

QIYANG LU, Ph.D.

School of Engineering, Westlake University
E2-413, 600 Dunyu Rd., Hangzhou, China 310030
Email: luqiyang@westlake.edu.cn; Web: ssi-westlake.com

PROFESSIONAL APPOINTMENTS

- 07/2026 – Present Associate Professor (with tenure)
09/2020 – 07/2026 Assistant Professor
School of Engineering, Westlake University
Principal Investigator (PI) of [Solid State Ionics \(SSI\) Laboratory](http://ssi-westlake.com)
04/2019 – 07/2020 Joint Advanced Light Source (ALS) Postdoctoral Research Fellow
Stanford University/ Advanced Light Source, Lawrence Berkeley
National Laboratory
Advisors: Prof. William C. Chueh (Stanford)/Dr. Slavomír Nemšák (ALS)
02/2018 – 04/2019 Postdoctoral Research Associate
Materials Science and Technology Division
Oak Ridge National Laboratory
Advisor: Dr. Ho Nyung Lee

EDUCATION

- 08/2012 – 02/2018 Ph.D. in Materials Science and Engineering
Massachusetts Institute of Technology, Cambridge, MA, USA
Department of Materials Science and Engineering (DMSE)
Advisor: Prof. Bilge Yildiz
07/2008 – 07/2012 Bachelor of Science in Materials Science and Engineering
Tsinghua University, Beijing, China
Department of Materials Science and Engineering

HONORS & AWARDS

- 2024 Excellent Teacher of Hangzhou Education Bureau System Award
2024 Finalist, Young Scientist Award (YSA), International Society of Solid State Ionics (ISSI)
2023 Faculty Award for Excellence in Teaching, School of Engineering, Westlake University
2022 Young Talent Program of the National Science Foundation of China (NSFC)
2021 Faculty Award for Excellence in Services, School of Engineering, Westlake University
2018 Ross Coffin Purdy Award, the American Ceramic Society (ACerS), “*Given to the author or authors who made the most valuable contribution to ceramic technical literature.*”
2018 Best PhD Thesis Award, Department of Materials Science and Engineering, Massachusetts Institute of Technology
2017 Graduate Student Gold Award (GSA Gold), Materials Research Society (MRS)

PUBLICATIONS

Total citations: 3260, h-index = 28 (based on [Google Scholar](#)).

Key contributor as SSI Lab student/postdoc.

#Equally contributing first author *Corresponding author.

