Yifeng Shi

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EDUCATION:

Georgia Institute of Technology
Ph.D. in Chemical & Biomolecular Engineering — 2017 – 2022

Sichuan University
B.E. in Chemical Engineering and Technology — 2013 – 2017

RESEARCH EXPERIENCE:

May 2022 – Present — **Postdoctoral Scholar, University of California, Berkeley**
Advisor: Professor Grigory Tikhomirov
1) Structural DNA Nanotechnology
2) Self-Assembly of Inorganic Nanocrystals
3) Plasmonic Nanocavities for Single-Molecule Sensing
4) Magnetic Particle Imaging

Aug 2017 – May 2022 — **Graduate Research Assistant, Georgia Institute of Technology**
Advisor: Professor Younan Xia
1) Colloidal Synthesis of Metal Nanocrystals
2) Surface and Crystal Structure Engineering of Nanocrystals
3) Structure-Catalytic Property Relationship of Nanocrystals

June 2015 – June 2017 — **Undergraduate Researcher, Sichuan University**
Advisor: Professor Hairong Yue
1) Monolithic Catalysts for Hydrogenation of CO_2-Derived Ethylene Carbonate

PUBLICATIONS

†equal contribution

Pre-print & articles under peer review:

37. B. Cary, J. Garlepp, A. Swamynathan, A. R. Mohtasebzadeh, Y. Shi, C. Saayujya, B. D. Fellows, R. Sagar, U. I. Chio, L. Zhu, D. Krishnaswamy, P. Ganguly, S. Zhao, J. Huzar, M. F. Wendland, S. M. Conolly and G. Tikhomirov, "Water-Stable Superferromagnetic Nanoparticle Chains Break the Langevin Resolution Limit in Magnetic Particle Imaging." *ChemRxiv: https://chemrxiv.org/doi/abs/10.26434/chemrxiv.15008162/v1*
36. Y. Shi, M. Kim, and G. Tikhomirov. "Embedding spatial addressability onto inorganic nanocrystals for DNA-guided self-assembly." *Chemrxiv:https://doi.org/10.26434/chemrxiv.15003328/v1*

