

A. Benjamin Schantz

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Career Summary:

Through coursework and research, I've gained expertise in chemical engineering, biophysics, and materials science, and used these skills to characterize proteins and bio-inspired nanoscale devices. I hope to continue applying these skills to challenges in materials and device design and characterization.

Education:

- Dec. 2017 Ph.D. in Chemical Engineering
Penn State University, University Park, PA (GPA 3.8)
Dissertation: *Analysis of Biomimetic Block Copolymer Membranes used for Protein Incorporation*
- May 2012 Bachelor of Science in Chemical Engineering
University of Delaware, Newark, DE (GPA 3.9, graduated Magna Cum Laude)
Honors Program (completed 12 honors courses, 36 honors credits)
Winter semester abroad at the Catholic University of Argentina (completed 6 credits of Spanish language and Latin American Culture courses)

Work experience:

- 2012-2017 Research Assistant: Protein-Polymer Biomimetic Membranes
Advisors: Dr. Manish Kumar and Dr. Janna Maranas, Penn State University
- Developed a molecular dynamics model to examine structure-property relationships in biomimetic membranes used for biosensors and water filtration, allowing the selection of better-optimized polymers for these membranes
 - Determined the mechanism of biomimetic membrane formation during detergent dialysis, allowing rational optimization of the membrane formation procedures
 - Designed and characterized an inexpensive PEO-PPO block copolymer porous vesicle for possible use as a microreactor or biosensor
 - Determined the mechanisms of the antimicrobial peptide MOCP (used to treat drinking water in developing countries cheaply, sustainably, and with local materials) and the toxin GhoT (responsible for the antibiotic-resistant persister cell phenotype in *E.coli*)
 - Wrote a literature review article describing the potential for using high-pressure reverse osmosis to safely dispose of high-salinity waste brines from seawater desalination, unconventional shale gas development, carbon sequestration, and coal power production
- 2010 Undergraduate Research Assistant: Block Copolymer Electrolytes
Advisor: Dr. Thomas Epps, University of Delaware
- Demonstrated that salt-doping of a diblock copolymer can create improved solid polymer electrolytes for lithium ion batteries

Publications:

Schantz, Xiong, Dees, Moore, and Kumar, Challenges and opportunities for high-pressure reverse osmosis. *In preparation; invited article for Environmental Science: Water Research and Technology*.

Kim, Schantz, Song, Kumar, and Wood, GhoT of the GhoT/GhoS Toxin/Antitoxin System Damages Lipid Membranes Through Spanning. Just accepted at *Biochemical and Biophysical Research Communications*.

Schantz, Ren, Pachalla, Shen, Hickey, Butler, and Kumar, Porous vesicles with extrusion-tunable permeability from mixed solutions of PPO-PEO triblock copolymers. Just accepted at *Macromolecular Chemistry and Physics*.

Kowalik, Schantz Al-Naqi, Shen, Sines, Maranas, and Kumar, Chemically specific coarse-grained models to investigate the structure of biomimetic membranes. *RSC Advances*, **2017**, 7, 54756-54771, DOI: 10.1039/c7ra10573h. **(co first author)**

Schantz, Saboe, Sines, Lee, Bishop, Maranas, Butler, and Kumar, PEE-PEO block copolymer exchange rate between mixed micelles is detergent and temperature activated. *Macromolecules*, **2017**, DOI 10.1021/acs.macromol.6b01973.

Shebek, Schantz, Sines, Lauser, Velegol, and Kumar, The Flocculating Cationic Polypeptide from *Moringa oleifera* Seeds Damages Bacterial Cell Membranes by Causing Membrane Fusion. *Langmuir*, **2015**, 31 (15) 4496-4502. **(co first author)**

Young, Albert, Schantz, and Epps, Mixed-Salt Effects on the Ionic Conductivity of Lithium-Doped PEO-Containing Block Copolymers. *Macromolecules*, **2011**, 44 (20) 8116-8123.

Conference Presentations:

PEE-PEO block copolymer exchange between micelles is detergent and temperature activated, *American Physical Society March Meeting (research talk)*, **April 2016**, and *Penn State Graduate Research Symposium (research talk)*, **August 2015**.

The influence of temperature and detergent on polymer exchange rate in PEE-PEO vesicles used for protein incorporation, *Gordon Research Seminar on Polymer Physics (poster presentation)*, **July 2014**.

Morphology and Conductivity Effects of Salt Doping in Diblock Copolymers, *University of Delaware Undergraduate Research Symposium (poster presentation)*, **August 2010**.

Research Skills:

- Molecular dynamics simulations (LAMMPS, GROMACS, and VMD software)
- Programming and data analysis (C++, Linux, Matlab, Mathematica, and IGOR Pro)
- Scattering experiments (small-angle x-ray and neutron scattering, dynamic light scattering, stopped-flow light scattering)
- Physical/biophysical characterization (UV-vis spectroscopy, HPLC, dye encapsulation assays, impedance measurements)

Leadership and Teaching Experience:

- 2017 Mentored an undergraduate researcher, who assisted me with the preparation and characterization of PEO-PPO polymer vesicles
- 2013, 15, 16 TA for Thermodynamics I, Thermodynamics II, and Fluid Mechanics (assisted students during office hours and review sessions, and lectured selected classes)
- 2014-16 President of the Nittany Grotto Caving Club (planned caving trips, organized seminar speaker visits, recruited new members, ran meetings, and ensured proper cave safety and conservation practices)
- 2010-12 Treasurer of Students in the Public Interest

Certifications and Professional Society Memberships:

- 2012-2017 Member of the American Physical Society (organization for physics research)
- 2012 Passed the Fundamentals of Engineering Exam (demonstrates skills required for starting engineers in industry)

Additional Training:

- 2010, 14, 16 Radiation safety training
- 2013, 15 CPR/AED/First Aid certifications
- 2013 National School on X-ray and Neutron Scattering (two-week course on scattering techniques, acceptance based on a competitive application process)

Awards and Honors:

- 2017 Publication (Schantz, Saboe et al) nominated for departmental Best Paper Award
- 2010-2012 Chemical Engineering Class of 1950 Academic Scholarship
- 2010 Chemical Engineering Industrial Sponsors Award
- 2010 Research essay on privacy and electronic databases selected for publication in the Arak Anthology (a university guide to excellence in writing)
- 2010 General Honors Award for Academic Achievement
- 2010 Summer Scholars Research Scholarship