

Peter Beaucage

Education

- expected Fall 2018 **Doctor of Philosophy** in Materials Science & Engineering, *Cornell University*, Ithaca, New York.
Advisors - Profs. Ulrich Wiesner and Sol Gruner
- May 2016 **Master of Science** in Materials Science & Engineering, *Cornell University*, Ithaca, New York.
First synthesis of block copolymer-derived mesoporous NbN superconductors with Profs. Uli Wiesner and Sol Gruner
- April 2013 **Bachelor of Science** in Chemical Engineering, *University of Cincinnati*, Cincinnati, Ohio, *Cum Laude*,
Honors, *GPA – 3.64*.
Undergraduate research experiences in small-angle scattering for structural characterization of graphene oxide sheets and sucrose-ester based micellar drug delivery systems.

Publications

- 14 Q. Zhang, F. Matsuoka, H.S. Suh, **P.A. Beaucage**, S. Xiong, D-M. Smilgies, K.W. Tan, J.G. Werner, P.F. Nealey, and U.B. Wiesner. "Pathways to Mesoporous Resin/Carbon Thin Films with Alternating Gyroid Morphology", *ACS Nano* (2017).
- 13 **P.A. Beaucage**, E.M. Susca, S.M. Gruner, and U.B. Wiesner. "Discovering Synthesis Routes to Hexagonally Ordered Mesoporous Niobium Nitrides Using Pluronic/Pluronic Block Copolymers", *Chem. Mater.* **29** 8973-8977 (2017).
- 12 K.W. Oleske, K.P. Barteau, **P.A. Beaucage**, E. Asenath-Smith, U.B. Wiesner, and L.A. Estroff. "Nanopatterning of Crystalline Transition Metal Oxides by Surface Templated Nucleation on Block Copolymer Mesostructures", *Crystal Growth & Design* **17** 5775-5782 (2017).
- 11 K.E. Fritz, **P.A. Beaucage**, F. Matsuoka, U.B. Wiesner, and J. Suntivich. "Mesoporous titanium and niobium nitrides as conductive and stable electrocatalyst supports in acid environments", *Chem. Comm.* **53** 7250-7253 (2017).
- 10 B.J. Smith, L.R. Parent, A. Overholts, **P.A. Beaucage**, R.P. Bisbey, A.D. Chavez, N. Hwang, C. Park, A.M. Evans, N.C. Gianneschi, and W.R. Dichtel. "Colloidal Covalent Organic Frameworks", *ACS Central Science* **3** 58-65 (2017).
- 9 K.W. Oleske, K.P. Barteau, M.Z. Turker, **P.A. Beaucage**, L.A. Estroff, and U. Wiesner. "Block copolymer directed nanostructured surfaces as templates for confined surface reactions", *Macromolecules* **50** 542-549 (2017).
- 8 A.D. Chavez, B.J. Smith, M.K. Smith, **P.A. Beaucage**, B.H. Northrop, W.R. Dichtel. "Discrete, Hexagonal Boronate Ester-Linked Macrocycles Related to Two-Dimensional Covalent Organic Frameworks", *Chem. Mater.* **28** 4884-4888 (2016).
- 7 Q. Zhang, Y. Gu, Y.M. Li, **P.A. Beaucage**, T. Kao, and U. Wiesner. "Dynamically Responsive Multifunctional Asymmetric Triblock Terpolymer Membranes with Intrinsic Binding Sites for Covalent Molecule Attachment", *Chem. Mater.* **28** 3870-3876 (2016).
- 6 D.K. Rai, G. Beaucage, K. Ratkanthwar, **P.A. Beaucage**, R. Ramachandran, and N. Hadjichristidis, "Quantification of interaction and topological parameters of polyisoprene star polymers under good solvent conditions", *Phys. Rev. E* **93** 052501 (2016).
- 5 E.M. Susca, **P.A. Beaucage**, M.A. Hanson, U. Werner-Zwanziger, J.W. Zwanziger, L.A. Estroff, and U. Wiesner. "Self-Assembled Gyroidal Mesoporous Polymer-Derived High Temperature Ceramic Monoliths", *Chem. Mater.* **28** 2131-2137 (2016).

- 4 S.W. Robbins*, **P.A. Beaucage***, H. Sai, K.W. Tan, J.P. Sethna, F.J. DiSalvo, S.M. Gruner, R.B. van Dover, and U. Wiesner. "Block Copolymer Self-Assembly Directed Synthesis of Mesoporous Superconductors", *Science Advances* **2** e1501119 (2016).
*Indicates equal contribution.
Featured in Popular Mechanics, Phys.org, Superconductor Week, Cornell Chronicle.
- 3 D.K. Rai, G. Beaucage, K. Rathanthwar, **P.A. Beaucage**, R. Ramachandran, N. Hadjichristidis "Determination of the interaction parameter and topological scaling features of symmetric star polymers in dilute solution." *Phys. Rev. E* **92**, 012602 (2015).
- 2 K.W. Tan, H. Sai, S.W. Robbins, J.G. Werner, T.N. Hoheisel, S.A. Hesse, **P.A. Beaucage**, F.J. DiSalvo, S.M. Gruner, M. Murtagh, U. Wiesner. "Ordered Mesoporous Crystalline Aluminas from Self-Assembly of ABC Triblock Terpolymer-Butanol-Alumina Sols." *RSC Adv.* **5**, 49287-49294 (2015).
- 1 E.O. Jonah, D. T. Britton, **P. Beaucage**, D. K. Rai, G. Beaucage, B. Magunje, J. Ilavsky, M. R. Scriba, and M. Harting. "Topological investigation of electronic silicon nanoparticulate aggregates using ultra-small-angle X-ray scattering." *J. Nanopart. Res.* **14**, 1-10 (2012).

