Xin CHEN

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EDUCATION

Graduate

Materials Science and Engineering, University of California, Berkeley Sept 2019 - Jun 2024

- Ph.D. in Computational Materials Science (Expected Jun 2024); GPA: 3.82/4.00
- Graduate Student Research Assistant at Lawrence Berkeley National Lab
- Minor field: Computer Science
- Research: Data analytics, computer vision and machine learning in photovoltaic (PV) module degradation

Undergraduate

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

- B.S. (Honor) in Materials Science and Engineering; GPA: 90/100; Rank: 2/114
- Research: DFT 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

RESEARCH EXPERIENCE

Data Analytics and Deep Learning in PV Module degradation Sep 2019 - Current

Advisor: Anubhav Jain, Staff Scientist at Lawrence Berkeley National Laboratory
Co-advisor: Gerbrand Ceder, Professor at Materials Science and Engineering, UC Berkeley

- **Automatic identification of defects on PV modules**

- Designed perspective transform tool with semantic segmentation model (UNet) to pre-process of field electroluminescence (EL) images
- Developed classification and object detection CNN models (ResNet, YOLO) to identify defects (crack, solder disconnection, etc.) on solar cells
- Published a computer vision Python package *PV-Vision*
- Applied *PV-Vision* on large-scale field EL images to investigate spatial distribution of defects on PV modules and found an abnormal formation of one defect (striation defect)
- Oral presentation at World Congress on Artificial Intelligence in Materials & Manufacturing (AIM 2022)
- Paper submitted.

- **Automatic crack segmentation of PV modules and worst-case degradation area prediction**

- Developed semantic segmentation CNN model (UNet) to extract cracks on solar cells
- Designed algorithms of predicting the worst-case degradation area
- Presentation at NREL Photovoltaic Reliability Workshop (PVRW 2022)
- Paper being drafted

- **Automatic time-series IV parameters extraction and degradation analysis of large-scale PV systems**

- Maintaining and developing PV degradation analysis tool *PVPRO*
- Data mining of large-scale PV systems and extract time series IV parameters to analyze degradation and durability
- Oral presentation NREL Photovoltaic Reliability Workshop (PVRW 2022)
- Paper being drafted

Effects of Charge Distribution on Lithium-Ion Diffusivity Sep 2018 - June 2019

Advisor: Hong Zhu, Associate Professor at University of Michigan-SJTU Joint Institute

- Simulated electrolyte material Li_3MI_6(M=La, Sc, Y) and predicted a general rule of 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

Advisor: Chris Grovenor, Professor at Department of Materials, Oxford University

- Fabricate $Li_{1.5}Al_{0.5}Ge_{1.5}(PO_4)_3$ (LAGP) thin-film electrolytes by magnetron plasmon sputtering
- Conducted X-ray Diffraction (XRD) to determine the structure of the electrolytes, the Scanning Electron Microscope (SEM) and Energy Dispersive Spectrometer (EDS) to characterize the morphology and composition of the films
- Optimized the ionic conductivity of the electrolyte to 1.24×10^{-4} S/cm, tested by the Electrochemical Impedance Spectroscopy (EIS)
- Published a paper at *Solid State Ionics*

PUBLICATIONS & PRESENTATIONS

- **X. Chen**, Anubhav Jain "Automated Defect Identification in Electroluminescence Images of Solar Modules", World Congress on Artificial Intelligence in Materials & Manufacturing (AIM 2022, to be held in April)
- **X. Chen**, Anubhav Jain, et al. "PVPRO: a software tool and analysis method to extract degradation mechanisms from production data", NREL Photovoltaic Reliability Workshop (PVRW 2022)
- **X. Chen**, PV-VISION: https://github.com/hackingmaterials/pv-vision
- Xu, Zhenming, **Xin Chen**, Ke Liu, Ronghan Chen, Xiaoqin Zeng, and Hong Zhu. "Influence of anion charge on Li-ion diffusion in a new solid-state electrolyte, Li3LaI6." *Chemistry of Materials* 31, no. 18 (2019): 7425-7433.
- Mousavi, T., **X. Chen**, C. Doerrer, B. Jagger, S. C. Speller, and 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* 354 (2020): 115397.
- Xu, Zhenming, **Xin Chen**, Ronghan Chen, Xin Li, and Hong 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.

SKILLS

- Programming and Software: Python / JAVA / C++ / MATLAB / Pytorch / Scikit-learn / OpenCV / Pandas / VASP / Materials Studio / VESTA, etc.
- Experimental skills: Magnetron plasmon sputtering, X-ray Diffraction, Electrochemical Impedance Spectroscopy, etc.

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