

## Christine E. Duval, PhD

Assistant Professor, Department of Chemical and Biomolecular Engineering  
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### RESEARCH SUMMARY

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The Duval Lab combines our expertise in *f*-element (lanthanides and actinides) and radiochemistry with core chemical engineering principles (transport, thermodynamics, kinetics) to design new separation materials and processes to benefit human health and safeguard the environment. Research questions range from peptide-ion complexation mechanisms, to manufacturing new chromatography materials, to process unit design.

**Fundamentals:** ion-exchange and adsorption; interfacial engineering; membrane science; transport

**Applications:** nuclear fuel reprocessing; nuclear medicine; critical mineral mining and recovery

### HIGHLIGHTS

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All highlights correspond to my independent career at Case Western Reserve University (CWRU).

- **Research support summary:** \$2.9 million external funding to CWRU; \$2.5 million to Duval Lab
- **Publication record summary:** 7 papers in print, 3 in review, 4 in preparation
- **Current research team:** 1 postdoc, 3 PhD students (recruiting 3 for Fall 2023), 5 undergrads
- **Graduate degrees awarded:** 1 PhD (Current: McKinsey & Associates), 3 MS
- **Selected awards, invited talks, and honors:**
  - DOE Early Career Research Award (2020-2025), NSF CAREER (2023-2028), nominee for Presidential Early Career Award for Scientists & Engineers (PECASE: Pending approval by White House Office of Science & Technology).
  - North American Membrane Society (NAMS) Young Membrane Scientist Award (2022)
  - Recipient of the Case School of Engineering (CSE) Undergraduate Teaching Award (2020) and Graduate Teaching Award (2022)
  - 11 invited university seminars outside of CWRU, 2 invited seminars at national laboratories, and 6 invited talks at conferences including NAMS (2022), American Chemical Society (ACS) National Meeting (1 in Spring 2023 and 2 in Fall 2023), and TechConnect World (2021)
  - Selected to participate in the 2023 National Academy of Engineering (NAE) – US Frontiers of Engineering Workshop
- **Leadership roles:**
  - Co-Chair of Programming for Area 02D Membranes of the American Institute of Chemical Engineers (2022 and 2023 meetings) in line to be chair (2024 and 2025 meetings).
  - Elected to the Board of Directors for the North American Membrane Society (NAMS) in 2022 for a 2-year term.
  - Director of a \$1.7 million NSF ECO-CBET grant—a collaborative grant that supports 4 faculty, 5 PhD students and 1 postdoc at CWRU, Clemson University, and Penn State

### APPOINTMENTS (ACADEMIC, GOVERNMENT, AND INDUSTRY)

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2017-present	Assistant Professor, Department of Chemical and Biomolecular Engineering Case Western Reserve University, Cleveland OH
Summer 2017	Department of Energy Scholar, Nuclear Materials Information Program, Office of Intelligence and Counterintelligence, US Department of Energy, Washington DC
2012-2017	Graduate Research Assistant, Department of Chemical and Biomolecular Engineering Clemson University, Clemson SC
2012	Director of Marketing, Amastan LLC Mansfield CT
2011-2012	Business Analyst, Innovation Accelerator Program Connecticut Center for Entrepreneurship and Innovation, East Hartford CT

## EDUCATION

<b>Doctor of Philosophy in Chemical Engineering</b> Clemson University, Clemson, SC	2017
<b>Bachelor of Science in Chemical Engineering</b> University of Connecticut, Storrs, CT	2011

## PROFESSIONAL HONORS AND AWARDS (Duval)

Selected for 2023 National Academy of Engineering (NAE) Frontiers in Engineering Workshop	2023
Selected for the AY24 cohort of the Veale Faculty Fellows Program	2023
NSF CAREER Award	2022
Nominated by DOE for the Presidential Early Career Award for Scientists & Engineers (PECASE: pending approval by White House Office of Science & Technology)	2022
North American Membrane Society: Young Membrane Scientist Award	2022
Case School of Engineering: Graduate Teaching Award	2022
DOE Early Career Research Award	2020
Case School of Engineering: Undergraduate Teaching Award	2020
Nominee for university-level awards at CWRU	
J. Bruce Jackson, M.D. Award for Excellence in Undergraduate Mentoring	2020
Carl F. Wittke Award for Excellence in Undergraduate Teaching	2020
John S. Diekhoff Award for Distinguished Graduate Student Mentoring	2020, 21, 22
Great Lakes Energy Institute Sponsored Faculty in Energy Program	2019-2020
Finalist (Top 10) for the K. Patricia Cross Future Leaders Award, AAC&U	2017

