Xin CHEN

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EDUCATION

University of California, Berkeley; GPA: 3.81/4.00 Sept 2019 - 2024 (expected)
- **Ph.D.** in Material Science & Engineering | Advisor: Dr. Anubhav Jain, Prof. Gerbrand Ceder
- Minor in **Artificial Intelligence** & **Materials Informatics**
- Research: Advancements in Machine Learning for Multi-Scale Inspection and Analysis of Energy Materials

Graduate Certificate in Applied Data Science, University of California, Berkeley
Master of Computer Science, Georgia Institute of Technology (Concurrent) Sep 2023 – 2025 (expected)

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

University of Oxford July 2018 - Sep 2018
- Student researcher in Department of Materials | Advisor: Prof. Chris Grovenor
- Research: Fabrication of solid-state electrolytes

University of California, Berkeley; Summer School; GPA: 4.0/4.0 July 2017 - Aug 2017

WORK EXPERIENCE

Lawrence Berkeley National Lab | Graduate Student Researcher Aug 2019 – Current
- Build machine learning systems and apply data science methods to solar energy research and industry

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 $Li_{1+x}Al_xGe_{2-x}(PO_4)_3$ 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, Li3LaI6." ***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, Multi-layer Perceptron**, *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 $Li_{1.5}Al_{0.5}Ge_{1.5}(PO_4)_3$ (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