

Haimei Zheng

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Research Interests

My research interests are centered on understanding how atomic scale heterogeneity and fluctuations control the physical and chemical processes of materials. By developing and applying in situ transmission electron microscopy (TEM) techniques, my group studies nucleation, growth and transformations of materials at the atomic level, solid-liquid (electrode-electrolyte) interfaces, (electro-)catalysis and other topics. Insights garnered from this research enable novel materials synthesis and efficient applications of materials in catalysis, batteries and other functional devices. Effort in developing apparatus for imaging and spectroscopy including liquid cell design and fabrication, TEM sample stages and other tools leads to technological advances.

Appointments

2018-present Senior Staff Scientist, Materials Sciences Division, Lawrence Berkeley National Lab (LBNL)
2017-present Adjunct Associate Professor, Department of Materials Science & Engineering, UC Berkeley
2013-2017 Adjunct Assistant Professor, Department of Materials Science & Engineering, UC Berkeley
2010-2017 Staff Scientist, Materials Sciences Division, Lawrence Berkeley National Lab

Education & Training

Postdoc	Lawrence Berkeley National Lab & UC Berkeley	Electron Microscopy & Chemistry	2006-2010
Postdoc	UC Berkeley	Materials Sci. Eng. & Physics	2005-2006
Ph.D.	University of Maryland, College Park	Materials Sci. Eng.	2004

Honors & Awards

2021 Materials Research Society Fellow
2019 Materials Research Society Medal Award
2013 LBNL Director's Award for Exceptional Scientific Achievement
2011 DOE Office of Science Early Career Award
2003 Materials Research Society Graduate Student Gold Medal Award

Editorial Services

Guest Editor, *MRS Bulletin* special issue: Liquid Phase Electron Microscopy, 2020
Member of the Editorial Board, *Scientific Report*, 2018-present
Member of the Editorial Advisory Board, *Chem*, 2016-present
Guest Editor, *Accounts of Chemical Research* special issue: Direct Visualization of Chemical and Self-Assembly Processes with Transmission Electron Microscopy, 2017
Guest Editor, *MRS Bulletin* special issue: Frontiers of In Situ Electron Microscopy, 2015

Reviewer

Acta Materialia, Accounts of Chemical Research, ACS Applied Materials & Interfaces, ACS Catalysis, ACS Nano, Analytical Chemistry, Annual Review of Physical Chemistry, Applied Physics Letters, Chemical Communications, Journal of Materials Chemistry, Journal of Physical Chemistry, JACS, Microscopy and Microanalysis, Nano Letters, Nanoscale, Nature, Nature Catalysis, Nature Communications, Nature Energy, Nature Materials, Nature Nanotechnology, Science, Science Advances, Scientific Reports, Ultramicroscopy

Conference Organization

- Chair, MRS Fall Meeting, 2022.
- Organizer, Symposium on "Direct visualization of chemical and self-assembly processes with high-resolution microscopy," Pacificchem 2020, The International Chemical Congress of Pacific Basin Societies, Honolulu, Hawaii, December 15-20, 2021.

- Organizer, Symposium on “In situ TEM characterization of dynamic processes during materials synthesis and processing,” Microscopy & Microanalysis, Portland, Oregon, August 4-8, 2019.
- Organizer, Symposium on “In situ and operando microscopy of electronic and energy materials,” XXVII International Materials Research Congress, Cancun, Mexico, August 19-24, 2018.
- Organizer, Symposium on “In situ electron microscopy of dynamic materials and phenomena,” MRS Spring Meeting & Exhibit, Phoenix, Arizona, April 17-21, 2017.
- Organizer and Chair, DOE Office of Science Workshop on “Future Electron Scattering & Diffraction,” Rockville, Maryland, February 25-26, 2014.
- Organizer, Symposium on “In situ microscopy” at Microscopy & Microanalysis, Hartford, Connecticut, August 3-7, 2014.
- Session Chairs for MRS Meetings (2018 Spring, 2017 Fall, 2017 Spring, 2016-2013 Fall, 2010 Spring).