## Prior to CWRU

AIChE Graduate Student Research Award: Separations Division	2016
Session's Best Paper at AIChE National Meeting	2016
AIChE TED-Sep Competition, second place	2016
Clemson University ChBE Research Symposium, best oral presentation	2016
Clemson University Professional Enrichment Grants	Biannually 2013-2016
Outstanding Graduate Teaching Assistant Award	
• College of Engineering and Science, Clemson University	2015
• Department of Chemical Engineering, Clemson University	2015
Poster awards	
• Clemson Graduate Research & Discovery Symposium	2016
• American Filtration and Separation Society National Meeting	Fall & Spring 2015
• Clemson ChBE Research Symposium	2014 & 2015
Specialized trainings	
• Next Generation Safeguards Initiative Workshop, SRNL	2014
• Radiation Detection for Nuclear Security Summer School, PNNL	2013

## MEMBERSHIPS

North American Membrane Society
American Institute of Chemical Engineers: Separations, Education Division
American Chemical Society: ENV

## PROFESSIONAL HONORS AND AWARDS (Students)

(Key: CWRU graduate student, CWRU undergraduate student)

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### CWRU: Department, School and University

CWRU ChBE Graduate Student Research Award ( <u>Bethany Kersten</u> )	2023
CWRU ChBE Graduate Student Teaching Assistant Award ( <u>Maura Sepesy</u> )	2023
CWRU ChBE Graduate Student Teaching Assistant Award ( <u>Bethany Kersten</u> )	2022
CWRU ChBE Graduate Student Service Award ( <u>Bethany Kersten</u> )	2022
CWRU Graduate Student Appreciation Award ( <u>Priyanka Suresh</u> )	2022
CWRU Elisa Lindsey International Student Award ( <u>Priyanka Suresh</u> )	2022
CWRU ChBE Graduate Student Service Award ( <u>Maura Sepesy</u> )	2020

### US Department of Energy (DOE)

Nuclear Energy University Leadership Program Fellowship ( <u>Bethany Kersten</u> )	2020-2023
DOE Innovations in Nuclear Energy R&D Student Award ( <u>Bethany Kersten</u> )	2023
DOE Innovations in Nuclear Technology R&D Award ( <u>Bethany Kersten</u> )	2022

### American Institute of Chemical Engineers (AIChE)

AIChE Women's Initiative Committee Travel Award ( <u>Bethany Kersten</u> )	2021
AIChE Women's Initiative Committee Travel Award ( <u>Priyanka Suresh</u> )	2020

### North American Membrane Society (NAMS)

Student Fellowship Honorable Mention, NAMS ( <u>Priyanka Suresh</u> )	2022
Undergraduate Travel Award, NAMS ( <u>Joelle Scott</u> )	2022
Elias Klein Travel Supplement, NAMS ( <u>Maura Sepesy</u> )	2022
Elias Klein Travel Supplement, NAMS ( <u>Priyanka Suresh</u> )	2021

### Poster Awards

NAMS Undergraduate Poster Award, First Place ( <u>Joelle Scott</u> )	2022
AIChE North Central Regional Student Conference ( <u>Spencer Schmidt</u> )	2021
AIChE National Student Conference: Separations Division ( <u>Dylan Kulbacki</u> )	2020
AIChE National Student Conference: Separations Division ( <u>Joelle Scott</u> )	2020
AIChE National Student Conference: Environmental Division ( <u>Kevin Pataroque</u> )	2020
American Filtration Society National Meeting ( <u>Priyanka Suresh</u> )	2019
American Filtration Society National Meeting ( <u>Maura Sepesy</u> )	2019
Research ShowCASE ( <u>Maura Sepesy</u> )	2019
AIChE National Student Conference: Environmental Division ( <u>Niko Kamlet</u> )	2019
AIChE North Central Regional Student Conference ( <u>Niko Kamlet</u> )	2019
CWRU Intersections ( <u>Kevin Pataroque</u> )	2018

### Competitive Undergraduate Research Fellowships at CWRU

SOURCE STEM Undergraduate Research Fellowship ( <u>Isabel Wang</u> )	2023
SOURCE STEM Undergraduate Research Fellowship ( <u>Christopher Yoon</u> )	2022
SOURCE STEM Undergraduate Research Fellowship ( <u>Alec Johnson</u> )	2021
SOURCE STEM Undergraduate Research Fellowship ( <u>Trent Kozar</u> )	2021
SOURCE/WISER Undergraduate Research Fellowship ( <u>Joelle Scott</u> )	2020
SOURCE Undergraduate Research Fellowship ( <u>Ben Fugate</u> )	2020
Beckman Scholar ( <u>Kevin Pataroque</u> )	2019
SOURCE Provost Scholars Undergraduate Research Grant ( <u>Kevin Pataroque</u> )	2018

