Curriculum Vitae

Hua Zhu

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Department of Chemistry & Biochemistry, Texas State University
601 University Dr, San Marcos, TX 78666

Research interest: Nanomaterials | Quantum Dots | Photocatalysis | Optoelectronics | Energy

EDUCATION AND RESEARCH EXPERIENCE

Texas State University Jan. 2026 ~ present
Assistant Professor in Department of Chemistry & Biochemistry
Doctoral Faculty, Materials Science, Engineering, and Commercialization (Ph.D.) program
Meta Platforms, Inc. Aug. 2025 ~ Dec. 2025
Material Research Intern
Massachusetts Institute of Technology Oct. 2020 ~ July 2025
Postdoctoral Associate
Advisor: Moungi Bawendi (The Nobel Prize in Chemistry 2023)
Brown University 2015 ~ 2020
Ph.D. *in Chemistry*
Advisor: Ou Chen
University of Connecticut Summer, 2014
Visiting Student
Advisor: Christian Brückner
Fudan University 2011 ~ 2015
B.S. *in Chemistry*
Advisor: Prof. Xingwen Sun

AWARDS AND PROFESSIONAL AFFLIATIONS

- 2019 Award for Outstanding Self-Financed Students Abroad 2020
- MRS Fall 2019 Graduate Student Award 2019
- Brown University Vince Wernig Fellowship (1%) 2019
- Brown IMNI 10th Anniversary Poster Competition, 1st Prize 2017
- People's scholarship, Fudan University, 2nd Prize 2013
- National Chemistry Competition, 2nd Prize 2010
- Members of American Chemistry Society Since 2017
- Members of Material Research Society Since 2018
- Members of Royal Society of Chemistry Since 2019

TEACHING AND MENTORING

Teaching

- CHEM0500 Inorganic Chemistry Head-Teaching Assistant 2017

- CHEM0360L Organic Chemistry Teaching Assistant 2015, 2016
- CHEM0500 Inorganic Chemistry Teaching Assistant 2016

Research Mentor

- Co-authored multiple publications with mentees, resulting in their first-author papers in prestigious journals such as *Advanced Materials* and *ACS Nano*.
- Mentees received awards and job offers from big-tech companies.

PROFESSIONAL ACTIVITIES AND SERVICES

2026 Green Chemistry Conference GRC 2026

- *Poster: Stabilization of Organic Cations in Lead Halide Perovskite Solar Cells Using Phosphine Oxides Derivatives*

30th Annual Green Chemistry & Engineering Conference 2026

- *Poster: Stabilization of Organic Cations in Lead Halide Perovskite Solar Cells Using Phosphine Oxides Derivatives*

2025 MIT Workshop on Small Display Technologies 2025

- *Talk: Engineering Colloidal Quantum Dots (QDs) for Micro-LED Displays*

2023 MRS Fall Meeting 2023

- *Meet the New Faculty Candidates Poster Session: "Inorganic Nanoparticles and Organic Hybrids for Renewable and Sustainable Energy Applications"*

2019 MRS Fall Meeting 2019

- *MRS graduate student award session, oral: "Controlling Orientational Orders in Self Assembly of Quantum Dot Gold Heterostructural Nanocrystals"*

258th ACS National Meeting 2019

- *Poster: "Pressure Induced Transformation of Formamidinium Lead Halide Perovskite and Quantum Dot Gold Heterostructural Nanocrystals"*
- *Talk: "Controlling Orientational Orders in Self Assembly of Quantum Dot Gold Heterostructural Nanocrystals"*

Gordon Research Conference: Crystal Growth and Assembly 2019

- *Poster: "Self-Assembly of Quantum Dot-Gold Heterodimer Nanocrystals with Orientational Order"*

2018 MRS Fall Meeting 2018

- *Poster: "Pressure-Induced Phase Transformation and Bandgap Engineering of Formamidinium Lead Iodide Perovskite Nanocrystals"*

254th ACS National Meeting 2017

- *Poster: "Anisotropic Nanocrystal Synthesis, Self-Assembled Superstructures and Pressure-Induced Transformations"*

