

Jack Fredrick

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Education

University of Tennessee College of Engineering (GPA: 3.99/4.00) Knoxville, TN
M.S. Materials Science and Engineering Expected May 2024
B.S. Materials Science and Engineering (Honors) Graduated May 2023

University of Colorado College of Engineering & Applied Science (GPA: 3.85/4.00) Boulder, CO
Transferred to UTK for Spring 2020 Semester to pursue Materials Science and Engineering Fall 2019

Relevant Coursework

- Principles/Processing of Metallic Materials
- Mechanical Behavior of Materials I
- Applied Statistics and Numerical Methods for Materials Scientists and Engineers
- Thermodynamics of Materials
- MATLAB, Mathematica, Microsoft Office

Relevant Work Experience

University of Tennessee College of Engineering Knoxville, TN
Graduate Assistant in Materials Science and Engineering August 2023 - Present

- Collaborating with NASA to determine novel aluminum-cerium alloying compositions
- Utilizing SEM imaging and image analysis software to quantitatively analyze aluminum alloy microstructures
- Discerning material properties via Vickers microhardness and X-ray diffraction

University of Tennessee College of Engineering Knoxville, TN
Undergraduate Researcher for Fulton Bellows, LLC May 2021 - Present

- Microstructural analysis of metal bellows for the aerospace and automotive applications
- Conducting comprehensive analysis of bellows microstructures using SEM and optical microscopy techniques; identifying structural defects, grain boundary corrosion, and phase compositions, informing material optimization strategies for enhanced mechanical properties
- Fractography and metallography of 316-L steel, nickel alloys, phosphor bronze, and brass, which require mounting, grinding, polishing, and etching samples for analysis

Y-12 National Security Complex Oak Ridge, TN
Intern for the Mechanical Patrol and Sensor Systems Development group May 2022 - July 2022

- Created an operating procedure for defect detection software in additive manufacturing instruments
- Prepared and analyzed melt pool of samples formed via laser powder bed fusion
- Developed a macro in ImageJ for measuring and annotating micrographs of melt pool samples
- Maintained active security clearance (DOE Q)

University of Tennessee College of Engineering Knoxville, TN
Undergraduate Researcher at Center for Renewable Carbon August 2020 - December 2020

- Researched properties and applications of lignin for renewable/recyclable solutions
- Tabulated infrared spectroscopy data for determining quality of electrospun lignin fibers

Project

Geodesic Dome Design, American Society for Metals Domesday Competition

- Designed a geodesic dome in Fusion 360 for 3D printing
- Utilized investment casting to create an aluminum dome from the printed structure
- Tempered and Anodized aluminum for improved mechanical properties and aesthetics

Student Activities

- Tau Beta Pi (Engineering Honor Society) September 2021 - Present
- Material Advantage (Materials Science Society) April 2021 - Present
- Blacksmithing Club (University of Tennessee) August 2021 - Present

Awards

- Volunteer of Distinction April 2023
- Top Collegiate Scholar/Top Graduate April 2023
- Tau Beta Pi Scholarship 2022 - 2023
- Raymond A. Buchanan Award for Outstanding Junior - College of Engineering May 2022
- Barry Goldwater Scholarship Finalist 2022
- Racheff Scholarship - College of Engineering 2020 - Present
- ASM International Domesday – Runner-up and Best in Destruction - National Geodesic Dome Competition 2022
- ASM International Domesday – Runner-up in Design/Category and Structural Integrity 2023