## PUBLICATIONS

(Key: **Corresponding author**; CWRU graduate student, CWRU undergraduate student)

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### In preparation (to be submitted in summer 2023)

23. Sibley, M; Banik, T; Sepesy, M; Kankanamalage, P.H.A.; Hatcher-Lamarre, J; Cutler, C; **Duval, CE**. "Diglycolamide-functionalized membranes: synthesis and adsorption of lanthanides and Ac-225." *In preparation for ACS Advanced Materials and Interfaces*.
22. Sepesy, M; Che, A; **Duval, CE**. "Adsorption kinetics of copper from strong acids onto amine-functionalized membrane adsorbers." *In preparation for the Separation & Purification Technology*.
21. Sepesy, M; **Duval, CE**. "A beginner's guide to characterizing membrane adsorbers and translating performance metrics across fields." *In preparation for the Journal of Membrane Science*.
20. Banik, T; Sepesy, M; Scott, J; Johnson, A; **Duval, CE**. "Electrospun polystyrene fibers with tailorable surface chemistry." *In preparation for Membranes MDPI*.
19. Kersten, B; Hawthorne, K; Williamson, M; **Akolkar, R**; **Duval, CE**. "Insight into electrodeposition inefficiencies of Am from AmCl<sub>3</sub>-LiCl-KCl through diffusion-reaction modeling, voltammetry and potentiometry." *In preparation for TBD*.

### Under review (submitted in 2023)

18. Kersten, B; Akolkar, R; **Duval, CE**. "An electrochemical technique for sensing uranium adsorption." *Submitted to Analytica Chimica Acta*.
17. Suresh, P; Sibley, M; Che, A; Ward, L; Weinman, ST; **Duval, CE**. "So you think you can graft? Avoiding characterization pitfalls when "grafting from" polyethersulfone membranes." *Submitted to ACS Central Science*.
16. Suresh, P; Johnson, L; **Duval, CE**. "Membrane adsorbers with copolymer coatings for the separation of actinides from lanthanides (UO<sub>2</sub><sup>2+</sup> and La<sup>3+</sup>)." *Submitted to Journal of Membrane Science*.

### In print

#### **2023**

15. Hostert, JD; Sepesy, M; **Renner, JN**; **Duval, CE**. "Clickable polymer scaffolds enable Ce recovery with peptide ligands." *Soft Matter*, 2023, 19, 2823-2831. doi: 10.1039/D2SM01664H

#### **2022**

14. Kersten, B; Hawthorne, K; Williamson, M; Akolkar, R; **Duval, CE**. "Conversion of americium oxide to americium (III) chloride in a LiCl-KCl molten salt." *J. Radioanalytical and Nuclear Chemistry*, 2022, 331, 4913-4918. doi: 10.1007/s10967-022-08527-3
13. Suresh, P; Che, A; Yu, M; Pataroque, K; Kulbacki, D; **Duval, CE**. "Including non-binding 'spacer' monomers in polymeric phosphonate ligands can tune ligand-ion affinity for rare earth element, La." *ACS Applied Polymer Materials*. 2022, 4, 9, 6710-6722. doi: 10.1021/acsapm.2c01065
12. Sepesy, M; Fugate, B; **Duval, CE**. "Amine-functionalized membranes to capture copper from acidic solutions." *ACS Applied Polymer Materials*, 2022. Special Issue: Early Career Forum (invited). doi: 10.1021/acsapm.1c01512

#### **2021**

11. Kersten, B; Hawthorne, K; Williamson, M; Akolkar, R; **Duval, CE**. "Future of Nuclear Energy: Electrochemical Reprocessing of Fuel Takes Center Stage." *ECS Interface*. Fall 2021. (invited) <https://iopscience.iop.org/article/10.1149/2.F06213F>

## 2020

10. Suresh, P; Duval, CE. "Poly(acid) grafted membranes to sequester uranium from seawater." *Industrial & Engineering Chemistry Research*, 2020, 59, 26, 12212-12222. doi: 10.1021/acs.iecr.0c01090
9. Yu, M; Renner, JN; Duval, CE. "A lysine-modified polyethersulfone (PES) membrane for lanthanide recovery." *Frontiers in Chemistry*, 2020. Special Edition for Women in Science: Chemistry. doi: 10.3389/fchem.2020.00512

## 2019

8. Duval, CE; Hardy, W; Pellizzeri, S; DeVol, TA; Husson, SM. "Phosphonic acid and alkyl phosphate-derivitized resins for the simultaneous concentration and detection of uranium in environmental waters" *Reactive and Functional Polymers*, 2019 (137), 133-139.

