Miaofang Chi

Center for Nanophase Materials Sciences
Oak Ridge National Laboratory, Oak Ridge, TN 37830

Phone: 865·241·4284
E-mail: chim@ornl.gov

Current Position: R&D Staff Member, Electron and Atom Probe Microscopy Group, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory

Research Focus:

- Structure-functionality relationships at atomic scale defects, surfaces, and interfaces in energy materials
- The development of advanced atomic resolution functional imaging for materials and interfaces
- The understanding of mass and electron transport behavior at the atomic-scale and the coupling of materials physics with local lattice strain, bonding, and chemistry
- *In situ* S/TEM and EELS characterizations at atomic-resolution for inorganic nanomaterials.

Education:

Institution and Location	Degree	Year(s)	Field of Study
University of California, Davis	Ph.D.	09/2003 – 01/ 2008	Materials Science and Engineering
Shanghai Institute of Ceramics	M.E.	09/ 2000 – 07/ 2003	Materials Science and Engineering
Jilin University	B.E.	09/ 1993 – 07/ 1997	Materials Science

Research and Professional Experience:

R&D Staff 09/2013 - present	Center for Nanophase Materials Sciences, Oak Ridge National Laboratory
R&D Associate 09/2008 - 2013	Materials Science and Technology Division, Oak Ridge National Laboratory
Application Scientist 01/2008 – 08/2008	Gatan Co., Pleasanton, CA
Research Fellow 05/2006 – 01/2008	Institute of Geophysics and Planetary Physics, Lawrence Livermore National Laboratory, Livermore, CA
Research Assistant 09/2004 - 04/2006	National Center for Electron Microscopy, Lawrence Berkeley National Laboratory, Berkeley, CA

Significant Awards and Honors:

- Burton Medal Award, Microscopy Society of America (2016).
- Director's Award for Outstanding Accomplishment in Science & Technology, ORNL Awards Night (2015).
- Early Career Researcher Award, ORNL Awards Night (2015).
- Significant Event Award, Oak Ridge National Laboratory (2015).
- Awarded - Most Publications in Division, Materials Sciences & Technology Division, ORNL (2010).
- Lawrence Graduate Student Research Fellowship at Lawrence Livermore National Laboratory, Livermore, CA (2006-2008).
- Distinguished Scholar Award (MAS), Microscopy & Microanalysis 2007 Annual Meeting, Fort Lauderdale, FL (2007).
- Graduate Student Award, 11th Frontiers of Electron Microscopy in Materials Science Conference (2007).

Publications (Citations: 4011; h-index: 30; i10-index: 52)

