Junyuan Lu

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Education

Bachelor of Engineering in Material Science and Engineering *Sep 2021 – Expected Jun 2025*
Undergraduate program *Shanghai Jiao Tong University*

- Student of *Hsu Tzuyao* Honor Class in School of Material Science and Engineering (SMSE), taking most of the major courses in English.
- GPA: 88/100 (3.75/4.3), ranked 3/17 in *Hsu Tzuyao* Honor Class and 11/117 in college.

Summer School *Jun 2023 – Jul 2023*
2023 Zhi-Hong International Summer School of ISS-AM *Shanghai Jiao Tong University*

Participated in a two-week international summer school held by SMSE of SJTU. Listened to lectures given by professors from Northwestern, KTH, SJTU, etc. Completed group works and the final presentation with foreign graduate students from Singapore and Kazakhstan.

Selected Publications

- Qingyun Hu, Wei Wang, **Junyuan Lu**, He Zhu, Qi Liu*, Yang Ren, Hong Wang, and Jian Hui*. "High-Throughput Screening of High Energy Density LIMN1-xFexPO4 via Active Learning." *Chinese Chemical Letters*, August 2024, 110344. https://doi.org/10.1016/j.cclet.2024.110344.
- Hongjian Yuan†, **Junyuan Lu**†, Genmao Zhuang, Yang Ren, Jian Hui*, and Hong Wang*. "High-Throughput Screening of Superlattice-like Ge-Sb-M (M = Sn, Se) Thin Films for Multi-Level Phase Change Photonics Materials." *Microstructures*. (Accepted)
- Qingyun Hu, **Junyuan Lu**, Jian Hui*, Ziyuan Rao, Hong Wang, and Yang Ren*. "Transforming Battery Materials Development with Artificial Intelligence: Progress and Challenges" *Advanced Energy Materials*. (Resubmitted)

Research and Project Experience

High-throughput Screening of Combinatorial O-PCM Thin Films *Jun 2023 – Present*
Projects in Prof. Hong Wang's research group *Materials Genome Initiative Center, SJTU*

- Project 1: Optical properties and thermal stability of superlattice-like Ge-Sb-Se-Te optical phase change materials (O-PCM). Used ion beam deposition to combinatorial synthesize thin films. High-throughput XRD, ellipsometry, and XRF are used to characterize the thin films in order to construct composition-structure-property relationships of the material. This is a ZIRC-founded project and is expected to be completed in June 2025 with papers.
- Project 2: The thermal stability of superlattice-like Ge-Sb-Se/Sn thin films. Developed Python package for high-throughput XRD data analysis and the visualization of ternary structural map. Submitted an invited paper as co-first author to *Microstructures*. Presented in the poster section of *8th forum of Materials Genome Engineering*.
- Collaborated on a literature review on AI application in developing battery materials. Plotted most of the figures and wrote some of the content. Submitted the review as second author to *Advanced Materials*.
- Collaborated on high-throughput screening of high energy density LiMn1-xFexPO4. Published a paper on *CCL* as third author. Contributions include writing and reviewing.

Machine Learning Accelerated Phase Field Simulation *Jul 2024 – Present*
Research Assistant in Prof. Hong Liu's group *SMSE, SJTU*

- A graph neural network (GNN) based phase field method is used to simulate grain growth in laser-based additive manufactoring. In the GNN model, nodes represent grains and edges represent grain boundaries. The model is based on *a previous paper*.
- Transferred the model's repo from Python to MATLAB and optimized the code for speed. Conducted a series of simulations to verify its accuracy and efficiency. Discovered physical inaccuracy in the model, including the lack of nucleation process and vague anisotropy behavior.
- Proposed an adaptive mesh refinement approach to simulate nucleation and growth of nucleus. Improved the model's physical integrity while maintaining its efficiency.

