan Yang

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Education

Sep 2007 – Jun 2012	Ph.D., Department of Materials Science and Engineering, Stanford University
Sep 2003 – Jul 2007	B.S., Department of Physics, Peking University, China

Professional Experience

Jan 2020 – present	Associate Professor, Materials Science and Engineering, Department of Applied Physics and Applied Mathematics, Columbia University
Jul 2015 – Dec 2019	Assistant Professor, Materials Science and Engineering, Department of Applied Physics and Applied Mathematics, Columbia University
Jul 2012 – Jun 2015	Postdoctoral Associate, Department of Mechanical Engineering, MIT

Awards & Honors

2024	CUAFA Young Investigator Award
2020-2022	Clarivate Highly Cited Researcher
Jan 2022	*Materials Today* Rising Star Award
Dec 2021	*Energy Storage Materials* Young Scientist Award
Mar 2021	3M Non-tenured Faculty Award
Jun 2020	IAAM Innovation Award of the International Association of Advanced Materials (IAAM)
Oct 2019	Emerging Investigators Award by *Journal of Materials Chemistry A*.
Jun 2019	*Nano Research* Young Innovator Awards in NanoEnergy 2019
Aug 2017	Scialog Fellow on Advanced Energy Storage
Apr 2015	MRS Postdoctoral Award for 2015 Spring Meeting
Dec 2014	World Changing Ideas Selected by *Scientific American*

Journal Publications

***:** corresponding author §: equal contribution
Total citation > 40,000 times H index: 73

115. L. Tian, Q. Wu, K. Tang, Z. Tang, Z. Yang, Z. Shen, L. Zhang, W. Xie, Y. Yang*, Z. J. Xu*, Dual roles of deep eutectic solvent in polysulfide redox and catalysis for intermediate-temperature potassium–sulfur batteries. ***Advanced Materials***, Early view (2025).
114. Q. Cheng*, C. Tang, B. W. Kim, Y. Xu, N. Yu, J. Mandal, H. Yin, Y. Yang, Cost-effective bilayer radiative cooling paint via a porous P(VDF-HFP) top layer. ***Advanced Functional Materials***, early view (2025).
113. L. Tian, Z. Yang, S. Yuan, T. Milazzo, Q. Cheng, S. Rasool, W. Lei, W. Li, Y. Yang, T. Jin, S. Cong, J. Wild, Y. Du, T. Luo*, D. Long*, Y. Yang*, Designing electrolytes with high solubility of sulfides/disulfides for high-energy-density and low-cost K-Na/S batteries. ***Nature Communications***, 15, 7771 (2024).
112. Q. Cheng, S. Gomez, G. Hu, A. Abaalkhail, J. Beasley, P. Zhang, Y. Xu, X. Chen, S. Tian, J. Mandal, A. Raman, N. Yu, Y. Yang*, Realizing Optimal Radiative Cooling Walls in Building-Energy Nexus via Asymmetric Emissivity. ***Nexus***, 1, 3, 100028 (2024).
111. Z. Han, J. Wild, J. Chen, Y. Yang*, Modeling Silane Deposition in Nanoporous Carbon for High-capacity Si/C Composite Anodes. ***Energy Material Advances***, 5, 0111 (2024).
110. T. Jin, K. Liang, J-H. Yu, T. Wang, Y. Li, T-D. Li, S. Ong, J-S Yu, Y. Yang*; Enhanced Cycling Stability of All-solid-state Lithium-Sulfur Battery through Nonconductive Polar Hosts. ***Nano Letters***, 24, 6625 (2024).
109. J. Wild, Z. Han, Y. Yang, Modelling a countercurrent liquid centrifuge for large-scale isotope separation. ***Separation and Purification Technology***, 352, 128046 (2024).
108. Q. Cheng, C. Tang, D. Luo, M. Park, S. Tian, Y. Yang, A dynamic wall design with tunable angular emissivity for all-season thermal regulation. ***Cell Reports Physical Science***, 5, 5, 101934 (2024).
107. W. Li, P. Wen, Y. Ren, W. Xie, J. Lin, M. Chen, Y. Yang*, X. Lin*, Polysiloxane-Enabled Ternary Eutectic Electrolyte with Fast Ion Transport Under Extreme Conditions. ***ACS Energy Letters*****,** 8, 5128 (2023).
106. G. Singer, C-T. Hsieh, T. Jin, S. Lee, Y. Yang*, A quasi-solid polymer electrolyte-based structural battery with high mechanical and electrochemical performance. ***EcoMat*****,** e12418 (2023).
105. Q. Cheng, G. W. Ho*, A. P. Raman*, R. Yang*, Y. Yang*, Regulating thermal radiation for energy and sustainability. ***Next Energy***, 1, 100019 (2023).
104. J. Wild, H. Chen, K. Liang, J. Liu, S. Cox, A. Halliday, Y. Yang*, Liquid solution centrifugation for safe, scalable, and efficient isotope separation. ***Science Advances***, 9, 8993 (2023).
103. T. Jin, G. Singer, K. Liang, Y. Yang, Structural batteries: Advances, challenges and perspectives. ***Materials Today***, 62, 151 (2023).
102. Y. Chen, B. Zhao, Y. Yang, A. Cao*, Toward High-Areal-Capacity Electrodes for Lithium and Sodium Ion Batteries. ***Advanced Energy Materials***, 2201834 (2022).
101. Q. Cheng*, T. Jin, Y. Miao, Z. Liu, J. Borovilas, H. Zhang, S. Liu, H. Wang, X. Chen, L-Q. Chen, W. Min*, **Y. Yang***, Stabilizing Lithium Metal Anode by Ion