## 2018

7. Duval, CE; Darge, AW; Ruff, CL; DeVol, TA; Husson, SM. "Rapid sample preparation for alpha spectroscopy with ultrafiltration membranes" *Analytical Chemistry*. 2018 (90) 6, 4144-4149.

## Before August 2017

6. Duval, CE; DeVol, TA; Husson, SM. "Extractive scintillating polymer sensors for trace-level detection of uranium contaminated ground water" *Analytica Chimica Acta*. 2016 (947), 1-8. \*Featured on cover
5. Thies, S; Duval, CE; DeVol, TA; Husson, SM. "Creating Monodisperse Polymer Microspheres Using Membrane Emulsification" *Journal of Applied Polymer Science*. 2016 (44593), 1-9.
4. Duval, CE; DeVol, TA; Wade, EC; Seliman, AF; Bliznyuk, VN; Husson, SM. "Stability of polymeric scintillating resins developed for ultra-trace level detection of alpha- and beta-emitting radionuclides" *Journal of Radioanalytical and Nuclear Chemistry*. 2016 310 (2), 583-588
3. Duval, CE; DeVol, TA; Husson, SM. "Evaluation of resin radius and column diameter for the implementation of extractive scintillating resin in flow-cell detectors" *Journal of Radioanalytical and Nuclear Chemistry*. 2016 (307), 2253-2258.
2. Blyzniuk, VN; Duval, CE; Apul, OG; Seliman, AF; Husson, SM; DeVol, TA. "High porosity scintillating polymer resins for ionizing radiation sensor applications" *Polymer*. 2015 (56), 271-279.
1. D. Kim, D. Donahue, B. Kuncharam, C. Duval and B. Wilhite, "Toward an integrated ceramic micro-membrane network: Effect of Ethanol Reformate on Palladium Membranes" *Industrial & Engineering Chemistry Research*. 2010 49 (21), 10254-10261.

## CONTRIBUTED ORAL PRESENTATIONS (CWRU graduate student, CWRU undergraduate student)

28. Duval, CE; Sibley, MM; Banik, T; Kankanamalage, P.H.A.; Sepesy, M; Ford, Alexa; Yen, T; Hatcher-Lamarre, J; Cuter, CS. "Chelating DGA membranes enable ion-ion selectivity in radiopharmaceutical processing." *North American Membrane Society*. Tuscaloosa, AL. May 2023.
27. Sepesy, M; Fugate, B; Scott, J; Duval, CE. "Membrane adsorbers to capture Cu from mixed metal acidic solutions." *AIChE National Meeting*. Phoenix, AZ, November 2022.
26. Kersten, B; Hawthorne, K; Williamson, M; Akolkar, A; Duval, CE. "Probing Adsorption of Uranium Species at Electrochemical Interfaces in Support of Environmental Radiochemistry." *242<sup>nd</sup> Electrochemical Society Meeting*, Vancouver, Canada. October 2022.

25. Sibley, M; Sepesy, M; Scott, J, Ford, A; Yen, T; Banik, T; Johnson, A; Kozar, T. Duval, CE. "Ac-225 purification via membrane adsorbers with covalently tethered diglycolamide ligands." *ACS National Meeting*. Chicago, IL, August 2022.
24. Suresh, P; Che, A; Pataroque, K; Kulbacki, D; Duval, CE. "Including non-binding 'spacer' monomers in polyprotic polymeric ligands impacts ligand-ion affinity for lanthanum." *North American Membrane Society*. Tempe, AZ, May 2022.
23. Duval, CE; Suresh, P; Sibley, M; Ward, L; Weinman, S. "So you think you can graft? Avoiding pitfalls when grafting from PES." *North American Membrane Society*. Tempe, AZ, May 2022.
22. Kersten, B; Hawthorne, K; Williamson, M; Akolkar, R; Duval, CE. "Synthesis of americium trichloride in lithium chloride-potassium chloride molten salt and the study of the electrodeposition reaction of americium". *Methods and Applications of Radioanalytical Chemistry: MARC XII*. Kona, HI. March 2022.
21. Sibley, M; Sepesy, M; Suresh, P; Scott, J; Kozar, T; Ford, A; Yen, T; Johnson, A; Duval, CE. "Membrane adsorbers with covalently tethered diglycolamides ligands for actinium-225 purification". *Methods and Applications of Radioanalytical Chemistry: MARC XII*. Kona, HI. March 2022.
20. Sibley, M; Sepesy, M; Suresh, P; Scott, J; Kozar, T; Ford, A; Yen, T; Johnson, A; Duval, CE. "Diglycolamide ligands for membrane adsorption purification of Ac-225". *The DOE Isotope Program's Virtual Seminar Series—On the Horizon: Novel Isotopes and Future Leaders*." Online, November 18, 2021.
19. Sepesy, M; Fugate, B; Duval, CE. "Cu-Selective Membrane Adsorbers for Medical Isotope Production." *AIChE National Meeting*, Boston, MA, November 2021.
18. Pataroque, K; Suresh, P; Duval, CE. "Affinity-based purification of actinides and lanthanides". *Intersections: Undergraduate Research Symposium*, Case Western Reserve University, Cleveland OH. May 2021.
17. Suresh, P; Yu, M; Duval, CE. "Tuning La(III)-binding strength in membrane adsorbers using heterogeneous polymer brushes" *AIChE National Meeting*, San Francisco, CA, November 2020. Online due to COVID-19.
16. Sepesy, M; Fugate, B. "Membrane Adsorbers for Medical Isotope Production" *AIChE National Meeting*, San Francisco, CA, November 2020. Online due to COVID-19
15. Duval, CE; Suresh, P; Sepesy, M. "Membrane adsorbers for medical isotope purification" *North American Membrane Society National Meeting*, Online due to COVID-19. May 2020.
14. Suresh, P; Gupta, M; Duval, CE. "Membrane chromatography for lanthanides and actinides" *World Filtration Congress*, San Diego, CA, 2020. \*\*Accepted but not presented due to COVID-19
13. Sepesy, M; Fugate, B; Duval, CE. "Membrane adsorbers for medical isotope purification" *World Filtration Congress*, San Diego, CA, 2020. \*\*Accepted but not presented due to COVID-19
12. Darge, AW; Duval, CE; Gera, Y; DeVol, TA; Husson, SM. "Uranium isolation and concentration using reactive membranes for quantitative analysis." *ACS National Meeting*, San Diego, CA. August 2019.
11. Suresh, P; Duval, CE. "Phosphate-functionalized membranes for the selective sequestration of uranium from seawater." *AIChE National Meeting*, Pittsburgh, PA. October 2018.