Independent Reviewer for 2019 ~ Present

Advanced Functional Materials | *Advanced Optical Materials* | *Chemistry of Materials* | *Nanomaterials* | *ACS Applied Nano Materials* | *The Journal of Physical Chemistry* | *MRS Advances* | *The Journal of Physical Chemistry Letters* | *Laser & Photonics Reviews* | *iScience* | *CCS Chemistry* | *Materials Letters* | *Catalysts* | *ACS Catalysis*

MIT Environment, Health & Safety Office

Primary lab safety representatives 2021 ~ 2025

PUBLICATIONS (Google Scholar)

42. McFarlane-Connelly, K. S.; Brown, N. L.; **Zhu, H.**; Nix, O. M.; Bawendi, M. G.* Extending the weakly confined regime of perovskite nanocrystals for fast emission at low temperature. *ACS Nano* **2026**, *20* (12), 9742-9750.

41. Shih, M. C.; Tan, S.; Lu, Y.; Kodalle, T.; Lee, D-K.; Dong, T.; Larson, B.W.; Park, S.; Zhang, R.; Grotevent, M. J.; Sverko, T.; **Zhu, H.**; Lin, Y-K.; Sutter-Fella, C. M.; Zhu, K.; Beard, M. C.; Bulović, V.; Bawendi, M. G.* A 2D/3D heterostructure perovskite solar cell with a phase-pure and pristine 2D layer. Adv. *Mater.* **2025**, *37*, 2416672.

40. Tan, S.;† Shih, M. C.;† Lu, Y.;† Choi, S. G.; Dong, Y.; Lee, J. H.; Yavuz, L.; Larson, B. W.; Park, S. Y.; Kodalle, T.; Zhang, R.; Grotevent, M. J.; Lin, Y. K.; **Zhu, H**.; Bulovié, V.; Sutter-Fella, C. M.; Park, N. G.; Beard, M. C.; Lee, J. W.; Zhu, K.;* Bawendi, M. G,* Spontaneous formation of robust 2D perovskite phases. *Science*, **2025**. *388* (6747), 639-645.

39. Lu, Y.;† **Zhu, H.**;† Tan, S.; Zhang, R.; Shih, M.-C.; Grotevent, M. J.; Lin, Y.; Choi, S.-G.; Lee, J.-W.; Bulović, V.; Bawendi, M. G.* Stabilization of organic cations in lead halide perovskite solar cells using phosphine oxides derivatives. *J. Am. Chem. Soc.* **2024**. *146* (32), 22387-22395. (†co-first author)

38. Grotevent, M. J.; Lu, Y.; Sverko, T.; Shih, M.-C.; Tan, S.; **Zhu, H.**; Dang, T.; Mwaura, J. K.; Swartwout, R.; Beiglböck, F.; Kothe, L.; Bulović, V.; Bawendi, M. G.* Additive-free oxidized Spiro-MeOTAD hole transport layer significantly improves thermal solar cell stability. *Adv. Energy Mater.* **2024**, 2400456.

37. Krajewska, C. J.; Kick, M.; Kaplan, A. E. K.; Berkinsky, D. B.; **Zhu, H.**; Sverko, T.; Van Voorhis, T.; Bawendi, M. G.* A-site cation influence on the structural and optical evolution of ultrathin lead halide perovskite nanoplatelets. *ACS Nano* **2024**, *18* (11), 8248–8258.

36. Heindl, M. B.; **Zhu, H.**; Bawendi, M. G.; Herink, G.*, Electro-absorptive quantum dot antenna resolves terahertz lightwaves via biased Stark effect. *ACS Photonics* **2024**, *11* (1), 13–17.

35. **Zhu, H**.; Kick, M.; Ginterseder, M.; Krajewska, C. J.; Sverko, T.; Li, R.; Lu, Y.; Shih, M. C.; Van Voorhis, T.; Bawendi, M. G.*, Synthesis of zwitterionic $CsPbBr_3$ nanocrystals with controlled anisotropy using surface-selective ligand pairs. *Adv. Mater.* **2023**, 2304069.

34. Lu, Y.; Shih, M.-C.; Tan, S.; Grotevent, M. J.; Wang, L.; **Zhu, H**.; Zhang, R.; Lee, J.-H.; Lee, J.-W.; Bulović, V.; Bawendi, M. G.*, Rational design of a chemical bath deposition based tin oxide electron transport layer for perovskite photovoltaics. *Adv. Mater.* **2023**, 2304168.