Peer-reviewed journal articles

35. Y. Shi. "A DNA Origami Syringe for Programmable Membrane Translocation". *Materials and Interfaces*, **2026**, *3*, 345-347. (Perspective article)
34. D. Lee, S. Oaks-Leaf, S. Betzler, Y. Shi, S. Zhou, C. Ophus, L. Wang, M. Asta, Y. Xia, D. Limmer, and H. Zheng. "Atomic evolution of hydrogen intercalation wave dynamics in palladium nanocrystals." *J. Am. Chem. Soc.* **2026**, *148*, 25829-25841
33 D. Lee, S. Oaks-Leaf, S. Betzler, H. Ma, J. He, Z. Wang, Y. Shi, E. Ahn, C. K. Bustillo, C. Song, et al. "Nanocrystal Geometry Governs Phase Transformation Pathways in Palladium Hydride" *ACS Nano* **2026**, *20*, 15266-15278
32. C. Saayujya, B. Fellows, Y. Shi, R. Sagar, B. Cary, J. Bryan, C. Yu, M. Kim, A. Hartley, Q. Huynh, P. Chandrasekharan, Z. W. Tay, M. F. Wendland, and S. M. Conolly. "Physicochemical Necessary and Sufficient Conditions for Superferromagnetism in High-Resolution Magnetic Particle Imaging." *Small* **2025**, *21*, e04794.
31. Z. Shokri Varniab, E. Chang, J. Wang, R. Duwa, V. Suryadevara, W. Wu; M. Kumar, T. Liang, Z. Khatoon, G. R. Morais, R. A. Falconer, Y. Shi, G. Tikhomirov, K. Nernekli, L.J. Pisani, and H.E. Daldrup-Link. "Dual-Enzyme Activated Theranostic Nanoparticles for Image-guided Glioblastoma Therapy" *Sci. Rep.* **2025**, *15*, 13540.
30. G.M. Saladino, D.B. Mangarova, K. Nernekli, J. Wang, G. Annio, Z.S. Varniab, Z. Khatoon, G. Ribeiro Morais, Y. Shi, E. Chang, L.J. Pisani, G. Tikhomirov, R. A. Falconer, and H.E. Daldrup-Link. "Multimodal Imaging Approach to Track Theranostic Nanoparticle Accumulation in Glioblastoma with Magnetic Resonance Imaging and Intravital Microscopy." *Nanoscale* **2025**, 17, 9986–9995.
29. K. Nernekli, D.B. Mangarova, Y. Shi, Z.S. Varniab, E. Chang, O.Z. Tikenogullari, L. Pisani, G. Tikhomirov, G. Wang, and H.E. Daldrup-Link. "Two-Photon Intravital Microscopy of Glioblastoma in a Murine Model" *J. Vis. Exp.* **2024**, *205*, e66304.
28. S. Zhou, M. Figueras-Valls, Y. Shi, Y. Ding, M. Mavrikakis and Y. Xia, "Fast and Non-Equilibrium Uptake of Hydrogen by Pd Icosahedral Nanocrystals", *Angew. Chem. Int. Ed.* **2023**, e202306906. (highlighted on the front cover)
27. C. Wang,† Y. Shi,† D. Qing and Y. Xia, "Bimetallic Core–Shell Nanocrystals: Opportunities and Challenges", *Nanoscale Horiz.* **2023**, *8,* 1194-1204. (selected for Nanoscale Horizons 10th anniversary regional spotlight collection)
26. K. G. Papanikolaou, Y. Shi, R. Schimmenti, Y. Xia and M. Mavrikakis, "The Role of Coverage Effects on the Structure–Sensitivity of Formic Acid Electrooxidation on Pd Surfaces", *J. Catal.* **2023**, *417*, 408-420.
25. M. Xie, Y. Shi, R. Chen, M. Shen and Y. Xia, "Continuous Production of Carbon-Supported and Surfactant-Free Pt-M (M=Fe, Co, Ni, and Cu) Nanocrystals for Catalyzing Oxygen Reduction", *J. Electrochem. Soc.* **2022**, *169*, 126507.
24. W. Wang,† Y. Shi,† Z. Chen, M. Zhao, Z. Cao, Z. Lyu, R. Chen, K. Xiao, M. Chi and Y. Xia, "Synthesis and Characterization of Pt-Ag Icosahedral Nanocages with Enhanced Catalytic Activity toward Oxygen Reduction", *ChemNanoMat* **2022**, e202200186.
23. Y. Shi, A. O. Elnabawy, K. D. Gilroy, Z. D. Hood, R. Chen, C. Wang, M. Mavrikakis and Y. Xia, "Decomposition Kinetics of H_2O_2 on Pd Nanocrystals with Different Shapes and Surface Strains", *ChemCatChem* **2022**, e202200475.
22. A. Janssen, Z. Lyu, M. Figueras-Valls, H.-Y. Chao, Y. Shi, V. Pawlik, M. Chi, M. Mavrikakis and Y. Xia, "Phase-Controlled Synthesis of Ru Nanocrystals *via* Template-Directed Growth: Surface Energy *versus* Bulk Energy", *Nano Lett.* **2022**, *22*, 3591–3597.
21. Y. Shi,† R. Schimmenti,† S. Zhu, J. Liu, M. Shao, M. Mavrikakis and Y. Xia, "Solution-

Phase Synthesis of $PdH_{0.706}$ Nanocubes with Enhanced Stability and Activity toward Formic Acid Oxidation", *J. Am. Chem. Soc.* **2022**, *144*, 2556-2568.

