

XIN CHEN

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EDUCATION

- University of California, Berkeley; GPA: 3.87/4.00 Sept 2019 - 2024 (expected)
- **Ph.D.** in Material Science & Engineering | Advisor: Dr. Anubhav Jain, Prof. Gerbrand Ceder
 - Minor in Artificial Intelligence & Materials Informatics
 - Research: Applied computer vision and interpretable machine learning for energy materials
- University of California, Berkeley Sept 2021 - 2023
- **Graduate Certificate** in Applied Data Science
- Shanghai Jiao Tong University (SJTU); GPA: 90/100; Rank: 2/114 Sept 2015 - Jun 2019
- **B.S. (Honor)** in Material Science & Engineering | Advisor: Prof. Hong Zhu
 - Research: Atomic-scale simulation of lithium-ion batteries

WORK EXPERIENCE

- Tesla** | Data (Machine Learning) Engineering Intern, Battery Aug 2023 – Dec 2023
- Developed encoder-decoder model for time-series prediction of battery health
 - Built statistical models and tree-based models for monitoring battery production
 - Applied statistical inference to battery data analysis
- Lawrence Berkeley National Lab** | Graduate Student Researcher Aug 2019 – Current
- Built computer vision software and machine learning pipeline for automatic inspection of solar modules
 - Developed deep learning models for solar module image processing
 - Applied statistical inference and interpretable machine learning for solar module optimization
 - Open-source software: <https://github.com/hackingmaterials/pv-vision>
- University of Oxford** | Undergraduate Student researcher July 2018 - Sep 2018
- Fabrication of solid-state electrolytes

PUBLICATIONS & CONFERENCES

- **X. Chen**, et al., A. Jain "Automatic Crack Segmentation and Feature Extraction in Electroluminescence Images of Solar modules", *IEEE Journal of Photovoltaics* (2023)
- C. Libby, B. Paudyal, **X. Chen** (co-first authors), et al., "Analysis of PV Module Power Loss and Cell Crack Effects due to Accelerated Aging Tests and Field Exposure", *IEEE Journal of Photovoltaics* (2022)
- **X. Chen**, et al., A. Jain "Automated Defect Identification in Electroluminescence Images of Solar Modules", *Solar Energy* (2022)
- T. Mousavi, **X. Chen**, et al., C. R. M. Grovenor. "Fabrication of $\text{Li}_{1+x}\text{Al}_x\text{Ge}_{2-x}(\text{PO}_4)_3$ thin films by sputtering for solid electrolytes." *Solid State Ionics* (2020)
- Z. Xu, **X. Chen**, et al., H. Zhu. "Anion charge and lattice volume dependent lithium-ion migration in compounds with fcc anion sublattices." *npj Computational Materials* (2020)
- Z. Xu, **X. Chen**, et al., H. Zhu. "Influence of anion charge on Li-ion diffusion in a new solid-state electrolyte, Li_3LaI_6 ." *Chemistry of Materials* (2019)
- **X. Chen**, PV-VISION: <https://github.com/hackingmaterials/pv-vision>
- **X. Chen**, et al., A. Jain "Automated Defect Identification in Electroluminescence Images of Solar Modules", *World Congress on Artificial Intelligence in Materials & Manufacturing* (AIM 2022)
- **X. Chen**, et al., A. Jain "Automatic Crack Segmentation in Electroluminescence Images of Solar Modules and Maximum Inactive Area Prediction", *49th IEEE Photovoltaic Specialists Conference* (49th PVSC)
- **X. Chen**, et al., A. Jain "PVPRO: a software tool and analysis method to extract degradation mechanisms from production data", *NREL Photovoltaic Reliability Workshop* (PVRW 2022)

RESEARCH & PROJECTS

- Optimization of solar module design with interpretable machine learning** June 2022 – Current
- **Exploratory Data Analysis & Feature Engineering** of solar module bill-of-materials (BOM) data
 - Correlating BOM data with solar module degradation using machine learning models (**Random Forest Regressor**, **XGBoost**, etc.)
 - Interpreting black-box models with **SHapley Additive exPlanations (SHAP)** to determine main design factors influencing solar module durability