Depletion-Induced Phase Transformation in Polymer Electrolytes. ***Joule***, 6, 1-18 (2022).

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99. Z. Jin*, Q. Cheng, A.M. Evans, J. Gray, R. Zhang, S.T. Bao, F. Wei, L. Venkataraman, **Y. Yang*,** C. Nuckolls*; π-Conjugated redox-active two-dimensional polymers as organic cathode materials. ***Chemical Science***, 13, 3533 (2022).
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90. R. Choudhury, J. Wild, **Y. Yang***; Engineering Current Collectors for Batteries with High Specific Energy. ***Joule***, 5, 1301 (2021).
89. J. C. Russell, V. A. Posey, J. Gray, R. May, D. A. Reed, H. Zhang, L. E. Marbella, M. L. Steigerwald, **Y. Yang**, X. Roy*, C. Nuckolfls*, S. Peurifoy*, High Performance Organic Pseudocapacitors via Molecular Contortion, ***Nature Materials***, 20, 1136 (2021).
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Mesoporous Photonic Structures for High-Performance Passive Daytime Radiative Cooling. ***Nano Letters***, 21, 1412 (2021).

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82. C. Lu, Y. Chen, **Y. Yang**, X. Chen*, Single-atom Catalytic Materials for Lean-electrolyte Ultrastable Lithium–Sulfur Batteries. ***Nano Letters***, 20, 5522 (2020).
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Nan*, Y. H. Lin*, **Y. Yang***, Engineering Interfacial Adhesion for High-performance Lithium Metal Anode. ***Nano Energy***, 67, 104242 (2020).

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64. H. Zhai, T. Y. Gong, B. Xu, Q. Cheng, D. Paley, B. Qie, T. Jin, L. Tan, Y. Lin, C. Nan, **Y. Yang***, Stabilizing Polyether Electrolyte with 4 V Metal Oxide Cathode by Nanoscale Interfacial Coating. ***ACS Applied Materials & Interfaces***, 11, 28774 (2019).
63. C. Lu, **Y. Yang**, X. Chen*, Ultrathin conductive graphitic carbon nitride assembly through van der Waals epitaxy toward high energy-density flexible supercapacitors, ***Nano Letters***, 19, 4103 (2019).
62. Q. Cheng, A. Li, N. Li, S. Li, Z. Amirali, Z. T. Li, W. Huang, A. Li, T. Jin, Q. Song, W. Xu, N. Ni, H. Zhai, D. Martin, Z. Karim Z, C. Xiu, D. Su, K. Yan*, **Y. Yang***, Stabilizing Solid Electrolyte-Anode Interface in Li-Metal Batteries by Boron Nitride-Based Nanocomposite Coating. ***Joule***, 3, 1510 (2019).
61. T. Jin, Y. Wang, Z. Hui, B. Qie, A Li, D. Paley, B. Xu, X. Wang, A. Chitu, H. Zhai, T. Gong, **Yuan Yang***, Nonflammable, Low-Cost, and Fluorine-Free Solvent for Liquid Electrolyte of Rechargeable Lithium Metal Batteries ***ACS Appl. Mater. Interfaces***, 11, 17333-17340 (2019)
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57. G. Qian, X. Liao, Y. Zhu, F. Pan*, X. Chen*, **Y. Yang***, Designing Flexible Lithium-Ion Batteries by Structural Engineering. ***ACS Energy Letters*** 4, 3 (2019).
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Visualizing Ion Diffusion in Battery Systems by Fluorescence Microscopy: A Case Study on the Dissolution of $LiMn_2O_4$. ***Nano Energy*****,** 45, 68-74 (2018).