Peer-reviewed Journal Articles

1. **Bin Zhao**, Luhan Wei, Jieping Zheng, Ying Lu, Haowen Chen, Kaichuang Yang, **Qiyang Lu***, Quantifying Chemical Capacitance and Diffusion Coefficients in Hydrogenated $\text{La}_{0.6}\text{Sr}_{0.4}\text{FeO}_{3-\delta}$ via Operando Spectro-Electrochemical Characterizations, **Nano Letters**, 26 (2026), 1578-1586 [Link](#)
2. **Kaichuang Yang**, Jieping Zheng, Ying Lu, Ziyun Zhang, Hui Zhang, Zhi Liu, **Qiyang Lu***, Elucidating the Role of Interfacial Charge Transfer on the Oxygen Incorporation/Evolution Reactions for Solid Oxide Cells, **Nature Communications**, 16 (2025), 11472 [Link](#)
3. **Ying Lu**, Luhan Wei, Yang Hu, Zihan Xu, Haowen Chen, Nian Zhang and **Qiyang Lu***, Metal-Support Interaction Tuned by Oxygen Chemical Potential Governs Coarsening of Metal Nanoparticles Exsolved from Perovskite Oxides, **Journal of the American Chemical Society**, 147 (2025), 47091-47101 [Link](#)
4. **Song Mao**, Xiao Yang* and **Qiyang Lu***, Deconvoluting Sources of Overpotential of Oxide Ion Conducting Membrane Assisted Inert Anode, **Journal of the Electrochemical Society** 172 (2025), 104503 [Link](#)
5. **Yang Hu**, Luhan Wei, Haowen Chen, Zihan Xu, Andrey Shavorskiy, Christoph Baeumer*, **Qiyang Lu***, Quantifying Dynamic Changes of Oxygen Nonstoichiometry and Formation of Surface Phases of SrCoO_x Electrocatalysts by Operando Characterizations, **ACS Nano** 19 (2025), 13999-14009 [Link](#)
6. **Luhan Wei**#, **Haowen Chen**#, Zihan Xu, Yang Hu, Bin Zhao, Ying Lu, Nian Zhang and **Qiyang Lu***, Quantifying Hydrogen Chemical Diffusivity in NdNiO_3 Thin Films through Operando Multimodal Measurements, **Nano Letters** 25 (2025), 6348-6355 [Link](#)
7. **Ying Lu**#, **Zihan Xu**#, **Luhan Wei**#, Haowen Chen and **Qiyang Lu***, Establishing Quantitative Understanding of Defect-Tuned Properties in Functional Oxides by an Electrochemically-Induced Gradient of Ionic Defect Concentration, **ACS Applied Materials & Interfaces**, 17 (2025), 13342-13357 (Invited Review) [Link](#)
8. **Luhan Wei**, Yang Hu, Yiwei Huang, Ying Lu, Zihan Xu, Nian Zhang and **Qiyang Lu***, Deconvoluting Surface and Bulk Charge Storage Processes in Redox-Active Oxides by Integrating Electrochemical and Optical Insights, **Journal of the American Chemical Society** 146 (2024), 24167-24176 [Link](#)
9. **Haowen Chen**#, **Zihan Xu**#, Luhan Wei, Mingdong Dong, Yang Hu, Ying Lu, Nian Zhang, Jie Wu and **Qiyang Lu***, Manipulating Protons and Oxygen Vacancies in Nickelate Oxides via Thermochemical Dehydration, **Journal of Materials Chemistry A** 12 (2024) 23658-23669 [Link](#)

10. **Kaichuang Yang**, Ying Lu, Yang Hu, Zihan Xu, Jieping Zheng, Haowen Chen, Jingle Wang, Yi Yu, Hui Zhang, Zhi Liu, and **Qiyang Lu***, Differentiating Oxygen Exchange Reaction Mechanisms across Phase Boundaries, **Journal of the American Chemical Society**, 145 (2023), 25806–25814 [Link](#)
11. Liyang Ma, Jing Wu, **Yiwei Huang**, **Qiyang Lu**, and Shi Liu*, Ultrahigh Oxygen Ion Mobility in Ferroelectric Hafnia, **Physical Review Letters**, 131 (2023), 256801 [Link](#)
12. **Ying Lu**, Yiwei Huang, Zihan Xu, Kaichuang Yang, Weichao Bao, **Qiyang Lu***, Quantifying Electrochemical Driving Force for Exsolution in Perovskite Oxides by Designing Graded Oxygen Chemical Potential, **ACS Nano**, 17 (2023), 14005–14013 [Link](#)
13. Ellen M. Kiens, Minju Choi, **Luhan Wei**, **Qiyang Lu***, Le Wang*, Christoph Baeumer*, Deeper Mechanistic Insights into Epitaxial Nickelate Electrocatalysts for the Oxygen Evolution Reaction, **Chemical Communications**, 59 (2023), 4562-4577 [Link](#)
14. **Haowen Chen**#, Mingdong Dong#, Yang Hu, Ting Lin, Qinghua Zhang, Er-Jia Guo, Lin Gu, Jie Wu, **Qiyang Lu***, Protonation-Induced Colossal Chemical Expansion and Property Tuning in NdNiO₃ Revealed by Proton Concentration Gradient Thin Films, **Nano Letters**, 22 (2022), 8983-8990 [Link](#)
15. Xin Yu#, **Yang Hu**#, Haoyuan Shi#, Ziyang Sun, Jinghang Li, Haoran Liu, Hao Lyu, Jiujiu Xia, Jingda Meng, Xingyu Lu, Jingjie Yeo*, **Qiyang Lu***, and Chengchen Guo*, Molecular Design and Preparation of Protein-Based Soft Ionic Conductors with Tunable Properties, **ACS Applied Materials & Interfaces**, 14 (2022), 48061-48071 [Link](#)
16. **Kaichuang Yang**#, Jiapeng Liu#, Yuhao Wang#, Xiangcheng Shi, Jingle Wang, **Qiyang Lu***, Francesco Ciucci*, and Zhibin Yang*, Machine-learning-assisted Prediction of Long-term Performance Degradation on Solid Oxide Fuel Cell Cathodes Induced by Chromium Poisoning, **Journal of Materials Chemistry A**, 10 (2022), 23683-23690 [Link](#)
17. **Yang Hu**, Haowen Chen and **Qiyang Lu***, Understanding the Phase Equilibrium and Kinetics of Electrochemically Driven Phase Transition in CoO_xH_y during Electrocatalytic Reactions, **Journal of Physical Chemistry C**, 126 (2022), 18198-18207 (Featured as Cover Article of Volume 126, Issue 43, November 2022) [Link](#)
18. Alessandro R Mazza#, **Qiyang Lu**#, Guoxiang Hu, Panchapakesan Ganesh, Thomas Zac Ward, Ho Nyung Lee, Gyula Eres* *et al.*, Reversible Hydrogen-Induced Phase Transformations in La_{0.7}Sr_{0.3}MnO₃ Thin Films Characterized by In Situ Neutron Reflectometry, **ACS Applied Materials & Interfaces**, 14 (2022), 10898-10906 [Link](#)
19. **Qiyang Lu***, Henrique Martins, Juhan Matthias Kahk, William C Chueh, Johannes Lischner*, Slavomir Nemsak* *et al.*, Layer-Resolved Many-Electron Interactions in Delafossite PdCoO₂ from Standing-Wave Photoemission Spectroscopy, **Communications Physics**, 4 (2021), 143 [Link](#)
20. Christoph Baeumer, Jiang Li, **Qiyang Lu**, Michal Bajdich*, Slavomír Nemšák*, J. Tyler Mefford*, William C. Chueh *et al.*, Tuning Electrochemically Driven Surface Transformation in Atomically Flat LaNiO₃ Thin Films for Enhanced Water Electrolysis, **Nature Materials**, 20 (2021), 674-682 [Link](#)

