

# Changyu Deng

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## EDUCATION

- Aug. 2018–present **University of Michigan, Ann Arbor**  
PhD Candidate, Mechanical Engineering, Focus: Battery design and modeling GPA: 4.00/4.00  
◦ Master of Science in Engineering, Electrical and Computer Engineering – Computer Vision  
◦ Master of Science in Engineering, Mechanical Engineering – Energy (conferred in Apr. 2020)
- Aug. 2014– **Xi'an Jiaotong University (China)**  
Jun. 2018 B. Eng., Energy and Power Engineering & B. Eco., Economics GPA: 4.01/4.30 Ranking: 1/113

## PUBLICATIONS

- Preprint **C. Deng** and W. Lu, A Facile Process to Make Phosphorus-doped Carbon Xerogel as Anode for Sodium Ion Batteries, *arXiv:2009.13056*
- Article **C. Deng** et al., Integrating Machine Learning with Human Knowledge, *iScience*, 2020, 101656
- Abstract **C. Deng** and W. Lu, Doping Phosphorus in Carbon Xerogel via Vaporization for Sodium Ion Batteries, *238th Electrochemical Society Meeting*, Honolulu, Hawaii, USA, 2020
- Article **C. Deng** and W. Lu, Measuring Consistent Diffusivity from Galvanostatic Intermittent Titration Technique and Electrochemical Impedance Spectroscopy, *J of Power Sources*, 2020, 473, 228613
- Proceeding **C. Deng** and W. Lu, Geometry Optimization of Porous Electrode for Lithium-Ion Batteries, *ECS Transactions*, 2020, 97(7), 249
- Preprint **C. Deng**, et al., Self-Directed Online Machine Learning for Topology Optimization, *arXiv:2002.01927*
- Article **C. Deng**, et al., Numerical Study on Equilibrium Stability of Objects in Fluid Flow — A Case Study on Constructal Law, *Case Studies in Thermal Engineering*, 2019, 100539
- Article M. Li, Z. Qin, Y. Cui, C. Yang, **C. Deng**, et al., Ultralight and Flexible Monolithic Polymer Aerogel with Extraordinary Thermal Insulation by A Facile Ambient Process, *Advanced Materials Interfaces*, 2019, 1900314
- Preprint **C. Deng**, et al., Thermal Conductivity of 1,2-Ethenediol and 1,2-Propanediol Binary Aqueous Solutions at Temperature from (253 to 273) K, *arXiv:1711.07189*
- Article **C. Deng**, et al., Development of a Vapor Pressure Measuring Apparatus for Experimental Teaching, *Research and Exploration in Laboratory*, 2018, 37(07):69-71+86

## RESEARCH EXPERIENCES

- Sep. 2019–present **Solid State Electrolyte Diffusion Enhancement by Electromagnetic Wave**  
◦ Tried to increase diffusivity of solid state electrolyte by imposing an electromagnetic wave for resonance.  
◦ Simulated scholastic resonance between diffusion and electromagnetic wave by Fokker-Planck equation.  
◦ Calculated diffusivity from conductivity measured by electrochemical impedance spectroscopy (EIS).
- Jun. 2019–present **Self-Supervised Object Detection Algorithm for Autonomous Driving**  
◦ Reduced the amount labeled data by making use of unlabeled data via semi-supervised learning.  
◦ Trained an encoder on all data to enforce consistency after augmentation and a detector on labeled data.  
◦ Tested on multiple datasets such as Pascal VOC to demonstrate improved performance.

- Jun. 2019– **Gradient-Free Battery Optimization Algorithm**  
 present
  - Reduced the number of trials (queries) in simulation or experiment for parameter optimization.
  - Chose parameter configurations by a machine learning model trained on existing cycling data.
  - Considered early-stopping and asynchronous parallelism during cycling.
- Mar. 2019– **Modeling and Parameterization of Li-ion Batteries**  
 Mar. 2020
  - Aimed at a calibrated model to analyze and predict the degradation of graphite/NMC cells.
  - Considered SEI, lithium plating, solvent oxidation and NMC particle cracks.
  - Obtained the physical parameters used in the model by experiment and fitting.
- Aug. 2018– **Synthesis of Phosphorus Anode for Sodium-ion Batteries**  
 Aug. 2020
  - Synthesized sodium ion batteries with phosphorus as the anode active material.
  - Condensed red P in carbon skeleton with low cost.
  - Maintained 90% capacity after 100 cycles at 1.5A/g (based on P).
- Jul. 2017– **Preperation of PVC Aerogel and Its Thermal Conductivity**  
 Sep. 2017
  - Discovered a universal method to prepare aerogel and applied this method to PVC (polyvinyl chloride).
  - Obtained samples with high porosity (94%) and low thermal conductivity ( $4 \text{ mW} \cdot \text{m}^{-1} \text{K}^{-1}$  in vacuum).
  - Received *CSST Award* in recognition of outstanding research and presentation skills.

## SERVICE AND LEADERSHIP

- Nov. 2020– **Student Representative, Graduate Admission Committee, U of M**  
 present The only student in the committee and the first in history. Working with faculty on mechanical engineering department admission process.
- Jan. 2019– **Prestigious Member, Tau Beta Pi Engineering Honor Society, U of M**  
 present Led and participated in teaching K-12 kids, tutoring undergraduate students and assisting a shelter center for those impacted by domestic violence or sexual assault.
- Jun. 2016– **Vice President, Table Tennis Association, XJTU**  
 Jun. 2017 In charge of income and expenditure of the association; organized several matches.
- Jun. 2015– **Head, Social Service Department of Student Union, XJTU**  
 Jun. 2016 Organized service events, managed volunteers' database, and protected the benefits of volunteers; personally participated in about 300 hours of service activities.

## SKILLS

- Experimental Electrode preparation, Coin cell assembly, CVD, Characterization: SEM, XRD, EDS, EIS, GITT
- Software COMSOL Multiphysics (li-ion battery, electrochemistry, optimization), SolidWorks, AutoCAD, L<sup>A</sup>T<sub>E</sub>X, 3ds Max, Cinema 4D, Adobe Photoshop/Premiere/Illustrator
- Programming Python (PyTorch for machine learning), MATLAB, C, Fortran, Shell script

## HONORS AND AWARDS

- Oct. 2020 ME Rising Star (by MIT, Stanford & Berkeley, based on research, service and teaching)
- Jan. 2018 Xiaoping-Seagate Scholarship (in recognition of technology innovation)
- Nov. 2017 National Scholarship of China (2%, also received in 2015 and 2016)
- Sep. 2017 UCLA CSST Award (20%, in a summer research program, gave a speech at the closing reception)
- Oct. 2017 Outstanding Student Award (10 undergrads per year in XJTU)
- Dec. 2016 Outstanding Student Cadre (3%, also received in 2015)
- Feb. 2016 Meritorious Winner in the Interdisciplinary Contest in Modeling
- Oct. 2016 Best Design Award in Honda Eco-Mileage Challenge (1/149)