

Curriculum Vitae

George Grosvenor Hollyer
Department of Materials Science and Engineering
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EMPLOYMENT

Department of Materials Science and Engineering, University of Pennsylvania

Graduate Research Fellow, 2023-Present

Advisor: Prof. Eric A. Stach

- Developing MEMS-based TEM gas cell for studying heterogenous catalysts in situ at industrial pressures (20+ atmospheres).
- Studying miniband formation and electronic coupling in quantum dot superlattices with Prof. Chris Murray using correlative EELS and cathodoluminescence as a user at Lawrence Berkeley Natl. Lab (SPECTRE STEM).
- Researching Extended Energy Loss Fine Structure (EXELFS) collection and fitting theory to bring synchrotron-like fine-structure analysis to the TEM.

Brookhaven National Laboratory, Upton NY

Office of Science Graduate Student Research (SCGSR) Fellow, May-December 2025

- Host scientist Prof. Anatoly Frenkel (BNL/SBU)
- Gathered data on heterogenous catalyst and quantum dot samples at QAS (XAFS), TES (XAFS) and IOS (in situ XPS) beamlines.
- Performed environmental TEM experimental campaign studying inverse ZnO/Cu/Al₂O₃ and Pt/CeO₂ catalysts at 20 bar on Titan 80-300 ETEM at Center for Functional Nanomaterials.

Nelumbo Inc., Hayward CA

Research Engineer, 2022 – 2023

- Developed nanostructured ceramic coating technology for textile water repellency designed to meet or exceed PFAS-based coatings.
- Scaled process for nanostructured deposit from benchtop to reel-to-reel (m² scale).
- Materials characterization with ICP-OES, FTIR, SEM.
- Chief operator of pilot-scale textiles line. Wrote SOPs and trained personnel on operation.
- Planned and executed experiments to map envelope of acceptable process conditions.

Department of Mechanical Engineering and Applied Mechanics, University of Pennsylvania

Undergraduate Research Assistant, Turner Lab, Summer 2021

- Led project leveraging photoelasticity to study mechanical properties of disordered particle packings.

Advanced Nuclear Materials Group, Oak Ridge National Laboratory (Remote: Covid-19)

SULI Intern, Dr. Lauren Garrison, Summer 2020

- Analyzed and communicated studies of tungsten-steel ultrasonic welding as part of the Dept. of Energy Fusion Energy Sciences program.

Department of Mechanical Engineering and Applied Mechanics, University of Pennsylvania
Undergraduate Research Assistant, Turner Lab, Summer 2019

- Assisted in developing direct ink writing additive manufacturing technology for nano-cellulose.

SKILLS

- Transmission Electron Microscopy (TEM): Aberration-corrected STEM (JEOL NEOARM), EDS, EELS, electron diffraction, 4DSTEM, in-situ gas heating experiments, scripting/APIs
- Focused Ion Beam (FIB): Prep of TEM samples from semiconductor devices, ceramics, alloys using plasma FIB
- Nanoparticle and Quantum Dot (QD) synthesis: colloidal synthesis of metallic core-shell particles, semiconducting QDs
- Rapid prototyping: CAD (SolidWorks, OpenSCAD), laser cutting, 3D printing, part drawings for machining
- Analytical techniques: ICP-OES, FTIR, XRD, tensile testing, nanoindentation, wet lab
- Coding: Python (PyTorch, Hyperspy), Matlab, JMP, LLM fine-tuning (Prime RL)

EDUCATION

Doctor of Philosophy in Materials Science and Engineering – In Progress, 2023-Present
University of Pennsylvania, Philadelphia PA
Advisor: Prof. Eric A. Stach

Bachelor of Science in Engineering – 2022
Materials Science and Engineering
University of Pennsylvania, Philadelphia PA

HONORS AND AWARDS

Office of Science Graduate Student Research Internship – 2025 S2
Ashton Fellowship – 2023
William Graham Technology Innovation Prize – 2022
Penn Engineering Exceptional Service Award – 2022
Dean's List - 2018-2019, 2021-2022 (Dean's List suspended 2019-2021)

PUBLICATIONS

[Google Scholar](#): 44 citations, h-index 2

Refereed Journal Articles

- J1. Hollyer, G. G.; Zakharov, D. N.; Alsem, D. H.; Parkin, C.; Stach, E. A. Nanometer-Scale Resolution in an Ultra-High Pressure Environmental TEM Holder. *MRS Commun.* 2025, 15 (5), 898–905.
<https://doi.org/10.1557/s43579-025-00825-7>.
- J2. Mogas-Soldevila, L.; Duro-Royo, J.; Lizardo, D.; Hollyer, G. G.; Settens, C. M.; Cox, J. M.; Overvelde, J. T. B.; DiMasi, E.; Bertoldi, K.; Weaver, J. C.; Oxman, N. Driving Macro-Scale

Transformations in Three-Dimensional-Printed Biopolymers through Controlled Induction of Molecular Anisotropy at the Nanoscale. *Interface Focus*. 2024, 14 (3), 20230077.

<https://doi.org/10.1098/rsfs.2023.0077>.

- J3. Foucher, A. C.; Yang, S.; Rosen, D. J.; Lee, J. D.; Huang, R.; Jiang, Z.; Barrera, F. G.; Chen, K.; Hollyer, G. G.; Friend, C. M.; Gorte, R. J.; Murray, C. B.; Stach, E. A. Synthesis and Characterization of Core-Shell Cu-Ru, Cu-Rh, and Cu-Ir Nanoparticles. *J. Am. Chem. Soc.* 2022, 144 (17), 7919–7928. <https://doi.org/10.1021/jacs.2c02538>.

Technical Reports

- T1. Garrison, L. M.; Hollyer, G.; Zhong, W.; Norfolk, M.; Wenning, J. *FABRICATION OF ULTRASONIC WELDED FUNCTIONALLY GRADED TUNGSTEN-STEEL LAMINATE*; DOE/ER-0313/68 – Volume 68; Oak Ridge National Laboratory - Fusion Reactor Materials Program, 2020; pp 76–77.

Poster Presentations

- P1. Hollyer, G. Tungsten Ultrasonic Bonding to Steel for Use in Fusion Reactors, 2021. American Nuclear Society Student Conference <https://www.ans.org/meetings/student2021/posters/>.
- P2. Hollyer, G. G.; Zakharov, D. N.; Parkin, C.; Alsem, D. H.; Stach, E. A. Development of a Method to Understand Morphological Changes in Materials at Ultrahigh Pressures Using Electron Microscopy [Poster]; Materials Research Society: Boston, MA, 2024.
- P3. Hollyer, G. G.; Zakharov, D. N.; Parkin, C.; Alsem, D. H.; Stach, E. A. HRTEM at 20 Bar – An Ultra-High Pressure Gas Holder for Catalysis Experiments at Industrial Conditions; Gordon Research Conferences, 2026.

TEACHING

University of Pennsylvania

Teaching Assistant, Energetics of Macro and Nanoscale Materials – 2021

Teaching Assistant, Transmission Electron Microscopy – 2025, 2026

UNIVERSITY SERVICE

University of Pennsylvania

MatSci Makerspace, Founder and Treasurer - 2021-2022