PV-Vision: an open-source computer vision package

Sep 2019 - Current

- Published the object-oriented-programming (OOP) Python package at PyPI
- Developed **computer vision tools** to do automatic **perspective transform** and cell **cropping**, with accuracy **over 90%**
- Built a **deep learning system** to do automatic detection and segmentation of solar module defects

Automatic defect identification in PV modules

June 2020 - Sep 2021

- Pre-processed field distorted EL images using semantic segmentation with **IoU of 99%**
- Developed **multi-class classification** of defective solar cells with average **F1 score of 0.87/1.00**
- Fine-tuned **object detection model (YOLO)** to track defective cells on PV module
- Analyzed the **statistical influence** of fire damage on a large-scale field EL image dataset (**2.4 million cells**)
- Oral presentation** at *World Congress on Artificial Intelligence in Materials & Manufacturing (AIM 2022)*
- Paper** published at *Journal of Solar Energy*

Automatic crack segmentation and feature extraction of PV modules

Sep 2019 – June 2022

- Fine-tuned a **UNet model** with pretrained **VGG16 backbone** to segment solar cell cracks, with **F1 score of 0.88/1.00**
- Designed algorithms of predicting the worst-case degradation area, with **correlation coefficient of 0.99/1.00**
- Designed algorithms of extracting crack features (e.g., crack length) from EL images
- Oral presentation** and **publication** at *49th IEEE Photovoltaic Specialists Conference (PVSC 49)*
- Paper** invited to publish on *IEEE Journal of Photovoltaics*

Time-series IV parameters extraction and degradation analysis of PV systems

July 2020 - Feb 2021

- Maintaining and developing PV degradation analysis tool *PVPRO*
- Data mining of large-scale PV systems (over **2 million rows**) and extract hidden time series IV parameters
- Oral presentation** at NREL Photovoltaic Reliability Workshop (PVRW 2022)
- Paper** submitted to *Journal of Solar Energy*

Effects of Charge Distribution on Lithium-Ion Diffusivity

Sep 2018 - June 2019

- Simulated a new electrolyte material Li_3MI_6 (M=La, Sc, Y) and analyzed effects of charge distribution on lithium migration with Density Functional Theory (DFT)
- Calculated the diffusion barrier with Nudged Elastic Band (NEB) method and ionic conductivity via Ab-initio Molecular Dynamics Simulation (AIMD)
- Predicted the stability of the electrolyte materials by computing phonon dispersion, phase diagram, band structure and electrochemical window
- Published two papers at *Journal of Chemistry of Materials* and *NPJ Computational Materials*

Fabricating LAGP Thin Films Solid-State Electrolytes

Jul 2018 - Sep 2018

- Fabricate $\text{Li}_{1.5}\text{Al}_{0.5}\text{Ge}_{1.5}(\text{PO}_4)_3$ (LAGP) thin-film electrolytes by magnetron plasmon sputtering
- Optimized the ionic conductivity to 1.24×10^{-4} S/cm, tested by Electrochemical Impedance Spectroscopy (EIS)
- Published a paper at *Solid State Ionics*

SKILLS

- Programming language: Python, JAVA, C++, MATLAB, SQL
- Programming tool: Pytorch, Tensorflow, Scikit-learn, Numpy, OpenCV, Scikit-image, Pandas, Matplotlib, Seaborn, GCP, AWS, Heroku, Docker, Git, VASP

AWARDS/HONORS/SCHOLARSHIPS

- Rong Chang Science and Technology Innovation Scholarship (top 0.2%) Oct 2018
- Honorable Mention in Mathematical Contest in Modeling (the USA) Apr 2018
- 2nd Prize of the Undergraduate Mathematical Contest in Modeling (China) Nov 2017

LEADERSHIP AND ACTIVITIES

Director of Media Center at Student Union, SJTU

May 2016 - Feb 2018

- Designed posters, activity videos, school uniform and mascot, etc.
- Rewarded with Excellent Department and Excellent Director in 2017

Vice Director of Sunlight Project Volunteer Club, SJTU

March 2017 - Sept 2017

- Organized voluntary activities to help children with autism