* Selected Publications Prior to joining Westlake University *

21. **Qiyang Lu**[#], Samuel Huberman[#], Hantao Zhang, Qichen Song, Jiayue Wang, Gulin Vardar, Adrian Hunt, Iradwikanari Waluyo, Gang Chen^{*}, Bilge Yildiz^{*}, Bi-directional Tuning of Thermal Transport in SrCoO_x with Electrochemically Induced Phase Transitions, **Nature Materials**, 19 (2020) 655-662 [Link](#)
22. **Qiyang Lu**, Gulin Vardar, Sean Bishop, Iradwikanari Waluyo, Harry Tuller and Bilge Yildiz^{*}, Surface Defect Chemistry and Electronic Structure of Pr_{0.1}Ce_{0.9}O_{2-δ} Revealed *in operando*, **Chemistry of Materials**, 30 (2018), 2600-2606 [Link](#)
23. **Qiyang Lu**, Sean Bishop, Dongkyu Lee, Hendrik Bluhm, Ho Nyunge Lee, Harry Tuller and Bilge Yildiz^{*}, Electrochemically Triggered Metal-Insulator-Transition between VO₂ and V₂O₅, **Advanced Functional Materials**, 28 (2018), 1803024 [Link](#)
24. Nikolay Tsvetkov[#], **Qiyang Lu**[#], Lixin Sun, Ethan Crumlin, and Bilge Yildiz^{*}, Improved Chemical and Electrochemical Stability of Perovskite Oxides by Oxidizing Cations at the Surface, **Nature Materials**, 15 (2016) 1010-1016 [Link](#)
25. **Qiyang Lu** and Bilge Yildiz^{*}, Voltage-controlled Topotactic Phase Transition in Thin film SrCoO_x Monitored by *in situ* X-ray Diffraction, **Nano Letters**, 16 (2016), 1186-1193 [Link](#)

Invited Perspective or Tutorial Articles

1. **Qiyang Lu**^{*}. How to Correctly Analyze the X-ray Photoelectron Spectra of 3d Transition Metal Oxides (Nano Focus Article). **ACS Nano**. 18 (2024) 13973–13982 [Link](#)
2. **Qiyang Lu**^{*}. Four Pitfalls in Analysis of X-ray Photoelectron Spectroscopy Data (Nano Focus Article). **ACS Nano**, *in preparation*

