Emil Annevelink

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Education

2018 - 2021 **Ph.D.** in Mechanical Engineering — University of Illinois at Urbana-Champaign
Thesis title: Topological defects in single and multi-layer graphene

2016 - 2018 **M.Sc.** in Mechanical Engineering — University of Illinois at Urbana-Champaign
Thesis title: Topological descriptions of grain boundaries in graphene

2012 - 2016 **B.Sc.** in Mechanical Engineering — University of California at Berkeley
Projects/Research: Hyperloop Subsystem Design; INSTAR; SRC Semiconductor Research;

Research Positions

2021 - present **Postdoctoral Research Associate** in Mechanical Engineering — CMU
Advisor: Prof. Venkat Viswanathan; Topic: Machine Learning in Molecular Dynamics.
Managed an ARPA-E project and a DARPA project

2016-2021 **Graduate Research Assistant** in Mechanical Engineering — UIUC
Advisors: Prof. Elif Ertekin and Prof. Harley Johnson; Topic: Topological Defects in 2D Materials

2014-2016 **Undergrad Research Assistant** in the INSTAR project — UCB
Advisors: Dr. Daniel Talancon and Prof. Dennis Lieu; Topic: Flywheel Energy Storage

2015-2016 **Undergrad Research Assistant** in Mechanical Engineering — UCB
Advisor: Prof. Liwei Lin; Topic: EDL Supercapacitors

2014 **Undergrad Research Assistant** — SRC
Program: Starnet; Topic: Characterization of epitaxial layer transfer films

2013 **Research Intern** — Imprint Energy
Advisor: Dr. Christine Ho; Topic: Characterization of battery electrode materials

Teaching Positions

2016 - 2021 **Guest Lecturer** — UIUC
ME 330 Introduction to Materials Science
TAM 451: Intermediate Solid Mechanics

2016 - 2021 **Teaching Assistant** — UIUC
ME 330 Introduction to Materials Science (4 Semesters)
TAM 451: Intermediate Solid Mechanics (1 Semester)

Publications and Conference Presentations

Authors who equally contributed to a publication are marked with a †.

Journal Publications

11. **Annevelink, E.** and Viswanathan, V. 'Differentiable molecular dynamics for efficiently learning classical interatomic potentials' In-Preparation
10. **Annevelink, E.** and Viswanathan, V. 'Comparing uncertainty quantification methods in creating datasets for machine learned interatomic potentials' In-Preparation
9. **Annevelink, E.**† Kurchin, R.† Muckley, E. Kavalsky, L. Hegde, V. Sulzer, V. Zhu, S. Pu, J. Farina, D. Johnson, M. Gandhi, D. Dave, A. Lin, H. Edelman, A. Ramsundar, B. Saal, J. Rackauckas, C. Shah, V. Meredig, B. and Viswanathan, V. 'AutoMat: Accelerated Computational Electrochemical systems Discovery ' In-Press MRS Bulletin

8. **Annevelink, E.** Xu, B. Johnson, H.T. and Ertekin, E. 'Shear-coupling of graphene grain boundaries: elementary mechanisms, effects of topology, and role of buckling' In-Press Acta Materialia

7. **Annevelink, E.** Zhang, Z.J. Dong, G. Johnson, H.T. and Pochet, P. 'A moire theory for probing grain boundary structure in graphene', Acta Materialia, 117156 (2021)

6. Zhu, S. **Annevelink, E.** Pochet P. and Johnson, H. T. 'Selection Rules of Twistronic Angles in 2D Material Flakes via Dislocation Theory', PRB, 103 (11), 115427 (2021)

5. **Annevelink, E.** Johnson, H. T. and Ertekin, E. 'A path to controlled 3D deformation in 2D materials', Current Opinion in Solid State and Materials Science, 25 (2), 100893 (2021)

4. **Annevelink, E.** Ertekin, E. and Johnson, H. T. 'Dislocation Theory of Bilayer Graphene Moiré Superlatices', PRB, 102, 18 184107 (2020)

3. Kim, S. **Annevelink, E.** Han, E. Yu, J. Huang, P Y. Ertekin, E. van der Zande, A. 'Stochastic stress jumps due to soliton dynamics in two-dimensional van der Waals interfaces.' Nano Letters, 20, 2, 1201-1207. (2020)