33. Proppe, A. H.; Berkinsky, D. B.; **Zhu, H.**; Sverko, T.; Kaplan, A. E.; Horowitz, J. R.; Kim, T.; Chung, H.; Jun, S.; Bawendi, M. G.*, Highly stable and pure single-photon emission with 250 ps optical coherence times in InP colloidal quantum dots. *Nat. Nanotechnol.* **2023**, https://doi.org/10.1038/s41565-023-01432-0.

32. Zhang, J.; Ning, Y.; **Zhu, H.**; Rotile, N.J.; Wei, H.; Diyabalanage, H.; Hansen, E.C.; Zhou,

I.Y.; Barrett, S.C.; Sojoodi, M.; Tanabe, K.K.; Humblet, V.; Jasanoff, A.; Caravan, P.; Bawendi, M. G.*, Fast detection of liver fibrosis with collagen-binding single-nanometer iron oxide nanoparticles via T1-weighted MRI. *Proc. Natl. Acad. Sci. U.S.A.* **2023**, *123* (18), e2220036120.

31. Krajewska, C. J.; Kaplan, A. E.; Kick, M.; Berkinsky, D. B.; **Zhu, H.**; Sverko, T.; Voorhis, T. V.; Bawendi, M. G.*, Controlled assembly and anomalous thermal expansion of ultrathin cesium lead bromide nanoplatelets. *Nano Lett*. **2023**, *23* (6), 2148–2157.

30. Nagaoka, Y.; Schneider, J.; **Zhu, H.**; Chen, O.*, Quasicrystalline materials from non-atom building blocks. *Matter* **2023**, *6* (1), 30-58.

29. **Zhu, H.**; Sverko, T.; Zhang, J.; Berkinsky, D. B.; Sun, W.; Krajewska, C. J.; Bawendi, M. G.*, One-dimensional highly-confined $CsPbBr_3$ nanorods with enhanced stability: synthesis and spectroscopy. *Nano Lett.* **2022**, *22* (20), 8355–8362.

28. Wang, J.; Yuan, Y.; Schneider, J.; Zhou, W.; **Zhu, H.**; Cai, T.; Chen, O.*, Quantum dot-based luminescent solar concentrators fabricated through the ultrasonic spray-coating method. *ACS Appl. Mater. Interfaces* **2022**, *14* (36), 41013–41021.

27. **Zhu, H.**; Fan, Z.; Shi, W.; Eggert, D.; Liu, Y.; Yuan, Y.; Kim, K-S.; Grünwald, M.*; Chen, O.*, Dual atomic coherence in the self-assembly of patchy heterostructural nanocrystals. *ACS Nano* **2022**, *125* (9), 15053–15062.

26. Sun, Y.; Wang, Y.; **Zhu, H.**; Jin, N.; Mohammad, A.; Biyikli, N.; Chen, O.; Chen, K.; Zhao, J.*, Excitation wavelength-dependent photoluminescence decay of single quantum dots near plasmonic gold nanoparticles. *J. Chem. Phys.* **2022**, *156*, 154701.

25. Sun, Y.; **Zhu, H.**; Jin, N.; Chen, O.; Zhao, J.*, Fast lifetime blinking in compact CdSe/CdS core/shell quantum dots. *J. Phys. Chem. C* **2021**, *125* (28), 15433–15440.

24. Yuan, Y.; Jin, N.; Saghy, P.; Dube, L.; **Zhu, H.**; Chen, O.*, Quantum dot photocatalysts for organic transformations. *J. Phys. Chem. Lett*. **2021**, *12* (30), 7180-7193.

23. Fischer, A. W.*; Jaeckstein, M. Y.*; Gottschling, K.; Heine, M.; Sass, F.; Mangels, N.; Schlein, C.; Worthmann, A.; Bruns, O. T.; Yuan, Y.; **Zhu, H.**; Chen, O.; Ittrich, H.; Nilsson, S. K.; Sun, E.; Scheja, L.; Heeren. J., Lysosomal lipoprotein processing in endothelial cells stimulateds adipose tissue thermogenic adaptation. *Cell Metab*. **2021**, *33* (3), 547-564.