PATENTS

1. Xiaohe Miao, Bin Zhao, **Qiyang Lu**, An Oxygen-Free Recirculating Flow Liquid Cell for High-Resolution X-ray Diffraction on a Horizontal Goniometer and an *in situ* Electrocatalytic Characterization Method, Chinese Patent, CN121090582B, 2026 (Issued)
2. Xiaohe Miao, Taofei Zhou, **Qiyang Lu**, Ying Lu, Kaichuang Yang, Ying Zhong, High-Resolution *in situ* X-Ray Diffraction System Based on Multi-Field Coupling and Its Testing Method, Chinese Patent, CN114235869B, 2024 (Issued)
3. Bilge Yildiz, Nikolai Tsvetkov, **Qiyang Lu**, Segregation Resistant Perovskite Oxides with Surface Modification, US Patent 11,179,682, 2021 (Issued)

INVITED SEMINARS AND CONFERENCE TALKS

1. Invited Talk, “On the Importance of Room-Temperature Defect Chemistry in Functional Oxides”, the 25th International Conference on Solid State Ionics (SSI-25), Singapore, July 10, 2026
2. MSE Seminar, Department of Materials Science and Engineering, Massachusetts Institute of Technology, October 3, 2025

3. Physical Chemistry Special Seminar, Department of Chemistry, Boston University, October 2, 2025
4. Invited Talk, “Concentration Gradients of Ionic Point Defects in Functional Oxides”, Materials Science & Technology Conference, Columbus, US, September 26, 2025
5. Invited Seminar, Institute of Chemical Technologies and Analytics, Technische Universität Wien (TU Wien), July 11, 2025
6. Invited Talk, “Room-Temperature Protonic Defect Chemistry in Functional Oxides”, Materials Research Society (MRS) Spring 2025 Conference, Seattle, US, April 11, 2025
7. Invited Colloquium, Surface Science Forum, Institute of Physics, September 27, 2024
8. Invited Physics Colloquium, Department of Physics, Tsinghua University, September 26, 2024
9. Invited Colloquium, UM-SJTU Joint Institute, Shanghai Jiaotong University, August 5, 2024
10. Invited Colloquium, Inorganic Materials Science, University of Twente, July 22, 2024
11. Invited Talk, “Navigating Complexity: Harnessing Ionic Defects for Tailored Oxide Thin Film Properties”, Young Scientist Award (YSA) session, the 24th International Conference on Solid State Ionics (SSI-24), London, UK, July 18, 2024
12. Invited Seminar, School of Energy and Environment, City University of Hong Kong, November 10, 2023
13. Invited Talk, “Differentiating Oxygen Exchange Reaction Mechanisms across Phase Boundaries”. The 15th Pacific Rim Conference of Ceramic Societies (PACRIM15), Shenzhen, China, November 8, 2023
14. Invited Talk, “Understanding the Role of Ionic Point Defects in Oxide Electrocatalysts”. The 10th International Conference on Electroceramics, Changsha, China, September 9, 2023
15. Invited Seminar, Department of Mechanical and Aerospace Engineering, Hong Kong University of Science and Technology (HKUST), February 2, 2023
16. Invited Talk, “Controlling Properties of Perovskite Oxides by Tuning Oxygen Defect Chemistry”, 2021 Electronic Materials and Applications (EMA 2021), online, January 20, 2021

TEACHING

MSE 4087/5026 Solid State Ionics (Ongoing advanced undergrad/graduate course, developed by Qiyang Lu)

- Offered in Spring 2022, 2023, 2024 and 2025 (continuing).
- Course materials available at <https://ssi-westlake.com/teaching/>. Total downloads > 4000 since launching in December 2022.
- Tutorial articles based on the course materials posted on WeChat (in Chinese), with >10,000 views in total, see <https://ssi-westlake.com/tutorial/>.

- Course videos uploaded to Bilibili (<https://space.bilibili.com/3546762329459250>) with >1,000 views.