2. Han, E.[†] Yu, J.[†] **Annevelink, E.** Ertekin, E. Huang, P. van der Zande, A. 'Ultrasoft slip-mediated bending in few-layer graphene.' Nature Materials, 19, 305-309. (2020)

1. **Annevelink, E.** Ertekin, E. and Johnson, H. T. 'Grain boundary structure and migration in graphene via the displacement shift complete lattice', Acta Materialia, 166, pp. 67–74. (2019)

Conference Talks

7. "A topologically derived dislocation theory for twist and stretch moire superlattices in bilayer graphene" USACM Nanomaterials 2021

6. 'Moire engineering for grain boundary design in graphene.' APS March Meeting 2021

5. 'Linear elastic theory of bilayer graphene interlayer dislocations.' Graphene 2020

4. 'Linear elastic theory of bilayer graphene interlayer dislocations.' SES 2020

3. 'Designing Graphene Atomic Structure through Strain Control of Grain Boundaries.' SES 2020

2. 'Linear elastic dislocation theory for interlayer dislocations in bilayer graphene.' SES 2019

1. 'Multiscale Analysis of Grain Boundary Motion in Graphene' MRS Spring 2018

Poster Presentations

4. 'Reactive Machine Learning Interatomic Potentials for SEI formation' Batteries Gordon Research Conference 2022

3. 'Structural Relaxation of Moiré Superlattices via Linear Elastic Dislocation Theory' ICFO-MIT Schools on the Frontiers of Light 2020

2. 'Displacement shift complete (DSC) lattice analysis of grain boundaries in graphene' UIUC Computational Materials Workshop 2017

1. 'Epitaxial Later Transfer of PZT onto STO' Techcon 2014

Honors and Awards

2021	Morphogenic Interface (MINT) Materials Program Lead proposal author	DARPA
2021	XSEDE Research Compute Allocation	NSF
2019-2020	Mavis Future Faculty Fellow	UIUC
2020	Teacher Scholar Certificate	UIUC
2020	Mentoring Certificate	UIUC

2019	Teaching Certificate	UIUC
2017	Graduate Research Fellowship Program Honorable Mention	NSF
2012	Eagle Scout	Boy Scouts of America

Skills

Strong knowledge of the programming language `Python` including `PyTorch` and `JAX`
Working knowledge in `C++`, `Matlab` , `Mathematic` , `Julia`

Service To The Scientific Community

2021 - Present **Organizer**: Scientific Machine Learning Webinar Series CMU

2021 - Present **Reviewer**
Journal of Applied Physics

2021 **Session Chair**: Scientific Machine Learning Webinar Series CMU

2021 **Mentor**: Research mentoring for two graduate students and one undergrad CMU
Viswanathan Research Group

2021 **Mentor**: Professional mentoring for five graduate students CMU
Mechanical Engineering Department

2019 **Mentor**: Mentored two undergraduate students through the Illinois-MRSEC summer REU program. UIUC

2017-2019 **Mentor**: Mentored an undergraduate students through the National Center for Supercomputing Applications (NCSA) Students Pursuing INnovation (SPIN) program. UIUC

Outreach to the Community

2021 - Present **Volunteer** CMU
Partner with the Mechanical Engineering department outreach coordinator to teach in local schools.

2016 - 2021 **Outreach Organizer** ENVISION
Engineering graduate student outreach organization.
Highlight 1: Developed COVID curriculum for 2 semesters at a local middle school.
Highlight 2: Developed a six week afterschool program for middle school students.

2020-2021 **Tutor** Champaign Black Teachers Alliance
Support local high school teachers to provide additional support for their students during virtual instruction by providing evening 'office hours' for students who needed help with homework.

2017 - 2020 **Engineering Curriculum Designer** Principle Scholars Program
I developed and implemented science experiments during Saturday morning instruction of students. Additionally, I help develop the curriculum and organize the volunteer efforts of graduate and undergraduate students for an annual 150 student conference with students from Champaign-Urbana, St. Louis, and Chicago.

2017 - 2019 **Curriculum Developer and Volunteer** GAMES Camp
Organized week long summer courses for high school students coming to UIUC

Extracurricular Activities

2022	Volunteer at Urban Farm	Oasis Farm and Fishery
2016-2021	High School Youth Group Mentor	Twin City Bible Church
2014-2016	Volunteer with weekend sports program	UCB Autism Speaks