

Corinne L. Carpenter, PhD

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SUMMARY

Languages: C++, Python, Bash, MATLAB, L^AT_EX, SQL, C, Javascript, R

Software: LAMMPS, VMD, OVITO, gnuplot, Github, Slack, Git, Vim, Emacs, GNU/Linux, SciPy, NumPy

Fields: Computational materials science, polymers, optimization, machine learning, statistical mechanics

Publications: 5 peer reviewed papers (4 first-authored) and 3 conference proceedings with > 120 citations

Conferences: AIChE 2012, SPIE Advanced Lithography 2014, 2015, & 2016, APS National Meeting 2015 & 2016

EDUCATION

PhD, Chemical Engineering, University of California Santa Barbara June 2017

BS, Chemical Engineering, University of Massachusetts Amherst May 2013

ENGINEERING EXPERIENCE

Postdoctoral Associate, Massachusetts Institute of Technology Aug. 2018-present

Simulate polyethylene crystallization in the presence of nucleating agents in LAMMPS

Design machine learning algorithms for optimizing nucleation rate kinetics

Manipulate physical properties of nucleating agent through force field parameters in MD

Analyze large, noisy simulation data (on order of 1TB) to calculate nucleation induction times

Engineering Consultant, Self-employed May 2018-Aug. 2018

Provided modeling and engineering expertise to industrial steelmaking company

Identified critical features of historical process data and prioritized updates to customer's legacy software

Collaborated with management consulting expert on both tandem coding and independent projects

Coordinated software updates across multiple platforms using Github

Designed and implemented program for evaluating and optimizing steelmaking furnace processing conditions

Graduate Research Scientist, University of California Santa Barbara Sept. 2013-Aug. 2017

Implemented experimentally relevant conditions in field theory simulation of block copolymer self-assembly

Provided morphological insight into full 3D behavior of past experimental systems

Developed features for PolyFTS (a polymer field theory simulation software) using Github for version control

Performed feature testing and full-scale simulations on high performance computing clusters

Demonstrated infeasibility of lithographic fabrication technique, eliminating need for pilot-scale testing

Implement high-throughput analysis to extract placement error from approx. 25TB of polymer density files

Created color-blind friendly, grayscale-compatible visualization for 3-component polymer morphology

Collaborated with industrial and experimental partners at Intel Corporation and MIT

Summer Graduate Research Intern, Intel Corporation June 2015- Sept. 2015

Coordinated theoretical and experimental effort on proprietary materials design work

Provided on-site consultation for PolyFTS, a polymer field theory simulation software

Undergraduate Research Scientist, University of Massachusetts Amherst June 2011-Aug. 2013

Simulated annealing process of irradiated single-layer graphene using LAMMPS

Analyzed impact of vacancy concentration on crystallinity and electronic properties of defected graphene

Determined impact of defectivity on anisotropy and magnitude of mechanical properties of single-layer graphene

Results reported in 3 first-author papers with approximately 100 citations

PUBLICATIONS

Carpenter, C. L., Nicaise, S., Theofanis, P. L., Shykind, D., Berggren, K. K., Delaney, K. T., Fredrickson, G. H., "Orientational preference in multilayer block copolymer nanomeshes with respect to layer-to-layer commensurability," *Macromolecules* 50, 20 (2017).

Farmer, T. C., **Carpenter, C. L.**, Doherty, M. F., "Polymorph selection by continuous crystallization." *AIChE Journal* 62, 9 (2016).

- Carpenter, C. L.**, Delaney, K. T., Fredrickson, G. H., “Suppression of thermal fluctuation placement errors in linear arrays of block copolymer cylinders.” Proceedings of SPIE 10146 (2017).
- Carpenter, C. L.**, Delaney, K. T., Fredrickson, G. H., “Directed self-assembly of diblock copolymers in multi-VIA configurations: effect of chemopatterned substrates on defectivity.” Proceedings of SPIE 9779 (2016). **2016 Hiroshi Ito Memorial Award for the Best Student Paper**
- Carpenter, C. L.**, Delaney, K. T., Laachi, N., Fredrickson, G. H., “Directed self-assembly of diblock copolymers in cylindrical confinement: effect of underfilling and air-polymer interactions on configurations.” Proceedings of SPIE 9423 (2015).
- Carpenter, C. L.**, Christmann, A. M., Hu, L., Fampiou, I., Muniz, A.R., Ramasubramaniam, A., and Maroudas, D.M., “Elastic properties of graphene nanomeshes.” Applied Physics Letters 104, 141911 (2014).
- Carpenter, C. L.**, Ramasubramaniam, A., Maroudas, D., “Mechanical properties of irradiated single-layer graphene.” Applied Physics Letters 103, 013102 (2013).
- Carpenter, C. L.**, Ramasubramaniam, A., Maroudas, D., “Analysis of vacancy-induced amorphization of single-layer graphene.” Applied Physics Letters 100, 203105 (2012).

LEADERSHIP AND COMMUNICATION EXPERIENCE

- Graduate, Kaufman Teaching Certificate Program** June 2019
 Learned evidence-based educational techniques for conveying technical content to diverse audiences
 Generate strategies for teaching communication techniques in scientific contexts
- Postdoc Representative, NAWSEM Leadership and Engagement Working Group** June 2019-present
 Create recommendations for eliminating institutional gender-based bias at MIT
 Propose short- and long-term policies and strategies for leaders in the MIT community
- Communication Fellow, MIT ChemE Communication Lab** May 2019-present
 Develop and deliver workshops for visual, written, and verbal communication in chemical engineering
 Provide peer coaching on technical assignments, grant applications, and job application materials
- ChE Department Representative, UCSB Graduate Student Association** Jan. 2016-Jun. 2017
 Represented 100 chemical engineering graduate students at university-wide forum
 Promoted increased representation from other departments in the College of Engineering
- Co-Chair, UCSB ChE Graduate Student Symposium** Jan. 2016-Oct. 2016
 Oversaw day-long research symposium with 14 presentations and 20 posters
 Coordinated attendance of representatives of 12 national labs and industry partners
- Co-Organizer, UCSB ChE Graduate Recruitment** Jan. 2016- Mar. 2016
 Planned information sessions, tours, meetings, and transport for 75 prospective graduate students
 Organized 8 fellow graduate students, 5 staff, and 15 volunteers over two 3-day weekends