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13. J. G. Zhou, J. Wang, Y. F. Hu, T. Regier, H. L. Wang, **Y. Yang,** Y. Cui, and H. J. Dai, 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).
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6. X. Xie, M. Pasta, L. B. Hu, **Y**. **Yang,** J. McDonough, J. Cha, C. S. Criddle, and Y. Cui, Nano-structured Textiles as High-performance Aqueous Cathodes for Microbial Fuel Cells. ***Energy & Environmental Science*** 4, 1293-1297 (2011).
5. L. B. Hu, H. Wu, F. La Mantia, **Y**. **Yang,** and Y. Cui, Thin, Flexible Secondary Li-Ion Paper Batteries. ***ACS Nano*** 4, 5843-5848 (2010).
4. H. Wu, L. B. Hu, M. W. Rowell, D. S. Kong, J. J. Cha, J. R. McDonough, J. Zhu, **Y. Yang,** M. D. McGehee, and Y. Cui, Electrospun Metal Nanofiber Webs as High-Performance Transparent Electrode. ***Nano Letters*** 10, 4242-4248 (2010).

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2. D. T. Schoen, S. Meister, H. L. Peng, C. Chan, **Y. Yang,** and Y. Cui, Phase Transformations in One-dimensional Materials: Applications in Electronics and Energy sciences. ***Journal of Materials Chemistry*** 19, 5879-5890 (2009).
1. D. K. Kim, P. Muralidharan, H. W. Lee, R. Ruffo, Y. Yang, C. K. Chan, H. Peng, R. A. Huggins, and Y. Cui, Spinel $LiMn_2O_4$ Nanorods as Lithium Ion Battery Cathodes. Nano Letters 8, 3948-3952 (2008).

Book Chapters

1. Applications of Emerging Stimulated Raman scattering (SRS) Microscopy in Materials Sciences. in *Stimulated Raman Scattering Microscopy: Techniques and Applications* (2022)

Patents & Patent Applications

13. **Y. Yang**, Y. Zhang, W. Huang, J. Mandal, and Y. Chen, Aqueous Processing Systems and Methods for Passive Daytime Radiative Cooling, Provisional application 63/080,354.
12. **Y. Yang**, J. Mandal, and Y. Chen, Materials and methods for passive radiative cooling, US-2021078038 (2019).
11. **Y. Yang**, T. Gong, H. Zhai, B. Xu, A. Li, Nanoscale Interfacial Coating for Stabilizing Electrolyte with High-Voltage Cathode. WO-2020047540 (2018).
10. **Y. Yang**, Q. Cheng, W. Xu, Eutectic solvents as electrolyte/catholyte for safe and high performance lithium sulfur batteries, US-2021143480 (2018).
9. **Y. Yang**, G. Qian, X. Chen, X. Liao, C. Shi and T. Wang, High-energy-density Deformable Batteries. US-2021005852 (2018). *Licensed to FlexFuture Inc.*
8. **Y. Yang**, J. Mandal and N. F. Yu, "Scalable Method of Fabricating Structured Polymer for Passive Daytime Radiative Cooling and Other Applications", WO-2019113596 (2017). *Licensed to ChillSkyn.*
7. C. Nuckolls, **Y. Yang**, T. Sisto, R. H. Sanchez, M. Milton, Margarita, Q. Cheng, Redox Flow Batteries and Compounds for Battery Application, US patent 11,289,729 (2022). *Licensed to XL Battery Inc.*
6. **Y. Yang,** and Z. Y. Cao, Alkali Metal Battery Negative Electrodes and Related Methods, US 11,233,268 (2022).

