Christopher Kniss

Amherst, MA | chris@ckniss.net | linkedin.com/in/christopher-kniss

EDUCATION

Bachelor of Science in Materials Science and Engineering **Expected May 2026**
University of Massachusetts Amherst *Amherst, MA*
- GPA: 3.85/4.0
- Relevant Coursework: Thermodynamics of Materials, Phase Transformations, Mechanical Behavior of Materials, Crystallography, Electronic Materials, Polymer Science

WORK EXPERIENCE

Undergraduate Research Assistant **June 2024 – Present**
Advanced Materials Laboratory, UMass Amherst *Amherst, MA*
- Conduct research on temperature-compensated piezoelectric materials under Prof. Sarah Mitchell
- Synthesize and characterize lead-free piezoelectric ceramics using solid-state reaction methods
- Perform X-ray diffraction analysis and scanning electron microscopy to evaluate crystal structure and microstructure
- Measure dielectric and piezoelectric properties using impedance analyzer and Berlincourt d33 meter
- Co-authored publication on bismuth sodium titanate-based composites (under review)

Materials Engineering Intern **May 2023 – August 2023**
TechCeramics Inc. *Worcester, MA*
- Assisted in development of high-temperature ceramic fiber materials for aerospace applications
- Conducted thermal stability tests on alumina-silica fiber samples up to 1500°C
- Performed tensile strength measurements and analyzed failure mechanisms using fractography
- Prepared technical reports documenting material properties and manufacturing process improvements
- Collaborated with senior engineers to optimize sintering parameters for improved fiber density

Teaching Assistant – Introduction to Materials Science **January 2024 – May 2024**
Department of Materials Science, UMass Amherst *Amherst, MA*
- Assisted with laboratory sessions for 60 undergraduate students in introductory materials science course
- Conducted weekly office hours to support students with homework and exam preparation
- Graded lab reports and provided detailed feedback on experimental techniques and data analysis

RESEARCH ACTIVITY

Temperature-Compensated Piezoelectric Materials June 2024 – Present
- Investigating bismuth sodium titanate (BNT)-based solid solutions for sensor applications requiring stable performance across wide temperature ranges
- Developing processing protocols to achieve phase-pure materials with controlled grain size
- Characterizing temperature-dependent properties including dielectric constant, piezoelectric coefficient, and electromechanical coupling factor

Ceramic Fiber Reinforcement Mechanisms May 2023 – August 2023
- Studied microstructural evolution in alumina-silica fibers during high-temperature exposure
- Analyzed phase transformation and grain growth kinetics using differential scanning calorimetry and XRD
- Correlated microstructural changes with mechanical property degradation

PUBLICATIONS

Temperature-Compensated Piezoelectric Properties in Bismuth Sodium Titanate-Based Ceramics
C. Kniss, A. Rodriguez, S. Mitchell
Journal of Materials Chemistry C (under review, 2024)

Thermal Stability and Mechanical Properties of Alumina-Silica Ceramic Fibers for High-Temperature Applications
M. Chen, C. Kniss, R. Patel, J. Liu
Ceramics International, vol. 49, pp. 15234–15242 (2023)

SKILLS

Characterization Techniques: X-ray diffraction (XRD), scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDS), differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), impedance spectroscopy, mechanical testing
Processing Methods: Solid-state synthesis, powder processing, sintering, tape casting, sol-gel processing
Software: MATLAB, Origin, ImageJ, JADE (XRD analysis), SolidWorks, Microsoft Office Suite
Laboratory Skills: Powder preparation and handling, pellet pressing, furnace operation, sample preparation for microscopy, cleanroom procedures

AWARDS & HONORS

Dean's List Fall 2022, Spring 2023, Fall 2023, Spring 2024
University of Massachusetts Amherst
Materials Research Society (MRS) Undergraduate Scholarship 2024
Awarded to outstanding undergraduate students pursuing materials science research
STEM Excellence Scholarship 2022 – 2026
University of Massachusetts Amherst
Second Place – Undergraduate Poster Competition April 2024
UMass Amherst College of Engineering Research Symposium