

QIYANG LU, Ph.D.

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PROFESSIONAL APPOINTMENTS

- 09/2020 – Present Assistant Professor, Principal Investigator (PI)
Westlake University
School of Engineering
Group Leader of [Solid State Ionics \(SSI\) Laboratory](#)
- 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
Oak Ridge National Laboratory
Materials Science and Technology Division
Advisor: Dr. Ho Nyung Lee (ORNL Corporate Fellow)

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
Thesis: *Controlling Properties of Functional Oxides by Tuning Oxygen Defect Chemistry* (awarded Best PhD Thesis 2018)
- 07/2008 – 07/2012 Bachelor of Science in Materials Science and Engineering
Tsinghua University, Beijing, China
Department of Materials Science and Engineering
GPA: 92.7/100 (Rank: 1/76)

HONORS & AWARDS

- 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)
- 2016 Award for Outstanding Student Abroad, China Scholarship Council (CSC)

PUBLICATIONS

Total citations: 1922, h-index = 21 (based on [Google Scholar](#), accessed on 12/11/2023).

Key contributor as SSI Lab student/postdoc.

#Equally contributing first author *Corresponding author.

Peer-reviewed Journal Articles

1. **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](#)
2. **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](#)
3. 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](#)
4. **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](#)
5. 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](#)
6. **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](#)
7. **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](#)
8. 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](#)
9. **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](#)

10. 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 **

11. **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](#)
12. **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](#)
13. **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](#)
14. **Qiyang Lu**, Yan Chen, Hendrik Bluhm, and Bilge Yildiz, Electronic Structure Evolution of SrCoO_x Probed by X-ray Absorption Spectroscopy during Electrochemically Driven Topotactic Phase transition, **Journal of Physical Chemistry C**, 120 (2016), 24148-24157 [Link](#)
15. 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](#)
16. **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 Review and Perspective Articles

1. **Qiyang Lu**^{*}. How to Correctly Analyze the X-ray Photoelectron Spectra of 3d Transition Metal Oxides (Invited Tutorial Article). **ACS Nano**. In preparation, 2023.

PATENTS

1. 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. Understanding the Role of Ionic Point Defects in Functional Oxide Electrocatalysts. School of Energy and Environment, City University of Hong Kong, November 10, 2023
2. Differentiating Oxygen Exchange Reaction Mechanisms across Phase Boundaries. the 15th Pacific Rim Conference of Ceramic Societies (PACRIM15), Shenzhen, China, November 8, 2023

3. Understanding the Role of Ionic Point Defects in Oxide Electrocatalysts. The 10th International Conference on Electroceramics, Changsha, China, September 9, 2023
4. Understanding the Role of Ionic Point Defects in Functional Perovskite Oxides: from High-temperature Solid/Gas Equilibrium to Room-temperature Solid/Liquid Dynamics, Hong Kong University of Science and Technology (HKUST), February 2, 2023
5. Controlling Properties of Perovskite Oxides via Turning Oxygen and Proton Defect Chemistry, 12th International Conference on High-Performance Ceramics (CICC-12), Suzhou, China, August 16, 2022
6. Controlling Properties of Functional Perovskite Oxides by Tuning Oxygen Defect Chemistry, Westlake International Symposium in Engineering, Hangzhou, China, October 27, 2021
7. Controlling Properties of Perovskite Oxides by Tuning Oxygen Defect Chemistry, 2021 Electronic Materials and Applications (EMA 2021), online, January 20, 2021

TEACHING

MSE 5007 Solid State Ionics (Ongoing graduate course, developed by Qiyang Lu)

- Offered in Spring 2022 and Spring 2023 (continuing)
- Course materials available at <https://ssi-westlake.com/teaching/>. Total downloads > 3000 (updated on 12/11/2023) since launching in December 2022
- Tutorial articles based on the course materials posted on WeChat (in Chinese). >3100 Subscribers with >10,000 views in total (updated on 12/11/2023)

MENTORING AND STUDENTS

Current group members

Name	Year joined	Role	Project
Ying Lu	2021	Research Scientist	Metal nanoparticle exsolution
Haowen Chen	2020	PhD Student	Ionotronics of nickelate thin films
Yang Hu	2021	PhD Student	Ionic defects in electrocatalysts
Kaichuang Yang	2021	PhD Student	Model electrodes of solid oxide cells
Luhan Wei	2021	PhD Student	Optical-electrochemical methods
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

Former group members

Name	Years	Role	Current position
Jingle Wang	2021-2023	Postdoc	Postdoc, Chinese Academy of Sciences

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

- 2023 China Scholarship Council (CSC) Exchange Student Scholarship to PhD student **Kaichuang Yang** (Financial support for visiting Prof. Bilge Yildiz's group at MIT during 01/2024~01/2025)
- 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 **ST**udent **T**alk (**WEST**)”. Highly acclaimed by students and colleagues & featured on University News.
- Undergraduate curriculum 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.
- Peer Review for scientific journals: Nano Letters, Chemistry of Materials, Journal of Physical Chemistry C, ACS Applied Materials & Interfaces, ChemSusChem, Journal of Materials Chemistry A, Applied Surface Science, Solid State Ionics.
- Reviewer for Department of Energy (DOE) Energy Frontier Research Centers (EFRCs) proposals (2022).

GRANTS

Current (External)

1. NSFC, Excellent Young Scientists Fund (overseas), “Solid state ionics of complex oxide thin films”. 1/1/2023-12/31/2025.
2. NSFC, Young Scientists Fund, “Tuning properties of oxide thin films by using spatially varied ion defect concentration”. 1/1/2023-12/31/2025.

Current (Internal)

1. Research Center for Industries of the Future, Westlake University, “Data-driven development of key materials for reversible solid oxide cells”. 1/1/2022-12/31/2024.
2. School of Engineering Dean Special Projects Fund, Westlake University, “Map phase boundaries electrochemically”. 1/1/2022-12/31/2024.