MENTORING AND STUDENTS

Current group members

Name	Year joined	Role	Project
Ying Lu	2021	Staff Scientist	Metal nanoparticle exsolution
Jieping Zheng	2022	PhD Student	High-temperature ionotronics
Song Mao	2022	PhD Student	Molten salt electrochemistry (Co-advised with Prof. Xiao Yang)
Zihan Xu	2023	PhD Student	Protonic defects in oxides
Bin Zhao	2024	PhD Student	Ionotronics of oxide thin films
Lingzhi Huang	2025	PhD Student	Defect chemistry of electrocatalysts

PhD Student Graduated

Name	Thesis Title
Luhan Wei	Spectro-electrochemical Characterization of Multi-dimensional Kinetics of Ionic Defect Intercalation in Functional Oxides (2026) Current affiliation: Postdoc at National University of Singapore
Kaichuang Yang	Mechanistic Understanding of Surface Decorations on Oxygen Electrode for Solid Oxide Cells by Model Thin Film Electrodes (2025) Current affiliation: Staff Scientist at Huairou National Laboratory
Yang Hu	Ionic Defects Chemistry and Dynamic Evolution in Cobalt-Based Model Electrocatalyst (2025) Current affiliation: Assistant Professor at Xi Hua University
Haowen Chen	Ionic Defect Engineering and Properties Tuning in Nickelates (2024) Current affiliation: Postdoc at Beijing Institute of Technology

Former group members

Name	Years	Role	Current position
Xi Wang	2025-2026	Research Associate	Industry
Rui Wang	2024-2026	Postdoc	Industry
Jingle Wang	2021-2023	Postdoc	Postdoc, Chinese Academy of Sciences
Yiwei Huang	2021-2023	Student	Master student, HKUST
Zimo Liu	2025	Summer Intern	Undergrad, USTC
Xinyuan He	2024	Summer Intern	Undergrad, Central South University
Yuxin Qiu	2024	Summer Intern	Undergrad, Xi'an Jiaotong University
Yuanqin Yun	2022	Summer Intern	PhD student, Brown University
Haodong Wu	2021	Summer Intern	PhD student, University of St. Andrews

Kaiyuan Fan	2021	Summer Intern	PhD student, USTC
Peng Tang	2020-2021	Research Associate	Industry

STUDENT HONORS & AWARDS

- 2026 Travel Award, the 25th International Conference on Solid State Ionics (SSI-25), **Luhan Wei** and **Bin Zhao** (PhD Student)
- 2023 China Scholarship Council (CSC) Exchange Student Scholarship to PhD student **Jieping Zheng** (Financial support for visiting Prof. Jürgen Fleig's group at Technology University of Vienna (TU Wien) during 08/2026~08/2027)
- 2024 NSFC Young Student Innovation Program, **Kaichuang Yang** (PhD Student), 2024/05-2025/12. Funded 300,000 RMB (~40,000 in USD)
- 2023 China Scholarship Council (CSC) Exchange Student Scholarship to PhD student **Kaichuang Yang** (Financial support for visiting Prof. Jürgen Fleig's group at Technology University of Vienna (TU Wien) during 08/2024~08/2025)
- 2023 China Scholarship Council (CSC) Exchange Student Scholarship to PhD student **Yang Hu** (Financial support for visiting Prof. Christopher Baeumer's group at University of Twente during 11/2023~11/2024)

SERVICE

Service within School of Engineering, Westlake University

- Founding co-chair, PhD Student Seminar Committee, 2021-present
 - Started weekly PhD Student Seminar Series; Featured >100 PhD student presenters;
 - Started annual 3-minute research presentation contest “**WE**stlake **S**tudent **T**alk (**WEST**)”. Highly acclaimed by students and colleagues & featured on University News.
 - Initiated the first 3-minute research presentation contest for engineering graduate students in the Yangtze-river-delta region and served as the competition chair.
- Undergraduate affair committee member, 2023-present
- Graduate student admission and curriculum committee member, 2020-2022

Services outside Westlake University

- Member, Executive committee of the Chinese Society for Solid State Ionics (CSSI), 2023-present.
- Reviewer for National Science Foundation of China (NSFC) proposals.
- Reviewer for US Department of Energy (DOE) Energy Frontier Research Centers (EFRC) proposal (2022).