Prior to joining Columbia University

5. Seok Woo Lee, Yuan Yang, Hadi Ghasemi, Gang Chen, Yi Cui, Electrochemical systems configured to harvest heat energy, US-9559388 (2017).
4. **Y. Yang,** L. B. Hu, Y. Cui, and S. Jeong, "Transparent electrochemical energy storage devices", US-8956757 (2011).
3. W. Y. Li, Y. Cui, Z. W. Seh, G. Y. Zheng, and **Y. Yang,** "Encapsulated sulfur cathodes for rechargeable lithium batteries" US-11189836 (2021).
2. **Y. Yang,** M. McDowell, A. Jackson, and Y. Cui, "Device and electrode having nanoporous graphite with lithiated sulfur for advanced rechargeable batteries",

WO-2011059766 (2009).

1. L. B. Hu, J. W. Choi, **Y. Yang,** and Y. Cui, "Conductive fibrous materials", WO-2011053811 (2009).

Invited Presentations

46. Materials and Device Designs for Flexible and Structural Batteries, University of California, San Diego, Jul 16, 2025
45. Materials Designs for Solid-state Alkaline-Metal Sulfur Batteries and Isotope Separation, University of Chicago, Jun 16, 2025
44. Materials Characterizations and Designs for High-energy-density Lithium Metal Batteries, Washington University at St Louis, Feb 10, 2025
43. Electrolyte Design for Intermediate-Temperature Na-S Batteries with High Energy Density, MRS fall meeting, Nov 30, 2023
42. Designing mechanically extreme batteries: From flexible to structural, ACS Spring meeting 2023, Indianapolis, IN, Mar 29, 2023
41. In-operando visualization and data-driven modeling of ion transport in electrolytes for lithium metal batteries, ACS Spring meeting 2023, Indianapolis, IN, Mar 27, 2023
40. Mechanically Extreme Batteries: From Flexible to Structural, 242nd ECS meeting, Atlanta, GA, Oct 10, 2022.
39. Scalable Production of Porous Polymer-based Radiative Cooling Paints, National Workshop on Active Paints, Washington DC, Jul 19, 2022
38. Scalable Production of Porous Polymer-based Radiative Cooling Paints, Materials Today Rising Award Ceremony, Mar 11, 2022 (Virtual)
37. Scalable Production of Porous Polymer-based Radiative Cooling Paints, Materials Today Rising Award Ceremony, Feb 23, 2022 (Virtual)
36. Bio-inspired Flexible and Structural Batteries, EcoMat Webinar, Feb 22, 2022 (Virtual)
36. Scalable Production of Radiative Cooling Paints, 3M Inc, Nov 5, 2021 (Virtual)
35. Interfacial characterizations and designs for polymer electrolyte-based solid state batteries, Argonne Natioal Laboratory, Oct 13, 2021 (Virtual)
34. Materials characterization and design for energy storage and thermal management, University of Texas, Austin, Mar 26, 2021 (Virtual)
33. Materials characterization and design in solid-state batteries, Georgia Institute of Technology, Mar 11, 2021 (Virtual)
32. Materials characterization and design for energy storage and thermal management, University of California, Berkeley, Mar 5, 2021 (Virtual)
31. Materials characterization and design for energy storage and thermal management, SLAC, Mar 4, 2021 (Virtual)
30. Scalable radiative cooling paints based on random porous polymers, Cornell University, Mar 3, 2021 (Virtual)
29. Material Characterizations and Designs for Energy Storage and Thermal Management, Stanford University, Feb 12, 2021 (Virtual)
28. Material Characterizations and Designs for Energy Storage and Thermal Management,

MIT, Feb 11, 2021 (Virtual)