Research Advisement

Postdocs: total 17

Ph.D students (co-advisement): total 19

Undergraduate students: total 11

Selected Publications (total 137 refereed papers; 2 book chapters; total citations of 24,950+ times and an H-index of 63, according to Google Scholar)

- 1) Q. Zhang, X. Peng, Y. Nie, Q. Zheng, J. Shangguan, C. Zhu, K. C. Bustillo, P. Ercius, L. W. Wang, D. T. Limmer, H. Zheng, “Defect-mediated ripening of core-shell nanostructures.” *Nature Communications* accepted (2022).
- 2) S. Lee, J. Shangguan, J. Alvarado, S. Betzler, S. J Harris, M. M Doeff, H. Zheng, “Unveiling the mechanisms of lithium dendrite suppression by cationic polymer film induced solid electrolyte interphase modification.” *Energy & Environmental Science* 13, 1832-1842 (2020).
- 3) J. Yang, Z. Zeng, J. Kang, C. Czarnik, X. Zhang, C. Ophus, C. Yu, K. Bustillo, M. Pan, J. Qiu, L. W. Wang, H. Zheng, “Formation of two-dimensional transition metal oxide nanosheets with nanoparticles as intermediates.” *Nature Materials* 18, 970–976 (2019).
- 4) Y. Wang, X. Peng, A. Abelson, P. Xiao, C. Qian, L. Yu, C. Ophus, P. Ercius, L. Wang, M. Law, H. Zheng, “Dynamic deformability of individual PbSe nanocrystals during superlattice phase transitions.” *Science Advances* 5, eaaw5623 (2019).
- 5) C. Zhu, S. Liang, E. Song, Y. Zhou, W. Wang, F. Shan, Y. Shi, C. Hao, K. Yin, T. Zhang, J. Liu, H. Zheng,* L. Sun,* “In-situ liquid cell transmission electron microscopy investigation on oriented attachment of gold nanoparticles.” *Nature Communications* 9, 421 (2018).
- 6) K. Niu, Y. Xu, H. Wang, R. Ye, H. L. Xin, F. Lin, C. Tian, Y. Lum, K. C. Bustillo, M. M. Doeff, M. T. M. Koper, J. Ager, R. Xu, H. Zheng, “A spongy nickel-organic CO₂ reduction photocatalyst for nearly 100% selective CO production.” *Science Advances* 3, e1700921 (2017).
- 7) K. Niu, T. Frolov, H. L. Xin, J. Wang, M. Asta, H. Zheng, “Bubble nucleation and migration in a lead-Iron hydroxide core-shell nanoparticle.” *PNAS* 112, 12928-12932 (2015).
- 8) H. G. Liao, D. Zherebetsky, H. Xin, C. Czarnik, P. Ercius, H. Elmlund, M. Pan, L. W. Wang, H. Zheng, “Facet development during platinum nanocube growth.” *Science* 345, 916-919 (2014).
- 9) Z. Zeng, W. Liang, H. G. Liao, H. L. Xin, Y. H. Chu, H. Zheng, “Visualization of electrode-electrolyte interfaces in LiPF₆/EC/DEC electrolyte for lithium ion batteries via in-situ TEM.” *Nano Letters* 14, 1745-1750 (2014).
- 10) H. G. Liao, L. Cui, S. Whitlam, H. Zheng, “Real time imaging Pt₃Fe nanorod growth in solution.” *Science* 336, 1011-1014 (2012).
- 11) H. Zheng,* J. B. Rivest, T. Miller, B. Sadtler, A. Lindenberg, M. F Toney, L. W. Wang, C. Kisielowski, A. P. Alivisatos,* “Observation of transient structural-transformation dynamics in a Cu₂S nanorod.” *Science* 333, 206-209 (2011).

Invited Talks (total 120+)

(Full CV available on request)