10. DeVol, TA; Darge, AW; Duval, CE; Wu, Y; Watson, M; Jacobsohn, LG; Husson, SM. "Functional membranes for quantification of special nuclear material in natural water." *Radiobioassay and Radiochemical Measurements Conference*. Portland, ME. May 2018.
9. Husson, SM; Darge, AW; Duval, CE; Wu, Y; Watson, M; Jacobsohn, LG; DeVol, TA. "Development of Functional Membranes for Nuclear Forensics." *Methods and Applications of Radioanalytical Chemistry, XI*, Kaiulua-Kona, April 2018.

#### **Before August 2017**

8. Duval, CE; Ruff, C; Darge, A; DeVol, TA; Husson, SM. "Uranium-binding ultrafiltration membranes for use in nuclear forensics." *AIChE National Meeting* in Minneapolis, MN, November 2017.
7. Duval, CE; DeVol, TA; Husson, SM. "Rapid uranium isotopic analysis using ultrafiltration and alpha spectroscopy." *ACS National Meeting* in Philadelphia, PA, August 2016.
6. Duval, CE; DeVol, TA; Husson, SM. "Online trace-level quantification of uranium in environmental water." *ACS National Meeting* in Philadelphia, PA, August 2016.
5. Duval, CE; DeVol, TA; Husson, SM. "Rapid Uranium Isotopic Analysis using Ultrafiltration and Alpha Spectroscopy" *North American Membrane Society National Meeting*, Bellevue, WA, May 2016.
4. Duval, CE; DeVol, TA; Husson, SM. "Rapid Uranium Isotopic Analysis using Ultrafiltration and Alpha Spectroscopy" *American Filtration and Separation Society National Meeting*, Nashville, TN, October 2015.
3. Duval, CE; Seliman, AF; DeVol, TA; Husson, SM. "Extractive scintillating resin for the ultra-trace-level quantification of uranium in environmental waters" *Methods and Applications of Radioanalytical Chemistry X*, Kailua-Kona, April 2015.
2. Duval, CE; Seliman, AF; DeVol, TA; and Husson, SM. "Synthesis and Characterization of Extractive Scintillating Resin for Ultra-Trace-Level Quantification of Uranium in Aqueous Media." *AIChE National Meeting*, Atlanta, GA. November 2014.
1. Duval, CE; Seliman, AF; Blyzniuk, VN; DeVol, TA and Husson, SM. "Synthesis and Characterization of Extractive Scintillating Resin for Ultra-Trace-Level Quantification of Uranium in Aqueous Media." *ACS National Meeting*, San Francisco, CA, August 2014.

