

# Luc N. Capaldi

Ph.D. Candidate and NSF Graduate Research Fellow  
Mechanical Engineering & Applied Mechanics, University of Pennsylvania  
Email ◊ Personal Website ◊ Google Scholar

## EDUCATION

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### University of Pennsylvania

Ph.D. Mechanical Engineering & Applied Mechanics June 2022 – May 2027 (Expected)  
M.S.E. Mechanical Engineering & Applied Mechanics December 2024

### University of Vermont

B.S. Mechanical Engineering May 2022

## RESEARCH POSITIONS

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### Graduate Research Assistant

July 2022 – Present

*Tertuliano Lab, University of Pennsylvania, Philadelphia, PA*

Multiscale fatigue crack initiation in hierarchical additively manufactured materials.

Technical skills: Scanning electron microscopy (SEM), focused ion beam (FIB), *in-situ* nanoindentation, synchrotron X-ray imaging (FXI, Beamline 18-ID, BNL).

Advisor: Ottman A. Tertuliano, PhD

### Undergraduate Research Assistant

October 2019 – June 2022

*Lab for Advanced Nanoscale Mechanics and Microstructures, University of Vermont, Burlington, VT*

Oxidation of nanocrystalline silicon carbide fibers in extreme environments.

Technical skills: Molecular dynamics simulations (LAMMPS).

Advisor: Frederic Sansoz, PhD

## TEACHING EXPERIENCE

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### Graduate Teaching Assistant

September 2023 – December 2025

*University of Pennsylvania, Philadelphia, PA*

MEAM 3540 – Mechanics of Solids (Fall 2023, Fall 2024)

MEAM 3330 – Heat and Mass Transfer (Spring 2024)

### Undergraduate Teaching Assistant

September 2021 – December 2021

*University of Vermont, Burlington, VT*

ME 2110 – Materials Engineering (Fall 2021)

## HONORS AND AWARDS

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| 7. SES Best Scientific Merit Student Poster Award  | 2025 |
| 6. Finalist for Penn Prize for Excellence in Teaching by Graduate Students (1 of 20 finalists) | 2025 |
| 5. Penn Outstanding Teaching Assistant Award in Mechanical Engineering (1 of 2 awardees)       | 2024 |
| 4. Walter L. Conwell Fellowship (1 of 4 awardees)  | 2022 |
| 3. National Science Foundation Graduate Research Fellowship (1 of 2193 awardees)               | 2022 |
| 2. University of Vermont Student Engineer of the Year (1 awardee annually)                     | 2022 |
| 1. Vermont Space Grant Consortium Fellowship (1 of 10 awardees)                                | 2020 |

## PUBLICATIONS

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7. **Capaldi, L. N.**, Ford, J., Fulco, S., Rai, R. K., Yang, W., Ching, S., Stach, E. A., Turner, K. T., Chen, W., & Tertuliano, O. A. (2026). Multiscale fatigue crack initiation in hierarchical additively manufactured alloys. *Proceedings of the National Academy of Sciences*. DOI.
6. Sharma, R., Ching, S., **Capaldi, L. N.**, Chen, K., Xiao, X., & Tertuliano, O. A. (2026). Bone Resists Fatigue Through Crack Deceleration at the Fibril Scale. *Science Advances*, 2nd revision. Preprint.
5. Chen, K., Bolanos-Campos, A., Perez, M. L., Berlew, E., Wang, T., **Capaldi, L. N.**, Tao, R., Mathijssen, A., Boerckel, J. D., & Tertuliano, O. A. (2025). Poroelastic Mechanical Loading Disrupts Cytoskeletal Symmetry in 3D Architected Scaffolds. *Biophysical Journal*. DOI. Commentary.
4. **Capaldi, L. N.**, Yuan, L., Qu, C., Sanchez, D., Carpick, R. W., & Tertuliano, O. A. (2025). High-Throughput Formation of 3D van der Waals Auto-Kirigami. *Nano Letters*. DOI.
3. Tertuliano, O. A., DePond, P. J., Lee, A. C., Hong, J., Doan, D., **Capaldi, L. N.**, Brongersma, M., Gu, X. W., Matthews, M. J., Cai, W., & Lew, A. J. (2024). High absorptivity nanotextured powders for additive manufacturing. *Science Advances*. DOI.
2. **Capaldi, L. N.**, & Sansoz, F. (2023). High-temperature active oxidation of nanocrystalline silicon-carbide: A reactive force-field molecular dynamics study. *Acta Materialia*. DOI.
1. Gendron, I., Savard, K., Capaldi, X., Liu, Z., Zeng, L., **Capaldi, L. N.**, & Reisner, W. (2021). Time-dependent knotting of agitated chains. *Physical Review E*. DOI

## CONFERENCES AND PRESENTATIONS

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5. “High-Throughput Formation of 3D van der Waals Auto-Kirigami.” Invited talk at the Singh Center for Nanotechnology Seminar Series, December 2025, Philadelphia, PA.
4. “High-Throughput Formation of 3D van der Waals Auto-Kirigami.” Poster and presentation at the Fold It. Stretch It. Build it. Shape it: Responsive Materials Meet Intelligence Workshop, December 2025, Philadelphia, PA.
3. “High-Throughput Formation of 3D van der Waals Auto-Kirigami.” Poster and presentation at the Society of Engineering Science (SES) Annual Technical Meeting, October 2025, Atlanta, GA. **Received SES Best Scientific Merit Student Poster Award.**
2. “Spontaneous Assembly of Graphite Auto-Kirigami.” Poster at the Materials Research Society (MRS) Fall Meeting, December 2024, Boston, MA.
1. “Microscale fatigue deformation of additively manufactured nanolamellar alloys.” Poster and presentation at the Society of Engineering Science (SES) Annual Technical Meeting, October 2023, Minneapolis, MN.

## STUDENTS MENTORED

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3. Chufei (Sophie) Li. **Penn Undergraduate Research Mentoring Program**, June – August 2024, 2025. University of Pennsylvania Undergraduate → TSMC summer intern.
2. Alexander Mejia. **Laboratory for Research on the Structure of Matter REU**, June – August 2023. University of Pennsylvania Undergraduate → Mechanical Lead, Penn Hyperloop.
1. Trinity Chandler-Rutling. **Laboratory for Research on the Structure of Matter REU**, June – August 2023. Community College of Philadelphia Student → Drexel University Undergraduate.