Selected Presentations

Beaucage, P., S.M. Gruner, U. Wiesner, "Synthesis of a new class of superconducting nanoporous morphologies based on a 3-D periodic gyroid structure." *Cornell Physics Department Discussion Series, Ithaca, NY.*

Beaucage, P., S.M. Gruner, U. Wiesner, "Understanding Structure Formation in Block Copolymer-Directed Functional Materials by in situ SAXS/WAXS." *Advanced Photon Source User Science Seminar, Argonne National Laboratory, Argonne, IL (invited).*

Beaucage, P., S.M. Gruner, U. Wiesner, et. al. "Block copolymer self-assembly derived synthesis of mesoporous gyroidal superconductors" *2016 ACS National Meeting, Philadelphia, PA.*
Selected as best presentation in session.

Contributed presentations at APS March Meeting 2013, 2017, MRS Fall Meeting 2016, 2017, GRC Polymer Physics 2016, GRC Crystal Growth and Assembly 2015

Research, Teaching, Work, and Service Experience

Research

- 2013-present **Graduate Research Assistant**, Wiesner and Gruner Groups, *Cornell University*, Ithaca, New York.
Thesis research on development of the first block copolymer-derived self-assembled mesoporous superconductors. Developed microbeam synchrotron x-ray techniques for high-throughput materials discovery and SAXS/SANS methods for characterization of mesostructure formation mechanisms in block copolymer-derived systems. Maintain lab spaces and equipment servicing two groups of 15+ workers, including inert gloveboxes, x-ray diffractometers, Schlenk lines, furnace systems, rotating anode SAXS system, etc. Designed and built custom systems for high-temperature annealing in custom gas environments. Independently developed collaborations with numerous outside groups for SAXS/WAXS investigation of systems ranging from covalent organic frameworks to room temperature delta-phase bismuth oxide.
- 2010 **Co-Op Student**, USAXS Instrument, Advanced Photon Source, *Argonne National Laboratory*, Argonne, Illinois.
Assisted with instrument development and user support, including software and hardware design for two pinhole SAXS instruments and converting the instrument controls to a new software platform. Conducted collaborative research with several users on structure formation in soft materials.

Teaching

- 2014 **Teaching Assistant**, Materials Science and Engineering Department, *Cornell University*, Ithaca, New York.
Assisted in teaching an undergraduate course in materials chemistry to 35 Materials Science majors. Wrote homework assignments, led recitations and in-class review sessions, held office hours, and prepared and gave selected lectures. Helped convert the course to a partial flipped classroom format to improve student success.

Service and Outreach

- 2008-present **Cofounder, Chief Operating Officer, & interim Chief Financial Officer (since 2014)**, *Concordia Humana Corporation*, Cincinnati, Ohio.
Cofounded and continue to manage 501(c)(3) charity focused on meeting basic needs around the world. Our most recent project is PowerUp Ethiopia, a \$30,000 solar-powered well for a village of 2,000 people in rural Ethiopia.
- 2016-present **Founding Treasurer**, *LATTICE: The Cornell MSE Graduate Student Association*.
Organized social, research, and advocacy events for the Cornell MSE graduate student society. Co-chaired the first student-organized, student-run research symposium in the Cornell MSE department. Started a monthly student symposium promoting interdisciplinary collaborations.
- 2010-2013 **Collegiate Affairs Chair, Treasurer**, *U. Cincinnati Engineering & Applied Science Tribunal*.
Coordinated student representation and served as a voting member of governance committees for the college. Managed finance for the UC Fall Career Fair Week, a \$150,000 student-led career event.

Awards

- May 2017 DOE Science Graduate Student Research Fellowship
US Department of Energy, National Renewable Energy Laboratory
Nationally-competitive fellowship award supporting a six month stay performing thesis work at the National Renewable Energy Lab.
- June 2014 National School on Neutron and X-Ray Scattering
US Department of Energy, Argonne and Oak Ridge National Laboratories
Admitted to selective, fully-funded national training program on X-Ray and Neutron Scattering techniques.
- April 2014 NSF Graduate Research Fellowship
National Science Foundation
Nationally-competitive fellowship award supporting three years of graduate research.
- April 2013 Robert S. Tour Award
Department of Chemical Engineering, University of Cincinnati
Elected by graduating class and faculty as one of two students demonstrating exceptional professionalism.
- February 2013 Outstanding Senior Award - Community
College of Engineering and Applied Science, University of Cincinnati
Selected as the most outstanding student in graduating class in demonstrating a record of community service. Led service trips to Ethiopia while serving as TA for an undergraduate class.

Analytical & Laboratory Experience

- Synthesis Anionic Polymerization, Air-Free (Schlenk Line/Glovebox) Synthesis, Lithography, Sputter Deposition, Sol-Gel Chemistry
- Analytical XRD (powder and single-crystal), IR, NMR, GPC, TGA, DSC, Nitrogen Sorption, Small-Angle Light, X-Ray, and Neutron Scattering. With Collaborators: Solid-State NMR, Inert Gas Fusion
- National User Facilities Lead author on successful proposals for 150+ shifts of beamtime for SAXS, USAXS, GISAXS, GIWAXS, XANES, and SANS time at the Cornell High Energy Synchrotron Source, Advanced Photon Source, and Spallation Neutron Source.
Developed several custom instruments/sample environments at CHESS for in situ GISAXS and GIWAXS analysis during annealing in inert and reactive gas environments at high temperature.
- Programming Igor Pro, Python (SciPy/NumPy), MATLAB, Mathematica, Java, Visual Basic, Linux command line
- Other Skills Experience in machining, mechanical design/fabrication/repair; excellent public speaking, writing, and communication skills.