#### **CONTRIBUTED POSTER PRESENTATIONS (CWRU grad students underlined, CWRU undergraduates)**

41. Ford, A; Schneider, B; Duval, CE. "Peptide Functionalized Agarose Beads for Rare Earth Elements Separation" SOURCE Intersections. May 2023.
40. Sepesy, M; Che, A; Duval, CE. "Upstream radiopharmaceutical purification: purifying metals in strong acids." *North American Membrane Society*, Tuscaloosa, AL. May 2023.
39. Johnson, L; Schneider, B; Duval, CE. "Click chemistry-based platform for selective membrane separations." *North American Membrane Society*, Tuscaloosa, AL. May 2023.
38. Sepesy, M; Fugate, B; Duval, CE. "Amine-functionalized membrane adsorbers to capture Cu from acidic solutions." *North American Membrane Society*, Tempe, AZ. May 2022.

37. Suresh, P; Sibley, M; Che, A; Ward, L; Weinman, ST; Duval, CE. "So you think you can graft? Avoiding pitfalls in characterization when "grafting from" PES membranes " *North American Membrane Society*, Tempe, AZ. May 2022.
36. Scott, J; Duval, CE. "Synthesizing poly(styrene-co-chloromethyl styrene) to electrospun membranes." *North American Membrane Society*, Tempe, AZ. May 2022. **\*\*Award Winner**
35. Kersten, B; Hawthorne, K; Williamson, M; Akolkar, R; Duval, CE. "Recycling Americium from Spent Nuclear Fuel through Molten Salt Electrodeposition" *AIChE National Meeting*, Boston MA, November 2021.
34. Hostert, J; Sepesy, M; Duval, CE; Renner, JN "Rare earth element recovery is only a 'click' away: recovering lanthanides with peptide-functionalized polyvinylidene fluoride (PVDF) membranes." *North American Membrane Society*, Estes Park, CO August 28 2021.
33. Sepesy, M; Fugate, B; Johnson, A; Duval, CE. "Radiopharmaceutical Separation Using Membrane Adsorbers." *North American Membrane Society*, Estes Park, CO August 28 2021.
32. Suresh, P; Che, AC; Sibley, MM; Duval, CE. "So you think you can graft? Avoiding pitfalls in characterization when 'grafting from' membranes." *North American Membrane Society*, Estes Park, CO August 28 2021.
31. Scott, J; Johnson, A; Sepesy, M; Duval, CE. "Electrospun polystyrene membranes for use in radiopharmaceutical purification." *North American Membrane Society*, Estes Park, CO August 28 2021.
30. Scott, J; Sepesy, S; Duval, CE "Electrospun Membrane Adsorbers for Radiochemical Separations." *AIChE Regional Conference*, Ohio State University, Columbus OH, April 17 2020, Online due to COVID-19.
29. Schmidt, S; Monge Negro, R; Kisley, L; Duval, CE. "Development of micron-thin polymer films to observe transport in the selective layer of membrane adsorbers using single molecule microscopy." *AIChE Regional Conference*, Ohio State University, Columbus OH, April 17 2020, Online due to COVID-19. **\*\* Award winner**
28. Kulbacki, D; Duval, CE. "Membrane adsorbers for the rapid purification of medical isotopes." *AIChE National Meeting*, San Francisco, CA, November 2020, Online due to COVID-19. **\*\*Award winner**
27. Fugate, B; Sepesy, M; Duval, CE. "Membrane separation of Cu-67 for use in theranostics." *AIChE National Meeting*, San Francisco, CA, November 2020, Online due to COVID-19.
26. Pataroque, K; Sankaran, M; Duval, CE. "Elucidation of radical species in an electrolytic non-equilibrium plasma-water system." *AIChE National Meeting*, San Francisco, CA, November 2020, Online due to COVID-19. **\*\*Award winner**
25. Scott, J; Sepesy, M; Duval, CE. "Electrospun membrane adsorbers for radiochemical separations." *AIChE National Meeting*, San Francisco, CA, November 2020, Online due to COVID-19. **\*\*Award winner**
24. Schmidt, S; Monge Nerla, R; Kisley, L; Duval, CE. "Sample preparation method to observe transport phenomena in membrane adsorbers using single molecule microscopy." *AIChE National Meeting*, San Francisco, CA, November 2020, Online due to COVID-19
23. Suresh, P; Gupta, M; Duval, CE. "Membrane chromatography for lanthanides and actinides" *North American Membrane Society Meeting*, Online due to COVID-19, May 2020.



