Elnur Jabiyev

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Professional Summary

Innovative Chemical Engineer with over 5 years of experience in Research and Development, focusing on advanced polymer synthesis, chemistry, membrane technology, and materials science. Revolutionized novel polyelectrolyte membrane - TEAM (Tethered Electrolyte Active-layer Membrane) technology by solving three critical limitations: developed green, industrially scalable synthesis, achieved salt rejection across wide concentration range through bottlebrush polymer grafting, and overcame permeability limitations by grafting polymers directly from polysulfone support. Co-inventor of novel Brush Active Reverse Osmosis (BARO) membranes using bottom-up polyamide brush synthesis. Seeking R&D opportunities in materials science and development, polymer science and synthesis, membrane technology, water treatment, or product development or formulation to translate fundamental research into commercial applications while gaining industry perspective on scale-up challenges, regulatory requirements, and commercial feasibility assessment.

Education

Doctor of Philosophy (Ph.D.) in Chemical Engineering
Auburn University, Auburn, Alabama
May 2023 - May 2026 (Expected)
Advisor: Professor Cassandra Porter
GPA: 3.3

Master of Science (MS) in Chemical Engineering
Auburn University, Auburn, Alabama
August 2021 - May 2023
GPA: 3.0
Thesis: Green TEAM: Surface-Initiated Free Radical Polymerization of Tethered Electrolyte Active-Layer Membranes

Bachelor of Science (BS) in Chemical Engineering
Baku Higher Oil School
September 2016 - July 2021
Graduated with Honors
GPA: 3.7

Work History

Graduate Research Assistant

Auburn University, Auburn AL
August 2021 - Present

- Revolutionized novel polyelectrolyte membrane - Tethered Electrolyte Active-layer Membrane (TEAM) technology by solving three critical limitations that prevented commercialization: (1) developed green, industrially scalable synthesis, (2) achieved salt rejection across wide concentration range (2-200 mM), (3) overcame permeability limitations by grafting polymer brushes on polysulfone substrates using bottom-up surface-initiated polymerization
- Developing lithium-magnesium selective nanofiltration membranes by investigating lithium selectivity in various charged polyelectrolytes and crown ether-functionalized polymers grafted on cellulose support. Achieved breakthrough selectivity performance - 100x lithium-magnesium selectivity improvement (Li/Mg ratio from 0.1 to 10) outperforming commercial nanofiltration membranes, addressing growing demand in EV battery supply chain where lithium costs represent 15-20% of total battery cost (market potential: $50M+)
- Establishing methodologies for synthesizing fouling-resistant covalently tethered polyanionic and polycationic polymer brushes using surface-initiated grafting on cellulose and polysulfone membranes
- Co-developed breakthrough BARO (Brush Active Reverse Osmosis) membranes using bottom-up polymerization to covalently grow polyamide brushes, eliminating defects inherent in traditional interfacial polymerization methods
- Published 2 peer-reviewed papers with 6 additional manuscripts in preparation targeting Journal of Membrane Science, Desalination, and other top-tier journals (8 total publications by PhD completion)

- Peer reviewer for Desalination and Water Treatment Journal - recognized expert contributing to field advancement and quality control
- Presented at 4 major international conferences (3 AIChE Annual Meetings, 1 NAMS) delivering 5 oral presentations and 5 poster presentations on breakthrough membrane technologies
- Mentored 6 undergraduate researchers in advanced synthesis techniques, with 1 securing graduate school placements and 2 joining industry R&D teams
- Consistently rated Exceeding Expectations in annual performance reviews by research advisor for research productivity and innovation

Process Engineering Intern (2+ years cumulative experience)
June 2018 – August 2021
Various Companies: Polystyrene and Polylactic Acid Production Plant, Ethylene Production Plant, Oil Refinery Plant
Gained comprehensive process engineering experience across petrochemical, refining, and chemical manufacturing sectors through internships at four major facilities spanning 2+ years. Developed expertise in process optimization, safety protocols, equipment troubleshooting, and plant operations while working with experienced engineers on real-world industrial challenges. Contributed to process improvement initiatives and gained hands-on experience with industrial-scale chemical processes, preparing me for the transition from academic research to commercial applications.

Peer-Reviewed Publications

1. **Jabiyev, E.**, Pour, M. H. M., & Porter, C. J. (2025). Greener TEAMs: Tethered Electrolyte Active-Layer Membranes Produced by Surface-Initiated Free Radical Polymerization. Journal of Membrane Science, 124049.
2. Porter, C. J., Beckingham, L. E., **Jabiyev, E.**, Shi, Z., & Pour, M. H. M. (2024). The water-environment nexus. In S. Jafarinejad & B. S. Beckingham (Eds.), The Renewable Energy-Water-Environment Nexus (pp. 205-255). Elsevier. ISBN 9780443134395.

Presentations

1. **Jabiyev, E.**, Pour, M. H. M., Howe, G., & Porter, C. Fabrication of Lithium/Magnesium Selective Tethered Electrolyte Active Layer Membranes for Lithium Production from Brine Water Sources. In *2025 AIChE Annual Meeting*. AIChE.
2. **Jabiyev, E.**, Pour, M. H. M., Jung, M., McPherson, A., Earhart, O., & Porter, C. Bottlebrush Polyelectrolyte Tethered Electrolyte Active-Layer Membranes for Enhanced Ion Selectivity. In *2025 AIChE Annual Meeting*. AIChE.
3. **Jabiyev, E.**, Pour, M. H. M., & Porter, C. (2024, October). Greener Teams: Tethered Electrolyte Active-Layer Membranes Produced By Surface-Initiated Free Radical Polymerization. In *2024 AIChE Annual Meeting*. AIChE.

Technical Skills and Research Expertise

Core Technical Skills: Chemical Engineering, Materials Science, Membrane Science, Process Engineering, R&D Innovation, Polymer Synthesis, Free Radical Polymerization, Atom Transfer Radical Polymerization, Chemistry, Surface Science, Surface Brush Grafting, Scale-up, Process Optimization, Materials Development, Water Treatment, Filtration
Research Expertise: Specialized in pressure driven membranes, reverse osmosis, ultrafiltration, nanofiltration and ion-exchange films and membranes, with expertise in controlled synthesis of polyamide reverse-osmosis membranes for water desalination and development of polyelectrolyte membranes for ion-ion solute separation. Research focuses on lithium-magnesium selective nanofiltration membranes, surface-initiated polymer grafting, and green chemistry approaches in polymer synthesis, polymer recycling, biopolymers, biobased product development.
Characterization Techniques: Nuclear Magnetic Resonance (NMR), Total Organic Carbon Analyzer, Ion Chromatography, Fourier-Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM), Gel Permeation Chromatography (GPC), Differential Scanning Calorimetry (DSC), Dynamic Mechanical Analysis (DMA), Thermogravimetric Analysis (TGA), X-ray diffraction (XRD)
Computer Skills: Aspen HYSYS, Aspen Plus, Microsoft Office, Python, MATLAB, Data Science, Machine Learning.
Language Skills: Fluent in English, Turkish, proficient in Russian

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References

Dr. Cassandra Porter Academic Advisor | Email: cjp0084@auburn.edu | Contact: +1 (334) 844-4827
Dr. Bryan Beckingham - Academic Advisor | Email: bsb0025@auburn.edu | Contact: +1 (334) 844-2036
Dr. Shiqiang Nick Zou - Academic Advisor | Email: szz0063@auburn.edu| Contact: +1 (540) 251-9973