Henry Price

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EDUCATION

Massachusetts Institute of Technology – *Cambridge, MA*

PhD Materials Science & Engineering 2024 – Present

Lehigh University - *Bethlehem, PA*

1 year of graduate coursework & research in Materials Science & Engineering 2023 – 2024

B.S. Materials Science & Engineering, High Honors 2019 – 2023

B.A. Earth & Environmental Science, High Honors 2019 – 2023

FELLOWSHIPS & AWARDS

NSF Graduate Research Fellowship 2023–2028

- Five year fellowship, three years of annual $37k stipend & $16k tuition support (2024-27)

Tau Beta Pi National Engineering Honor Society Scholarship 2022–2023

- $2k for senior undergraduates based on academic, extracurricular & career achievement

IMAT 2022 Conference, International Metallographic Society Poster Contest 1st Place 2022

- $500 award for in-person poster presentation at international conference

Lehigh MSE Department Undergraduate Research Symposium Awards 2021, 2022

- 2021 Largest Scientific Impact, 2022 Best Overall Presentation, totalling $400

Handwerk Prize, Noah A. Kahn Memorial Award, Ken Tarby Prize, Good Samaritan Award 2021–2023

- MSE & EES department awards for outstanding achievement, totalling $2,310

RESEARCH EXPERIENCE

Area-Selective Atomic Layer Deposition **2023 – 2024**

Graduate Researcher – PI: Nicholas Strandwitz *Lehigh University, Bethlehem, PA*

- Intel sponsored collaborative project with University of Missouri Kansas City (PI: Michelle Paquette)
- Performed a comprehensive study on alkanethiol self-assembled monolayers for blocking of alumina and hafnia atomic layer deposition. Characterized films with x-ray photoelectron spectroscopy. Determined deposition temperature constraints and investigated desorption mechanism. Manuscript in progress

Deep Sea Hydrothermal Vent Geochemistry **2022 – 2024**

Undergraduate Researcher, Senior Thesis – PI: Jill McDermott *Lehigh University, Bethlehem, PA*

- Two research cruises aboard R/V Atlantis, science dive in human occupied submersible ALVIN
- Senior thesis & presentation on hydrothermally altered basalt.
- Used SEM, EDS and LOM to analyze geochemistry of basaltic breccias from 9°N East Pacific Rise to determine how hydrothermal alteration affects mineralogy and petrology. Manuscript in progress

3D Printing of Polymer Derived Ceramics **Jun. – Aug. 2022**

NSF PIRE Fellow – PI: Himanshu Jain *IEM, Montpellier, France*

- International internship, presentation at annual NSF PIRE PDC conference in Austria.
- Studied the impact of sacrificial and structural fillers on the printability, morphology and porosity of SiOC 3D resin printed PDCs. Helped synthesize and test novel UV-curable resin chemistries.

Anodized Aluminium Die-Cast Alloy Design **Jan. – Dec. 2022**

Capstone Team Leader – Company: Apple *Lehigh University, Bethlehem, PA*

- Yearlong project leading interdisciplinary team of five students, presented to industry liaisons.
- Designed and cast novel Al-Mg-Si alloys, subjected to heat treatments. Tested microhardness, tensile strength, anodizability. Characterized with SEM, EDS and LOM image fraction analysis.

High Temperature Steel & Ceramic Corrosion **Aug. 2021 – May 2022**

Undergraduate Researcher – PI: Animesh Kundu *Lehigh University, Bethlehem, PA*

- Part time work during academic semester on NSF & state funded industry/academia project.
- Used a tube furnace system to test how molten salt chemistries impact alloy and ceramic lifespans for renewable energy systems. Characterized corrosion surfaces with SEM.

Uniaxially Pressed Optical Spinel Ceramics **Jun. – Aug. 2021**

NSF REU Fellow – PI: Masashi Watanabe *Lehigh University, Bethlehem, PA*

- NSF funded research internship, symposium presentation and poster.
- Fabricated Y-doped $MgAl_2O_4$ spinel, tested microhardness, analyzed microindentation crack propagation behavior with SEM to determine the influence of doping on material toughness

Low Energy Ion Scattering Simulations of ALD Thin Films **Jun. – Dec. 2020**

Undergraduate Researcher – PI: Nicholas Strandwitz *Lehigh University, Bethlehem, PA*

- Remote summer research internship, 2nd author on published manuscript
- Utilized Monte-Carlo based TRBS simulations of LEIS spectra of to help determine nucleation mechanics of ALD MoO_X thin films.