22. Sepesy, M; Fugate, B; Duval, CE. "Membrane adsorbers for medical isotope purification" *North American Membrane Society Meeting*, Online due to COVID-19, May 2020.
21. Fugate, B; Sepesy, M; Duval, CE "Membrane purification of Cu-67" *Intersections*. Case Western Reserve University, Online due to COVID-19, April 2020.
20. Pataroque, K; Sankaran, RM; Duval, CE. "Degradation of Perfluoroalkyl Compounds by Interfacial Reactions Between an Electrolytic Non-equilibrium Plasma and Water" *Intersections*. Case Western Reserve University, Online due to COVID-19, April 2020.
19. Suresh, P; Gupta, M; Duval, CE. "Membrane chromatography for lanthanides and actinides" *World Filtration Congress*, San Diego, CA, 2020. \*\*Accepted but not presented due to COVID-19
18. Sepesy, M; Fugate, B; Duval, CE. "Membrane adsorbers for medical isotope purification" *World Filtration Congress*, San Diego, CA, 2020. \*\*Accepted but not presented due to COVID-19
17. Schmidt, S; Sankaran, RM; Duval, CE. "Surface modification of membranes using plasma." *Intersections*, Case Western Reserve University, Cleveland OH, December 2019.
16. Kamlet, N; Duval, CE. "Multimodal resins for the adsorption of nitroaromatics." *AIChE National Meeting*, Orlando FL, November 2019. **\*\*Award winner**
15. Kamlet, N; Duval, CE. "Multimodal resins for the adsorption of nitroaromatics." *AIChE Regional Student Conference*, University of Toledo, April 2019. **\*\*Award winner**
14. Sepesy, M; Duval, CE. "Membrane-based purification of Cu-67 for use in theranostics." American Filtration Society Meeting, Cleveland OH, September 2019. **\*\*Award winner**
13. Suresh, P; Duval, CE. "Membrane adsorbers for radiochemical separations." American Filtration Society Meeting, Cleveland OH, September 2019. **\*\*Award winner**
12. Sepesy, M; Duval, CE. "Membrane-based purification of Cu-67 for use in theranostics." *Research ShowCASE*, Case Western Reserve University, Cleveland OH, April 2019. **\*\*Award winner**
11. Suresh, P; Duval, CE. "Extraction of uranium from seawater: A novel approach using phosphate-functionalized membrane adsorbers" *Research ShowCASE*, Case Western Reserve University, Cleveland OH, April 2019.
10. Pataroque, K; Sankaran, M; Duval, CE. "Degradation of perfluoroalkyl compounds by interfacial reactions between non-equilibrium plasma and water" *Intersections Research Symposium*, Case Western Reserve University Cleveland OH, December 2018. **\*\*Award winner**
9. Kamlet, N; Duval, CE. "Functionalization of poly(GMA-EGDMA) resins for nitroaromatic adsorption." *AIChE National Meeting*, Pittsburgh, PA, October 2018.
8. Duval, CE; Hardy, W; DeVol, TA; Husson, SM. "Uranium adsorption on phosphorous-derivitized extractive scintillating resins." *AIChE National Meeting*, Minneapolis, MN, November 2017.

#### **Before August 2017**

7. Duval, CE; DeVol, TA; Husson, SM. "Online Trace-Level Quantification of Uranium in Environmental Waters" *IEEE Symposium on Radiation Measurements and Applications Conference*, Berkeley, CA, May 2016.
6. Duval, CE; DeVol, TA; Husson, SM. "Rapid Uranium Isotopic Analysis using Ultrafiltration and Alpha Spectroscopy" *IEEE Symposium on Radiation Measurements and Applications Conference*, Berkeley, CA, May 2016.

5. Duval, CE; DeVol, TA; Husson, SM. "Rapid Uranium Isotopic Analysis using Ultrafiltration and Alpha Spectroscopy" *Clemson University Graduate Research and Discovery Symposium*, Clemson, SC, April 8, 2016.
4. Duval, CE; DeVol, TA; Husson, SM. "Online Detection of Uranium with Extractive Scintillating Resin" *Defense Threat Reduction Agency Basic Technical Review*, Springfield, VA, July 2015.
3. Duval, CE; DeVol, TA; Husson, SM. "Rapid Uranium Isotopic Analysis using Ultrafiltration and Alpha Spectroscopy" *American Filtration and Separation Society Meeting*, Charlotte, NC, April 2015.
2. Duval, CE; DeVol, TA; Husson, SM. "Extractive Scintillating Resin for the ultra-trace-level detection of alpha- and beta-emitting radionuclides" *Defense Threat Reduction Agency Basic Technical Review*, Springfield, VA, July 2014.
1. Duval, CE; Bliznyuk, V; Meldrum, A; Seliman, AF; DeVol, TA; Husson, SM. "Extractive Scintillating Resin for the ultra-trace-level detection of alpha- and beta-emitting radionuclides" *Defense Threat Reduction Agency Basic Technical Review*, Springfield, VA, July 2013.

