Joseph D. Kern

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Education

PhD in Materials Science and Engineering expected May 2025, 4.0 GPA
Georgia Institute of Technology, Atlanta, GA

B.S. in Materials Science and Engineering May 2020, 3.841 GPA
B.S. in Computer Science May 2020, 3.841 GPA
University of Wisconsin-Madison, Madison, WI

Associate Degree in Arabic March 2016, 3.9 GPA
Defense Language Institute Foreign Language Center, Monterey, CA

Associate Degree with an emphasis in Math and Physics May 2014, 4.0 GPA
Normandale Community College, Bloomington, MN

Technical Skills

- Extensive experience with C, MATLAB, HTML/CSS, and Python
- Experience with JavaScript, Java, Flask, Qt5, and OpenCV
- Arabic (Native proficiency)

Research Experience

Graduate Research Assistant, Georgia Institute of Technology, Atlanta, GA
Dept. of Materials Science, Aug 2020 – Present

- Utilize and improve genetic algorithm to design hypothetical polymers for high-temperature capacitor applications
- Create neural network to predict the solubility of polymers in solvents
- Design and deploy backend interface for polymer retrosynthetic planning via Flask
- Refactor and speed up polymer fingerprinting code
- Automate polymer data web scraping with Selenium

Research Assistant, University of Wisconsin-Madison, Madison, WI
Dept. of Materials Science, May 2019 – May 2020

- Created graphic user interface to facilitate utilization of machine learning algorithms for other users
- Developed python programs to dramatically increase the speed of data cleaning projects
- Generated tens of thousands of hypothetical perovskites with python and pymatgen
- Utilized gradient boosted, kernel ridge, and random forest regression to predict bandgaps of hypothetical perovskites

Research Assistant, University of Wisconsin-Madison, Madison, WI
Dept. of Engineering Physics, March 2017 – May 2020

- Extensive experience using Scanning Electron Microscopes (SEM) for imaging
- Utilized Energy Dispersive X-ray Spectroscopy (EDS) to quantify elemental makeup of alloys
- Performed nanoindentation on materials to characterize hardness of oxide patches and intermetallic compounds
- Utilized a Focused Ion Beam (FIB) to cross section micron sized oxide patches
- Took Atomic Force Microscope (AFM) images to quantify roughness of wear patches and oxidized super alloys
- Programmed a multifunctional data mapping application in MATLAB to analyze EDS data
- Hand and machine polished dozens of Incoloy 800HT and Inconel 617 samples
- Used Glow Discharge Optical Emission Spectroscopy to quantify elemental depth compositions in surface treated super alloys

Military Experience

Cryptological Linguist, Minnesota National Guard, Bloomington, MN
Bloomington Army National Guard Armory, November 2013 – November 2019

- Achieved native proficiency in Modern Standard Arabic
- Squad leader of four soldiers
- Subject matter expert for signals analysis

Publications

- J. Kern, V. Pauly, M. Clark, D. Grierson, and K. Sridharan, "Effects of Aluminization Via Thermo-Chemical Diffusion on the Wear Behavior of Structural Materials for High-Temperature Gas-Cooled Reactors," *Metall Mater Trans A*, Apr. 2021, doi: 10.1007/s11661-021-06236-2.
- V. Pauly, J. Kern, M. Clark, D. S. Grierson, and K. Sridharan, "Wear Performance of incoloy 800HT and inconel 617 in various surface conditions for high-temperature gas-cooled reactor components," *Tribology International*, vol. 154, p. 106715, Feb. 2021, doi: 10.1016/j.triboint.2020.106715.
- V. Pauly *et al.*, "High-temperature tribological behavior of structural materials after conditioning in impure-helium environments for high-temperature gas-cooled reactor applications," *J. Nucl. Mater.*, vol. 522, pp. 311–323, 2019.

Publications under review

- J. Kern *et al.*, "Design of Polymers for Energy Storage Capacitors Using Machine Learning and Evolutionary Algorithms"

Honors and Awards

National Defense Science and Engineering Graduate Fellowship 2021 Awardee

- Competitive fellowship only Awarded to 158 applicants out of approximately 3,000 (5%).

Theodore Herfurth Award: Comprehensive Undergraduate Excellence Honorable Mention

- Awarded for founding a club dedicated to the analysis of ethics in materials science, excelling in academics, and for two speeches in given front of committee members.

Three Army Achievement Medals

- Received highest score language score possible upon graduating from the Defense Language Institute.
- Graduated with a 95% grade point average, maximized physical training test, and excelling before a board of noncommissioned officers at advanced individual military training.
- For leading 59 other soldiers at basic combat training.

Distinguished graduate at Military Basic Combat Training

- Acted as platoon guide of 59 other soldiers and achieved a perfect score on the army physical fitness test.

STEM Scholarship from Normandale Community College for academic achievement in Math and Physics

- Presented to one student per year who has excelled in mathematics and physics.

Organization Memberships

Founder and Head of Data Analytics Section of Citizens Climate Lobby
Georgia Institute of Technology Chapter
Aug 2020 – Present

Founder and Head of Materials Ethics Club
University of Wisconsin-Madison
April 2019 – May2020

Member of Student Leadership Advisory Council
University of Wisconsin-Madison
Aug 2019 – May 2020