27. Interfacial Stabilization in Polymer Electrolyte-Based Lithium Metal Batteries, Pacific Northwest National Laboratory, Jan 29, 2021 (Virtual)
26. Material Characterizations and Designs in Polymer Electrolyte-Based Lithium-Metal Batteries, MRS fall meeting, Nov 2020 (Virtual)
25. Scalable Fabrication of Radiative Cooling Paint, MRS fall meeting, Nov 2020 (Virtual)
24. Salable Radiative Cooling Paint for Thermal Management in Buildings, IMECE2020, Nov 2020 (Virtual)
23. Scalable radiative cooling paints based on random porous polymers, SPIE Optics + Photonics 2020, Aug 2020 (Virtual)
22. Interfacial Characterizations and Designs for High-energy-density Batteries, Tsinghua University, China, Apr 18, 2020 (Virtual)
21. Polymer/ceramic Composite Electrolyte for Solid State Batteries, NAATBatt annual conference, Pasadena, CA, Feb 12, 2020
20. Light-matter interactions for energy storage and thermal management, Caltech, Jan 13, 2020
19. Material Characterizations and Designs for Energy Storage and Thermal Management, University of California, Los Angeles, Jan 10, 2020
18. Material Designs for Lithium Polymer Batteries with High Energy Density, Battery Safety Summit, Alexandria, VA, Oct 22, 2019
17. Material Characterizations and Designs for Energy Storage and Management, University of California, San Diego, Aug 28, 2019
16. 2D materials as effective coating and additives for solid-state batteries, ACS Fall 2019 National Meeting, Aug 26, 2019
15. Operando and three-dimensional visualization of ion depletion and lithium growth by stimulated raman scattering microscopy, ACS Fall 2019 National Meeting, Aug 25, 2019
14. Material Characterizations and Designs for Energy Storage and Management, University of Science and Technology Beijing, Aug 7, 2019.
13. Material Characterizations and Designs for Energy Storage and Management, University of Science and Technology of China, Aug 1, 2019.
12. Material Characterizations and Designs for Energy Storage and Management, Brookhaven National Laboratory, Jun 20, 2019.
11. Material Characterizations and Designs for Advanced Energy Storage, MRS fall meeting, Nov 28, 2018.
10. In-operando mesoscale 3D visualization of ion transport in battery electrolyte, ACS 256th National Meeting, August 22, 2018
9. Designing composite solid electrolyte for lithium batteries with high energy density, ACS 256th National Meeting, August, 20, 2018
8. In-operando 3D Visualization of Ion Depletion and Lithium Growth By Stimulated Raman Scattering Microscopy, Nature Conference, Shenzhen, China, Jan 14, 2018
7. Rational Structural Design for Lithium-based Rechargeable Batteries with High

Energy Density, ACS 254th National Meeting, Washington DC, Aug 22, 2017

6. Electrochemical Materials and Devices for Energy Storage and Conversion, Department of Mechanical Engineering, Binghamton University, Mar 5, 2016
5. Electrochemical Materials and Devices for Energy Storage and Conversion, Department of Materials Science and Engineering, Columbia University, Feb 6, 2015
4. Rechargeable Batteries and Beyond, College of Engineering, Nanjing University, China, Sep 9, 2013
3. Rechargeable Batteries and Beyond, Department of Chemistry, Peking University, China, Aug 27, 2013
2. Advanced Batteries: Materials Development and Device Fabrication. Oral Presentation in Mechanical Engineering, MIT, Mar 20, 2013
1. Transparent Batteries for Future Transparent Electronics. Oral Presentation at Printed Electronics & Photovoltaics USA 2011 – Santa Clara, CA, Dec 1, 2011

Professional Activities

Conference Organizer:

5. Symposium A05-Extreme Batteries, 242nd ECS Meeting, Oct 9-13, 2022, Atlanta, GA, USA.
4. Symposium EN10: Advanced Materials for Thermal Energy Management and Harvesting, 2021 MRS Fall Meeting, Boston, MA, USA.
3. Symposium ST05: Mechanics of Energy Storage Materials, 2021 MRS Spring Meeting, Apr 17-23, 2021.
2. Symposium ES2: High Capacity Electrode Materials for Next-generation Energy Storage, 2017 MRS Spring Meeting, Phoenix, AZ, USA
1. Symposium B-5: Heat Transfer: from Meso-scale to Macro-scale, Oct 3-4, 2016, College Park, MD, USA

Journal Reviewer: Science, Nature Nanotechnology, Nature Energy, Chemical Reviews, Nature Reviews Materials, Joule, Matter, Nature Communications, Advanced Materials, 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 Chemical Society. Electrochemical Society