22. Yuan, Y.; **Zhu, H.**; Hills-kimball, K.; Cai, T.; Shi, W.; Wei, Z.; Yang, H.; Wang, P.; He, J.; Chen, O.*, Stereoselective C–C oxidative coupling reactions photocatalyzed by $CsPbBr_3$ perovskite nanocrystals. *Angew. Chem. Int. Ed.* **2020**, *59* (50), 22563-22569.

21. Cai, T.; Shi, W.; Hwang, S.; Kobbekaduwa, K.; Nagaoka, Y.; Yang, H.; Hills-Kimball, K.; **Zhu, H.**; Wang, J.; Su, D.; Gao, J.; Wang, Z.; Chen, O.*, Lead-free layered double perovskite $Cs_4CuSb_2Cl_{12}$ nanocrystals. *J. Am. Chem. Soc.* **2020**, *142* (27), 11927-11936.

20. Peng, L.; **Zhu, H.**; Wang, W.; Chen, O.; Ma, X.*, Influence of local structures on the energy transfer efficiencies of quantum-dot films. *Phys. Rev. B* **2020**, *102* (3), 035437.

19. Luo, Y.; Wang, Y.; Liu, M.; **Zhu, H.**; Chen, O.; Zou, S.; Zhao, J.*, Colloidal assembly of Au-quantum dot-Au sandwiched nanostructures with strong plasmon-exciton coupling. *J. Phys. Chem. Lett*. **2020**, *11* (7), 2449-2456.

18. **Zhu, H.**; Cai, T.; Yuan, Y.; Wang, X.; Nagaoka, Y.; Zhao, J.; Liu, Z.; Li, R.; Chen, O.*, Pressure-induced transformations of three-component heterostructural nanocrystals with CdS-Au_2S janus nanoparticles as hosts and small Au nanoparticles as satellites. *ACS Appl. Nano Mater.* **2019,** *2* (11), 6804-6808.

17. Liu, E.; **Zhu, H.**; Yi, J.; Kobbekaduwa, K.; Adhikari, P.; Liu, J.; Shi, Y.; Zhang, J.; Li, H.; Oprisan, A.; Rao, A.; Sanabria, H.; Chen, O.; Gao, J.*, Manipulating charge transfer from core to shell in CdSe/CdS/Au heterojunction quantum dots. *ACS Appl. Mater. Interfaces* **2019**, *11* (51), 48551-48555.

16. Wang, J.; Yuan, Y.; **Zhu, H.**; Cai, T.; Fang, Y.; Chen, O.*, Three-dimensional macroporous photonic crystal enhanced photon collection for quantum dot-based luminescent solar concentrator. *Nano Energy* **2019,** *67*, 104217.

15. Que, M.; Dai, Z.; Yang, H.; **Zhu, H.**; Zong, Y.; Que, W.; Padture, N. P.; Zhou, Y.; Chen, O.*, Quantum-dot-induced cesium-rich surface imparts enhanced stability to formamidinium lead iodide perovskite solar cells. *ACS Energy Lett.* **2019**, *4* (8), 1970-1975.

14. **Zhu, H.**; Fan, Z.; Yu, L.; Wilson, M. A.; Nagaoka, Y.; Eggert, D.; Cao, C.; Liu, Y.; Wei, Z.; Wang, X.; He, J.; Zhao, J.; Li, R.; Wang, Z.; Gruenwald, M.*; Chen, O.*, Controlling nanoparticle orientations in the self-assembly of 'patchy' quantum dot-gold heterostructural nanocrystals. *J. Am. Chem. Soc.* **2019**, *141* (14), 6013-6021.

13. Yuan, Y.; **Zhu, H.**; Wang, X.; Cui, D.; Gao, Z.; Su, D.; Zhao, J.; Chen, O.*, Cu-catalyzed synthesis of CdZnSe-CdZnS alloy quantum dots with highly tunable emission. *Chem. Mater.* **2019**, *31* (7), 2635-2643.