1. M. Chi, C. Wang, Y. Lei, G. Wang, D. Li, K.L. More, A. Lupini, L.F. Allard, N.M. Markovic, and V.R. Stamenkovic, "Surface Faceting and Elemental Diffusion Behavior at Atomic Scale for Alloy Nanoparticles During In Situ Annealing," *Nature Communications* **6** Article 8925 (2015).
2. L. Zhang, L.T. Roling, X. Wang, M. Vara, M. Chi, J. Liu, S. Choi, J. Park, J. A. Herron, Z. Xie, M. Mavrikakis, and Y. Xia, "Platinum-Based Nanocages with Subnanometer-Thick Walls and Well-Defined Facets," *Science* **349** 412-416 (2015).
3. H. Liu, D.N. Qian, M.G. Verde, M.H. Zhang, L. Baggetto, K. An, Y. Chen, K.J. Carroll, D. Lau, M. Chi, G.M. Veith, and Y.S. Meng, "Understanding the Role of NH_4F and Al_2O_3 Surface Co-Modification on Li-Excess Layered Oxide $Li_{1.2}Ni_{0.2}Mn_{0.6}O_2$," *ACS Applied Materials & Interfaces* **7**[34] 19189-19200 (2015).
4. X. Li, L. Basile, B. Huang, C. Ma, J.W. Lee, I.V. Vlassiouk, A.A. Puretzky, M.W. Lin, M. Yoon, M. Chi, J.C. Idrobo, C.M. Rouleau, B.G. Sumpter, D.B. Geohegan, and K. Xiao, "Van der Waals Epitaxial Growth of Two-Dimensional Single-Crystalline GaSe Domains on Graphene," *ACS Nano* **9**[8] 8078-8088 (2015).
5. X. Wang, S. Choi, L.T. Roling, M. Luo, C. Ma, L. Zhang, M. Chi, J. Liu, Z. Xie, J.A. Herron, M. Mavrikakis, and Y. Xia, "Palladium–Platinum Core-Shell Icosahedra with Substantially Enhanced Activity and Durability Towards Oxygen Reduction," *Nature Communications* **6** Article 7594 (2015).
6. L.H. Wu, J. Yang, M. Chi, S.Y. Wang, P. Wei, W.Q. Zhang, L.D. Chen, and J.H. Yang, "Enhanced Thermoelectric Performance in Cu-Intercalated BiTel by Compensation Weakening Induced Mobility Improvement," *Scientific Reports* **5** Article 14319 (2015).
7. D. Qian, C. Ma, and M. Chi, "Advanced Analytical Electron Microscopy for Lithium-Ion Batteries," *NPG Asia Materials* - Invited Review Article **7**[6] Article e193 (2015).
8. C. Ma, E. Rangasamy, C. Liang, J. Sakamoto, K.L. More, and M. Chi, "Excellent Stability of a Lithium-Ion-Conducting Solid Electrolyte upon Reversible Li^+/H^+ Exchange in Aqueous Solutions," *Angewandte Chemie International Edition* **54**[1] 129-133 (2015).
9. B.H. Han, D.N. Qian, M. Risch, H.L. Chen, M. Chi, and Y. Shao-Horn, "Role of $LiCoO_2$ Surface Terminations in Oxygen Reduction and Evolution Kinetics," *Journal of Physical Chemistry Letters* **6**[8] 1357-1362 (2015).
10. Y. Wu, C. Ma, J. Yang, Z. Li, C. Liang, L.F. Allard, and M. Chi, "Probing the Initiation of Voltage Decay in Li-Rich Layered Cathode Materials at Atomic Scale," *Journal of Materials Chemistry A* **3**[10] 5385-5391 (2015).
11. J.K. Kim, B. Sentilkumar, S.H. Sahgong, J.H. Kim, M. Chi, and Y. Kim, "New Chemical Route for the Synthesis of β-$Na_{0.33}V_2O_5$ and Its Fully Reversible Li Intercalation," *ACS Applied Materials & Interfaces* **7**[12] 7025-7032 (2015).
12. W.S. Wang, Y.F. Ye, J. Feng, M. Chi, J.H. Guo, and Y.D. Yin, "Enhanced Photoreversible Color Switching of Redox Dyes Catalyzed by Barium-Doped TiO_2 Nanocrystals," *Angewandte Chemie International Edition* **54**[4] 1321-1326 (2015).
13. X.F. Li, L. Basile, M. Yoon, C. Ma, A.A. Puretzky, J.C. Idrobo, M. Chi, C.M. Rouleau, and D.B. Geohegan, "Revealing the Preferred Interlayer Orientation and Stackings of Two-Dimensional Bilayer Gallium Selenide Crystals," *Angewandte Chemie International Edition* **54**[9] 2712-2717 (2015).
14. J.C. Li, C. Ma, M. Chi, C. Liang, and N.J. Dudney, "Solid Electrolyte: The Key for High-Voltage Lithium Batteries," *Advanced Energy Materials* **5**[4] Article 1401408 (2015).
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16. H. Yang, P.G. Kotula, Y. Sato, M. Chi, Y. Ikuhara, and N.D. Browning, "Segregation of Mn2+ Dopants as Interstitials in $SrTiO_3$ Grain Boundaries," *Materials Research Letters* **2**[1] 16-22 (2014).

17. Y. Wang, S.I. Choi, X. Zhao, S. Xie, H.C. Peng, M. Chi, C.Z. Huang, and Y. Xia, "Polyol Synthesis of Ultrathin Pd Nanowires via Attachment-Based Growth and Their Enhanced Activity towards Formic Acid Oxidation," *Advanced Functional Materials* **24**[1] 131-139 (2014).
18. N. Shin, M. Chi, and M.A. Filler, "Interplay between Defect Propagation and Surface Hydrogen in Silicon Nanowire Kinking Superstructures," *ACS Nano* **8**[4] 3829-3835 (2014).
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20. D. Qian, B. Xu, M. Chi, and Y.S. Meng, "Uncovering the Roles of Oxygen Vacancy on Cation Migration in Lithium Excess Layered Oxides," *Physical Chemistry Chemical Physics* **16**[28] 14665-14668 (2014).
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23. X. Li, M.-W. Lin, A.A. Puretzky, J.C. Idrobo, C. Ma, M. Chi, M. Yoon, C.M. Rouleau, I.I. Kravchenko, and D.B. Geohegan, "Controlled Vapor Phase Growth of Single Crystalline, Two-Dimensional GaSe Crystals with High Photoresponse," *Scientific Report* **4** 5497 (2014).
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47. C.R. Fell, D. Qian, K.J. Carroll, M. Chi, J.L. Jones, and Y.S. Meng, "Correlation Between Oxygen Vacancy, Microstrain, and Cation Distribution in Lithium-Excess Layered Oxides during the First Electrochemical Cycle," *Chemistry of Materials* **25**[9] 1621-1629 (2013).
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49. Z. Bi, M.P. Paranthaman, P.A. Menchhofer, R.R. Dehoff, C.A. Bridges, M. Chi, B. Guo, X.-G. Sun, and S. Dai, "Self-Organized Amorphous TiO_2 Nanotube Arrays on Porous Ti Foam for Rechargeable Lithium and Sodium Ion Batteries," *Journal of Power Sources* **222** 461-466 (2013).
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Book Chapter:
N.D. Browning, J. Buban, M. Chi, B. Gipson, M. Herrera, D. Masiel, S. Mehraeen, D. Morgan, N. Okamoto, and Q. Ramasse, in Modeling Nanoscale Imaging in Electron Microscopy (Springer US, 2012) pp. 11-40.