PUBLICATIONS

- "Stability and Selectivity of 6, 12 and 18 Carbon Chain Length Alkanethiol Self-Assembled Monolayers on Cu for Area Selective Deposition of Alumina and Hafnia"; **H. Price**, V. Vemuri, M. Paquette, N. Strandwitz *(in preparation)*
- "Using Dodecanethiol Self-Assembled Monolayers for Inhibiting the Atomic and Molecular Layer Deposited Al and Hf chemistries on Cu"; V. Vemuri, **H. Price**, B. Garland, E. Hendrix, M. Nigohosian, M. Paquette, N. Strandwitz *(in preparation)*
- "Analysis of Hydrothermally Altered Basalt at 9°50'N East Pacific Rise"; **H. Price**, J. Siverand, B. Idleman, D. Fornari, J. McDermott *(in preparation)*

- "Surface Characterization of Ultrathin Atomic Layer Deposited Molybdenum Oxide Films Using High-Sensitivity Low-Energy Ion Scattering"; R. Singhania, **H. Price**, V. Kounga, B. Davis, P. Brüner, R. Thorpe, D. Hynek, J. Cha, N. Strandwitz; Journal of Vacuum Science & Technology A, 39, 063210, 2021 https://doi.org/10.1116/6.0001164

PRESENTATIONS

American Geophysical Union Conference, San Francisco, California Dec. 2023

- **Poster:** "Analysis of Hydrothermally Altered Basalt at 9°50'N East Pacific Rise"

Earth & Environmental Science Dept. Undergraduate Research Symposium May 2023

- **Presentation,** Honors Thesis: "Geochemical Comparison of Altered and Unaltered Basalts in M Vent Stockwork at 9°50'N EPR

Lehigh Engineering Capstone Final Presentation, Apple Dec. 2022

- **Virtual Group Presentation:** "Aluminum Die Cast Alloy Design"

IMAT Conference, New Orleans, Louisiana Sep. 2022

- **Poster:** "Chick Magnet – Sounds From a Chevy Subwoofer, Metallographic Analysis of a Ferrite Magnet" (Awarded 1st place International Metallographic Society Poster Contest)

Materials Science & Engineering Dept. Undergraduate Research Symposium Sep. 2022

- **Presentation:** 3D-Printing of SiOC Polymer Derived Ceramics (Awarded Best Overall Presentation)

NSF PIRE PDC MATCOM-COMMat Workshop, Hirshegg, Austria Aug. 2022

- **Presentation:** 3D-Printing of SiOC Based Polymer Derived Ceramics

Lehigh University Undergraduate Engineering Research Symposium Apr. 2021

- **Poster:** Influence of Elemental Doping on Microstructural and Mechanical Properties in Polycrystalline Spinel

Materials Science & Engineering Dept. Undergraduate Research Symposium Sep. 2021

- **Presentation:** "Study of Uniaxially Pressed Y-Doped $MgAl_2O_4$ Spinel by SEM and Microhardness" (Awarded Largest Scientific Impact)

LEADERSHIP POSITIONS

President - *Lehigh University Outing Club* 2022-2023

- Managed largest campus student organization, with 30+ outdoor trips a semester
- Awarded LU Club of the Year '23, individual University Allegiance Award for service to organization

Vice President – *Student Materials Society* 2022-2023

- Organized departmental events, served as representative of undergraduate MSE students

Student Representative – *American Society of Metallurgy, Lehigh Valley Chapter* 2022-2023

- Assisted in planning local networking/educational events at monthly chapter meetings

Rossin Junior Fellow – *P.C. Rossin College of Eng. & Applied Science* 2021-2023

- Mentored first & second year engineering students, provided academic & professional guidance

Eagle Scout - *Boy Scouts of America* 2019

- Organized & led volunteers on a 200+ hour community service project planting native tree species

FIELDWORK EXPERIENCE

Scientist – *Research Vessel Atlantis* 2023, 2024

- Monthlong cruises AT50-07 in 2023 and AT50-21 in 2024, both to EPR hydrothermal vent field
- ALVIN HOV submersible dive 5242 to a depth of 2559m

Teaching Assistant – *Lehigh University EES Field Camp* June 2024

- Assisted in teaching principles of field geology across Western US (WI, MN, SD, WY, ID), with topics including geologic mapping, stratigraphy, volcanic rocks, active tectonics, metamorphic core complexes, glacial, alluvial and fluvial landforms.
- Spent 1 month driving equipment truck, setting up camps, cooking, etc.

TECHNICAL SKILLS

Instrumentation/methods: Scanning electron microscopy (SEM), energy dispersive x-ray spectroscopy (EDS), x-ray photoelectron spectroscopy (XPS), atomic layer deposition (ALD), water contact angle (WCA), metallographic sample preparation (casting, sectioning, mounting , grinding, polishing), anodization, light optical microscopy, image fraction analysis, microhardness testing, tube furnaces, vacuum systems, 3D printing, Jacob's staff, Brunton compass, basic geologic mapping.

Computer programs: Microsoft Office, MATLAB, Python, ImageJ, casaXPS