Measurement of the Electron Conductivity of Solid Electrolytes *Feb 2022 – Feb 2023*
An undergraduate research project supervised by Prof. Huanan Duan *SMSE, SJTU*

- Used a symmetric Hebb-Wagner polarization method to measure the electron conductivity of solid electrolytes Li6.5La3Zr1.5Ta0.5O12. EIS, XRD, SEM, and density measurements were also conducted.

- Prepared high quality samples, performed characterization, analyzed data, and derived the variation pattern of the electron conductivity at different experimental conditions with speculated underlying mechanism.
- Finish the project with a detailed report and a thesis defense.

American Sign Language Detection Model *May 2023 – Jun 2023*
An A-level coursework *Student Innovation Center, SJTU*

- Build a DNN model in Pytorch that can output alphabets from a given image of a hand gesture based on the definition of American sign language. The model was trained on a dataset from Kaggle and mediapipe was used to derive the hand landmarks from images, which were then fed into the model. It is able to recognize 26 alphabets in realtime with very high accuracy.
- The model along with a gui demo was available on my github.

Relevant Work Experience

Internship at Lithium-ion Battery Incorperation *Sep 2024*
BatteroTech Co., Ltd. *Zhejiang, China*

Worked with engineers to perform electrochemical tests on batteries. Learned about the production process of lithium-ion batteries, including the preparation of cathode and anode materials, the assembly of cells, and the testing of batteries. Also learned about the safety regulations and the quality control of the products.

Awards

Suzhou Industrial Park (SIP) Scholarship	Awarded by SIP Administrative Committee	2022
Huawei Scholarship	Awarded by Huawei Technologies Co. Ltd.	2023
Yingcai Scholarship	Awarded by Mr. Wei Chi	2024
The Third Prize Scholarship	Awarded by Shanghai Jiao Tong Univ.	2022, 2023, 2024

Extracurricular Activities

Debating *Sep 2021 – Present*
Core member of the college debate team *SJTU*

Participated in dozens of debate competitions. Won the champion in a university tournament. Huge amount of paper reading to prepare for each debate. Proficiency in improvisational expression and effective communication.

***Internet Plus* Innovation and Entrepreneurship Competition** *Feb 2023 – Sep 2023*
Team leader *Shanghai and Zhejiang, China*

Led a team of 5 to participate in the competition, where a novel Na-LTA product for dehumidification is presented in collaboration with Prof. Yao Li. Multiple minor competition related to the competition were also attended. The project won a silver prize in *The 24th Sheng Xuanhuai Cup* of Shanghai Jiao Tong University.

The Practice Department of Student Union *Mar 2023 – Sep 2024*
Deputy Head *SMSE, SJTU*

Led a team of 12 students to organize all the social practice activities of the school. Our work included planning, publicity, organization, and monitoring of the activities. Won personal prize for my contributions in 2022 and 2023.

Technical Skills

Programming	Proficiency in *MATLAB* and *Python* for simulations, data analysis, plotting, machine learning, and software development. Have learned and used *C++*, *C#*, *lua*, and *Latex*.
Softwares	Familiar with *Microsoft Office*, *MDI Jade*, *Blender*, *Zotero*, *VS Code*, *Git*, *Photoshop*, *Linux*, HPC, etc. Have used *Solidworks*, *ABAQUS*, and *LAMMPS* in courses.
Characterization	Familiar with XRD (0D, 2D, postprocess algorithums), spectroscopic ellipsometry, SEM, and electrochemical workstation (EIS, CV, cell assembly). Have learned and used TEM, mechanical tests, XRF, Hardness tests, DSC, BET, and TGA from courses and projects.
Language Proficiency	English (TOEFL 110: 30/29/25/26; GRE V157/Q169/W3.5), Mandarin (Native speaker).

Soft Skills

Cultural Competence	Have learned about the communication and socialization habits of several representative cultures in an intercultural communication course.
Violin	Have been playing the violin since 6. Passion for classical music.