20. P. Zhai,† Y. Shi,† Q. Wang, K. Ding and Y. Xia, "Resolving the Surface Composition of Pd@Pt_{nL} Bimetallic Nanocrystals Using Catalytic Reaction and Spectroscopy Probes", *Nanoscale.* **2021**, *13*, 18498-18506.
19. J. Qiu, Y. Shi and Y. Xia, "Polydopamine Nanobottles with Photothermal Capability for Controlled Release and Related Applications", *Adv. Mater.* **2021**, 2104729.
18. R. Chen, Y. Shi, M. Xie and Y. Xia, "Facile Synthesis of Platinum Right Bipyramids by Separating and Controlling the Nucleation Step in a Continuous Flow System", *Chem. Eur. J.* **2021**, *27*, 13855-13863.
17. M. Xie, Y. Shi, R. Chen, M. Shen and Y. Xia, "In Situ Growth of Pt-Co Nanocrystals on Different Types of Carbon Supports and Their Electrochemical Performance toward Oxygen Reduction", *ACS Appl. Mater. Interfaces* **2021**, *13*, 51988-51996.
16. Y. Zhang, Z. Lyu, Z. Chen, S. Zhu, Y. Shi, R. Chen, M. Xie, Y. Yao,M. Chi, M. Shao and Y. Xia, "Maximizing the Catalytic Performance of Pd@Au_xPd_{1-x} Nanocubes in H_2O_2 Production by Reducing Shell Thickness to Increase Compositional Stability", *Angew. Chem. Int. Ed.* **2021**, *60*, 19643-19647.
15. Y. Zhang, M. Xie, Y. He, Y. Zhang, L. Liu, T. Hao, Y. Ma, Y. Shi, Z. Sun, N. Liu and Z. John Zhang, "Hybrid NiO/Co_3O_4 Nanoflowers as High-Performance Anode Materials for Lithium-Ion Batteries", *Chem. Eur. J.* **2021**, *420*, 130469.
14. R. Chen, Z. Lyu, Y. Shi and Y. Xia, "Improving the Purity and Uniformity of Pd and Pt Nanocrystals by Decoupling Growth from Nucleation in a Flow Reactor", *Chem. Mater.* **2021**, *33*, 3791-3801.
13. M. Zhao, Z. Chen, Y. Shi, Z. Lyu, Z. D. Hood, M. Xie, X. Yang, L. Figueroa-Cosme, M. Chi and Y. Xia, "Kinetically Controlled Synthesis of Rh Nanocrystals and Evaluation of Their Shape-Dependent Thermal and Catalytic Properties", *J. Am. Chem. Soc.* **2021**, *143*, 6293-6302.
12. W. Gao,† A. O. Elnabawy,† Z. D. Hood, Y. Shi, L. T. Roling, X. Pan, M. Mavrikakis, Y. Xia and M. Chi, "Nucleation and Growth of Pt on Pd Nanocrystals: Atomistic Insights from *in situ* Liquid-Cell Transmission Electron Microscopy and First-Principles Calculation", *Nature Commun.* **2021**, *12*, 3215.
11. Y. Shi,† Z. Lyu,† M. Zhao,† R. Chen,† Q. N. Nguyen and Y. Xia, "Noble-Metal Nanocrystals with Controlled Shapes for Catalytic and Electrocatalytic Applications", *Chem. Rev.* **2021**, *121*, 649-735. (invited review article)
10. Y. Shi, Z. Lyu, Z. Cao, M. Xie and Y. Xia. "How to Remove the Capping Agent from Pd Nanocubes without Destructing Their Surface Structure for the Maximization of Catalytic Activity?", *Angew. Chem. Int. Ed.* **2020**, *59*, 19129-19135.
9. W. Wang, Z. Chen, Y. Shi, Z. Lyu, Z. Cao, H. Cheng, M. Chi, K. Xiao and Y. Xia, "Facile Synthesis of Ag@Pd_{nL} Icosahedral Nanocrystals as a Class of Cost-Effective Electrocatalysts toward Formic Acid Oxidation", *ChemCatChem* **2020**, *12*, 5156-5163.
8. A. Janssen, Y. Shi and Y. Xia, "Separating Growth from Nucleation for Facile Control over the Size and Shape of Palladium Nanocrystals", *Chem. Eur. J.* **2020**, *26*, 13890-13895. (selected as a hot paper)
7. Y. Shi, Z. Lyu, J. Liu, E. Chase and Y. Xia, "Facile Synthesis of Pd−Cu Bimetallic Twin Nanocubes and a Mechanistic Understanding of the Shape Evolution", *ChemNanoMat* **2020**, *6*, 386-391. (highlighted on the front cover)

6. T.-H. Yang,† Y. Shi,† A. Janssen† and Y. Xia, "Surface Capping Agents and Their Roles in Shape-Controlled Synthesis of Colloidal Metal Nanocrystals", *Angew. Chem. Int. Ed.* **2020**, *59*, 15378-15401. (invited review article)
5. D. Huo,† M. J. Kim,† Z. Lyu,† Y. Shi,† B. J. Wiley and Y. Xia. "One-Dimensional Metal Nanostructures: From Colloidal Syntheses to Applications", *Chem. Rev.* **2019**, *119*, 8972-9073. (invited review article)
4. R. Chen, Z. Cao, Z. Lyu, M. Xie, Y. Shi and Y. Xia, "Continuous and Scalable Synthesis of Pt Multipods with Enhanced Electrocatalytic Activity toward the Oxygen Reduction Reaction", *ChemNanoMat* **2019**, *5*, 599-605.
3. H. Li, T. Wu, M. Xie, Y. Shi, S. Shen, M. Zhao, X. Yang, L. M. Figueroa-Cosme, Q. Ke and Y. Xia, "Enhancing the Tactile and Near-Infrared Sensing Capabilities of Electrospun PVDF Nanofibers with the Use of Gold Nanocages", *J. Mater. Chem. C* **2018**, *6*, 10263-10269.
2. M. Zhou, Y. Shi, K. Ma, S. Tang, C. Liu, H. Yue and B. Liang, "Nanoarray Cu/SiO_2 Catalysts Embedded in Monolithic Channels for the Stable and Efficient Hydrogenation of CO_2-Derived Ethylene Carbonate", *Ind. Eng. Chem. Res.* **2018**, *57*, 1924-1934.
1. M. Zhang, J. Lei, Y. Shi, L. Zhang, Y. Ye, D. Li and C. Mu, "Molecular Weight Effects of PEG on the Crystal Structure and Photocatalytic Activities of PEG-Capped TiO_2 Nanoparticles", *RSC Adv.* **2016**, *6*, 83366-83372.