12. Yuan, Y.; **Zhu, H.**; Nagaoka, Y.; Tan, R.; Davis, A. H.; Zheng, W.; Chen, O.*, Reversible photo-switching of dual-color fluorescent Mn-doped CdS-ZnS quantum dots modulated by diarylethene molecules. *Front. Chem.* **2019**, *7*, 145.

11. Cai, T.; Yang, H.; Hills-Kimball, K.; Song, J. P.; **Zhu, H.**; Hofman, E.; Zheng W.; Rubenstein B. M.; Chen, O.*, Synthesis of all-inorganic Cd-doped $CsPbCl_3$ perovskite nanocrystals with dual-wavelength emission. *J. Phys. Chem. Lett*. **2018**, *9* (24), 7079-7084.

10. Fang, C.; **Zhu, H.**; Chen, O.; Zimmt M. B.*, Reactive two-component monolayers template bottom-up assembly of nanoparticle arrays on HOPG. *Chem. Comm*. **2018**, *54*, 8056-8059.

9. Nagaoka, Y.; **Zhu, H.**; Eggert, D.; Chen, O.*, Single-component quasicrystalline nanocrystal

superlattices through flexible polygon tiling rule. *Science* **2018**, *362* (6421), 1396-1400. (*Highlighted by News at Brown, https://www.brown.edu/news/2018-12-20/quasicrystal*)

8. Nagaoka, Y.; Tan, R.; Li, R.; **Zhu, H.**; Eggert, D.; Wu, Y.A.; Liu, Y.; Wang, Z.; Chen, O.*, Superstructures generated from truncated tetrahedral quantum dots. *Nature* **2018**, *561* (7723), 378-382.

7. **Zhu, H**.; Cai, T.; Que, M.; Song, J. P.; Rubenstein, B. M.; Wang, Z. W.; Chen, O.*, Pressure-induced phase transformation and band-gap engineering of formamidinium lead iodide perovskite nanocrystals. *J. Phys. Chem. Lett.* **2018**, *9* (15), 4199-4205.

6. **Zhu, H**.; Fan, Z.; Yuan, Y.; Wilson, M. A.; Hills-Kimball, K.; Wei, Z.; He, J.; Li, R.; Gruenwald, M.*; Chen, O.*, Self-assembly of quantum dot-gold heterodimer nanocrystals with orientational order. *Nano Lett*. **2018**, *18* (8), 5049-5056.

5. **Zhu, H**.; Nagaoka, Y.; Hills-Kimball, K.; Tan, R.; Yu, L.; Fang, Y.; Wang, L.; Chen, O.*, Pressure-enabled synthesis of hetero-dimers and hetero-rods through intraparticle coalescence and interparticle fusion of quantum-dot-Au satellite nanocrystals. *J. Am. Chem. Soc*. **2017**, *139* (25) 8408-8411. (*Highlighted in CHESS news, https://www.chess.cornell.edu/about/news/pressure-induced-fabrication-janus-nanoparticles-and-helically-decorating-nanorods*)

4. Luciano, M.; Erfanzadeh, M.; Zhou, F.; **Zhu, H**.; Bornhuetter, T.; Roeder, B.; Zhu, Q.; Brueckner, C.*, In vivo photoacoustic tumor tomography using a quinoline-annulated porphyrin as NIR molecular contrast agent. *Org. Biomol. Chem.* **2017***,15*, 972-983.

3. Tan, R.;† **Zhu, H**.;† Cao, C.; Chen, O.*, Multi-component superstructures self-assembled from nanocrystal building blocks. *Nanoscale* **2016**, *8*, 9944-9961. (Invited, Selected as "HOT Article Collection", † co-first author)

2. Sun, Q.; **Zhu, H**.; Chen, Y.; Yang, X.; Sun, X.*; Lin, G., Squaramide-catalyzed synthesis of enantioenriched spirocyclic oxindoles via ketimine intermediates with multiple active sites. *Angew. Chem. Int. Ed.* **2015**, *54* (45), 13253-13257.

1. Sun, Q.; Chen, X.; **Zhu, H**.; Lin, H.; Sun, X.*; Lin, G., Asymmetric synthesis of poly-substituted spirocyclohexane oxindole via a squaramide catalyzed cascade Michael–Michael–Aldol sequence. *Org. Chem. Front.* **2015**, *2*, 110-113.