

Xin CHEN

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EDUCATION

Graduate

Materials Science and Engineering, University of California, Berkeley Sept 2019 - 2024 (expected)

- **Ph.D. in Computational Material Science**; GPA: 3.82/4.00
- **Graduate Student Research Assistant at Lawrence Berkeley National Lab**
- Research: **Data analytics, computer vision and machine learning in photovoltaic (PV) module degradation**

Graduate Certificate in Applied Data Science, University of California, Berkeley

Undergraduate

Materials Science and Engineering, Shanghai Jiao Tong University (SJTU) Sept 2015 - Jun 2019

- **B.S. (Honor) in Computational Material Science**; GPA: 90/100; Rank: 2/114
- Research: Atomic-scale simulation of lithium-ion batteries

Department of Materials, University of Oxford

July 2018 - Sep 2018

- Student researcher in Department of Materials
- Research: Fabrication of solid-state electrolytes

University of California, Berkeley

July 2017 - Aug 2017

- Summer School; GPA: 4.0/4.0

PUBLICATIONS & CONFERENCES

- **X. Chen**, T. Karin, C. Libby, M. Deceglie, P. Hacke, T. Silverman, A. Jain "Automatic Crack Segmentation in Electroluminescence Images of Solar Modules and Maximum Inactive Area Prediction", *IEEE Journal of Photovoltaics* [Invited paper, Under review]
- **X. Chen**, T. Karin, A. Jain "Automated Defect Identification in Electroluminescence Images of Solar Modules", *Solar Energy* 242 (2022): 20-29.
- T. Mousavi, **X. Chen**, C. Doerrer, B. Jagger, S. C. Speller, 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* 354 (2020): 115397.
- Z. Xu, **X. Chen**, R. Chen, X. Li, H. Zhu. "Anion charge and lattice volume dependent lithium-ion migration in compounds with fcc anion sublattices." *npj Computational Materials* 6, no. 1 (2020): 1-8.
- Z. Xu, **X. Chen**, K. Liu, R. Chen, X. Zeng, H. Zhu. "Influence of anion charge on Li-ion diffusion in a new solid-state electrolyte, Li_3LaI_6 ." *Chemistry of Materials* 31, no. 18 (2019): 7425-7433.
- **X. Chen**, PV-VISION: <https://github.com/hackingmaterials/pv-vision>
- **X. Chen**, T. Karin, A. Jain "Automated Defect Identification in Electroluminescence Images of Solar Modules", *World Congress on Artificial Intelligence in Materials & Manufacturing* (AIM 2022)
- **X. Chen**, A. Jain, et al. "Automatic Crack Segmentation in Electroluminescence Images of Solar Modules and Maximum Inactive Area Prediction", *49th IEEE Photovoltaic Specialists Conference* (49th PVSC)
- **X. Chen**, A. Jain, et al. "PVPRO: a software tool and analysis method to extract degradation mechanisms from production data", *NREL Photovoltaic Reliability Workshop* (PVRW 2022)

RESEARCH & PROJECTS

Data Analytics and Computer Vision in Photovoltaics (PV) Module degradation Sep 2019 - Current
Advisor: [Anubhav Jain](#), Staff Scientist at Lawrence Berkeley National Laboratory

- **PV-Vision: an open-source computer vision package of analyzing electroluminescence (EL) images**

- Combined computer vision algorithms (*e.g.*, Hough Transform, Harris Corner Detection, *etc.*) to do automatic perspective transform of distorted PV module EL images
- Designed algorithms to segment single cell images from PV module images, with accuracy **over 90%**
- Integrated with deep learning model inference
- Published the package at **PyPI**
- **Automatic defect identification pipeline for PV modules**
 - Developed semantic segmentation model (UNet) to pre-process of field EL images with **IoU of 99%**
 - Developed classification models (ResNet18, ResNet50, ResNet152) to do multi-class classification of defective solar cells with average **F1 score of 0.87**
 - Fine-tuned object detection model (YOLO) to track defective cells on PV module
 - Applied this automatic pipeline to large-scale field EL image dataset (**2.4 million cells**) and found an abnormal growth of one defect (striation defect)
 - **Oral presentation** at *World Congress on Artificial Intelligence in Materials & Manufacturing (AIM 2022)*
 - **Paper** published at *Journal of Solar Energy*
- **Automatic crack segmentation of PV modules and worst-case degradation area prediction**
 - Fine-tuned semantic segmentation CNN model (UNet) with pretrained VGG16 backbone to extract cracks on solar cells, with **F1 score of 0.88**
 - Designed algorithms of predicting the worst-case degradation area, with **Pearson correlation coefficient of 0.987**
 - **Oral presentation** at *49th IEEE Photovoltaic Specialists Conference (PVSC 49)*
 - **Paper** invited to publish on *IEEE Journal of Photovoltaics*
- **Automatic time-series IV parameters extraction and degradation analysis of large-scale PV systems**
 - Maintaining and developing PV degradation analysis software *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** being drafted

SKILLS

- Programming language: Python / JAVA / C++ / MATLAB / SQL
- Programming package: Pytorch / Scikit-learn / OpenCV / Scikit-image / Pandas / Matplotlib / Seaborn / Numpy

AWARDS/HONORS/SCHOLARSHIPS

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

LEADERSHIP AND ACTIVITIES

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|---|------------------------|
| Director of Media Center at Student Union, SJTU | May 2016 - Feb 2018 |
| <ul style="list-style-type: none"> ○ 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 |
| <ul style="list-style-type: none"> ○ Organized voluntary activities to help children with autism | |