AWARDS:

Postdoc Achievement Award, UC Berkeley	2026
Professional Development Award, The Berkeley Postdoctoral Association	2026
Selected recipient, ACS P2F (Postdoc to Faculty Workshop)	2026
NSF Student and Postdoc Travel Award, FNANO	2025
PMSE Future Faculty Scholar, ACS National Meeting	2023
Selected recipient, MIT Rising Stars in Chemical Engineering	2022
James F. Simmons Fellowship, School of Chemical & Biomolecular Engineering, Georgia Tech	2020
Travel Award, Gordon Research Conference	2019
Outstanding Undergraduate Students, Sichuan University	2016
National Scholarship for Excellent Students, Sichuan University	2016
The First Prize Scholarship, Sichuan University	2015

LEADERSHIP:

President, Postdoc Teaching Opportunities Program, UC Berkeley	2025-2026
College of Engineering Graduate Student Advisory Council, Georgia Tech	2019-2020

TEACHING EXPERIENCE:

Invited Guest Lecture: Chemical and Reaction Engineering, The University of Alabama	2025
Teaching Assistant: Advanced CHE Thermodynamics, Georgia Institute of Technology	2019
Teaching Assistant: Advanced Mass Transfer, Georgia Institute of Technology	2019
Teaching Assistant: Unit Operation Lab, Georgia Institute of Technology	2018

MENTORING EXPERIENCE:

Undergraduate Mentor: Five undergraduate students from UC Berkeley 2024 - 2026
Undergraduate Mentor**:** SUPERB REU Gia-Uyen Tran, Olin College 2023
Undergraduate Mentor**:** SUIN REU Emily Chase, The University of Tennessee 2019
Student co-authored publication #7 with me

PROFESSIONAL SERVICE:

Conference Organization
Symposium co-organizer, "Emerging Electrode Nanomaterials: Controlled Synthesis, Self-Assembly, and Operando Characterizations", 2027 MRS Spring Meeting & Exhibit

Manuscript Review
Nature Communications, Angewandte Chemie International Edition, ACS Applied Materials & Interfaces, ACS Applied Nano Materials, ChemSusChem, Small Structures

CONFERENCE PRESENTATIONS:

12. "Embedding molecular recognition into nanocrystals with DNA origami wraps", oral presentation at the ACS 2026 Fall meeting, Chicago, IL, August 2026.
11. "Embedding molecular recognition into nanocrystals with DNA origami wraps", selected poster for Sci-Mix at the ACS 2026 Fall meeting, Chicago, IL, August 2026.
10. "Embedding molecular recognition into nanocrystals with DNA origami wraps", poster presentation at the 2025 FNANO, Salt Lake City, UT, April 2025.
9. "Formation of Complex Metal Nanostructures by Imprinting Full-Site Addressability from DNA Origami onto Inorganic Particles", oral presentation at the 2024 AICHE annual meeting, San Diego, CA, October 2024.
8. "DNA-Guided Self-Assembly of Plasmonic Nanomaterials with Full-Site Addressability", oral presentation at the 2024 AICHE annual meeting, San Diego, CA, October 2024.
7. "Hybrid Materials for Catalysis and Sensing", poster presentation at the 2024 AICHE annual meeting, San Diego, CA, October 2024.
6. "Programming Self-Assembly of Plasmonic Nanomaterials with Sequence-Controlled DNA Polymers", oral presentation at the 2023 AICHE annual meeting, Orlando, FL, November 2023.
5. "Programming Self-Assembly of Plasmonic Nanomaterials with Sequence-Controlled DNA Polymers", oral presentation at the ACS 2023 Fall meeting, San Francisco, CA, August 2023.
4. "Removal of Capping Agent from Pd Nanocubes without Destructing Their Surface Structure for the Maximization of Catalytic Activity", oral presentation at the ACS 2021 Fall meeting, Atlanta, GA, August 2021.
3. "Facile Synthesis of Pd-Cu Bimetallic Twin Nanocubes and the Mechanistic Understanding of Shape Evolution", poster presentation at Gordon Research Conference on "Crystal Growth and Assembly", Manchester, NH, June 2019.
2. "Effect of Surface Twining of Pd Nanocrystals on the Catalytic Activity toward H_2O_2 Decomposition", oral presentation at 2019 ACS Colloid & Surface Science Symposium, Atlanta, GA, June 2019.
1. "H_2O_2 Decomposition on Pd Nanocrystals with Surface Twin Boundaries", poster

presentation at Gordon Research Conference on “Chemical Reactions at Surfaces”, Ventura, CA, February 2019.