Patent:
X. Qiu, M. Parans Paranthaman, M. Chi, I.N. Ivanov, Z. Zhang. (US Patent 20,130,045,383, 2013).

Invited Presentations:
- The 251st ACS National Meeting & Exposition March 13-17, San Diego, CA. "*In situ* Aberration-Corrected STEM for energy materials," (2016).
- In-situ Heating in Aberration-Corrected STEM Workshop and Educational Symposium, " Revealing Dynamic Atomic Rearrangements in Nanoparticles upon *In Situ* Annealing," Georgia Institute of Technology (2016)
- ORNL seminar, "Facilitating Ion Transport in Energy Storage Systems," Feb. 11th 2016.
- The Electrochemical Society, University of Kentucky Chapter, "Probing Interfacial Charge Transfer Mechanism of Solid Electrolytes in Li-ion Batteries," (2015).
- International Conference of Pacific Rim Ceramic Societies (PacRim-11), Jeju Island, Korea. "Stability & Conductivity of Solid Electrolytes and Their Interfaces: A Microscopic Perspective" (2015).
- Georgia Institute of Technology, Atlanta, GA. "Advanced Electron Microscopy for Energy Storage" (2014).
- Battery Congress, Troy, MI. "Advanced Electron Microscopy for Li-battery Oxide Cathode Materials for Li-Batteries" (2013).
- American Chemical Society, Indianapolis, IN. "Advanced Electron Microscopy for Energy Storage" (2013).
- Microscopy & Microanalysis 2011 Annual Meeting, Nashville, TN. "Probing Surface Modification and Electrochemical Cycling Stability of $Li[Ni_{xLi1/3-2x/3}Mn_{2/3-x/3}]O_2$ for Li-ion Batteries by using Advanced Analytical Electron Microscopy" (2011).
- PV School at ORNL-CNMS User Meeting, "Design Of Radial p-n Junction on TiO_2 through N-doping for Solar Applications" (2012)
- University of California, Riverside, "Advanced Analytical Electron Microscopy for Probing Nanostructures" (2010).
- University of California, San Diego, "Advanced Electron Microscopy for Energy Applications" (2011).
- Center for Functional Nanomaterials, Brookhaven National Laboratory, "STEM Analysis of Perovskite Vanadates and Comet Materials" (2008).
- EELS Imaging & Analysis School, Gatan Inc., "An Introduction to EELS Imaging and Analysis" (2008).
- Seagate Inc. R&D Center, CA "Application of STEM/EELS to Semiconductor Materials" (2008).
- Evans Analytical Group, CA "An introduction to EELS in a (S)TEM" (2007).

Meeting Symposia Organized and Committees Served:
- Symposium Organizer "In-situ Characterization of Material Synthesis and Properties at the Nanoscale with TEM," Materials Research Society 2014 Spring Meeting, San Francisco, CA.
- Activity co-organizer at Postdoc Mixer, Microscopy & Microanalysis 2014 Annual Meeting, Hartford, CT.
- Symposium Organizer "Advanced Microscopy Characterizations of Nanoparticles" Microscopy & Microanalysis 2013 Annual Meeting, Indianapolis, IN.
- Pre-meeting Congress Co-Organizer "Artifacts and Interpretation of Aberration-Corrected Electron Microscopy," Microscopy & Microanalysis 2011 Annual Meeting, Nashville, TN.

- Symposium Co-Organizer "A02 Aberration-Corrected Electron Microscopy: Exploring Materials Through New Eyes," Microscopy & Microanalysis 2010 Annual Meeting, Portland, OR.
- Poster Award Committee, Microscopy & Microanalysis 2010 Annual Meeting, Portland, OR.
- *Regular reviewer* for *Nano Letters, Nature Communications, Chemistry of Materials*, *Nano Research*, *ACS Nano*, *Energy & Environmental Sciences* etc.

Graduate Students and Postdoctoral Scholars Supervised:
- Graduate Students: Boyu Liu (XAJU, China); Danna Qian (UCSD, 2014); Minghao Zhang (UCSD, present); Zach Hood (Georgia Tech, present).
- Postdoctoral Scholars: Cheng Ma (ORNL, present); Wenpei Gao (UC-Irvine, present); Qiang Zheng (ORNL, present).

Graduate Advisors:
- Ph.D. Advisor: N.D. Browning, University of California, Davis (Currently at Pacific Northwest National Laboratory) and J. Bradley, Lawrence Livermore National Laboratory (Currently at University of Hawaii).
- M.S. Advisor: H. Gu, Shanghai Institute of Ceramic, Chinese Academy of Sciences, Shanghai, China