## RESEARCH SUPPORT

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### Highlights

- Raised \$2.9 million in external funds to CWRU since 2017 (Lead PI on \$2.5 million to CWRU)
- Director of a \$1.7 million multi-institution NSF ECO-CBET award (\$800K to CWRU)
- NSF CAREER (2023), PECASE nominee (2022), DOE Early Career (2020)
- Established new fellowship program in Nuclear Science at CWRU through US Dept. of Energy
  - \$161,000 in PhD fellowships thus far
- Established Master Framework Agreement with Bayer Pharmaceutical for ongoing nuclear medicine research at CWRU
  - \$250,000 in funding thus far

### Present Funding

15. Title: CAREER: Polymeric ligands for f-element separations  
 Sponsor: NSF CAREER  
 Collaborators: none  
 Role: PI  
 Dollar Amounts: \$548,000  
 Dates: January 2023 to January 2028
14. Title: Americium electrowinning at Argonne National Laboratory  
 Sponsor: Argonne National Laboratory  
 Collaborators: Krista Hawthorne (host at ANL)  
 Dollar Amounts: \$19,373  
 Dates: January 2023 to July 2023
13. Title: Radioisotope Capture Intensification Using Rotating Packed Bed Contactors  
 Sponsor: ARPA-E  
 Collaborators: Anna Servis (ANL, PI)  
 Role: co-PI  
 Dollar amounts: \$1,520,000 total (\$414,000 federal to CWRU, \$80K cost shared by CWRU)  
 Dates: January 2023 to December 2025

12. Title: Collaborative Proposal: ECO-CBET: Putting entropy to work: Leveraging the role of water organization in peptide binding events to selectively recover rare earths  
Sponsor: National Science Foundation, ECO-CBET  
Collaborators: Julie Renner (CWRU), Lauren Greenlee (Penn State), Rui Shi (Penn State), Rachel Getman (Clemson)  
Role: Lead PI  
Dollar amounts: \$1,728,000 (4 years); \$800,000 to CWRU  
Dates: September 2021 to August 2025
11. Title: A membrane-based approach to purifying medical isotopes  
Sponsor: DOE Early Career Program, Office of Nuclear Physics: The Isotope Program  
Collaborators: None  
Role: PI  
Dollar amounts: \$750,000 (5 years)  
Dates: September 2020 to August 2025
10. Title: Nuclear Science at Case Western Reserve University  
Sponsor: DOE Nuclear Engineering University Nuclear Leadership Program (formerly IUP)  
Collaborators: Akolkar (CWRU), Monreal (CWRU Physics)  
Role: PI  
Dates: August 2020 to July 2031  
Dollar amounts:
  - Bethany Kersten (ECHE), 2020-2023: \$161,000

#### **Past Funding at CWRU**

9. Title: Single-molecule imaging of f-element separations to advance purification design  
Sponsor: CWRU College of Arts and Sciences: Expanding Horizons Initiative  
Collaborators: Lydia Kisley (CWRU Physics)  
Role: co-PI  
Dollar amounts: \$30,000 (1 years)  
Dates: July 2021 to June 2022
8. Title: Master Framework Agreement: Bayer Pharmaceutical and CWRU  
Sponsor: Bayer Pharmaceuticals  
Collaborators: none  
Role: Lead PI  
Dollar amounts: \$237,000
  - SOW 2: Radiation detectors for radiopharmaceuticals
  - SOW 3: Extending the shelf-life of radiopharmaceuticals
7. Title: Design of a medical device for radiopharmaceuticals  
Sponsor: Bayer Pharmaceuticals  
Collaborators: John Volkar (Bayer)  
Dollar amounts: \$15,000  
Dates: May 2021 to October 2021
6. Title: ThinkEnergy, ThinkNuclear: The next generation of Think Energy Scholars at CWRU  
Sponsor: Nuclear Regulatory Commission: Scholarship Program  
Collaborators: Rohan Akolkar (PI-CWRU), Great Lakes Energy Institute (CWRU)  
Role: Senior Personnel  
Dollar amounts: \$212,893 to CWRU  
Dates: September 2020 - August 2022

5. Title: Synthesis of a LiCl-KCl- $\text{UCl}_3$  Eutectic Salt  
 Sponsor: Argonne National Laboratory  
 Collaborators: Akolkar (CWRU), Hawthorne (ANL)  
 Role: PI  
 Dollar amounts: \$13,271  
 Dates: May 2020 – May 2021
4. Title: Girl Scouts of Northeast Ohio Get to Know Nuclear  
 Sponsor: CWRU UCITE, Nord Grant  
 Collaborators: none  
 Role: PI  
 Dollar amounts: \$3,800  
 Dates: May 2020 – April 2021 (extended to Dec 2021)
3. Title: Laboratory Course in Chemical Engineering Innovation  
 Sponsor: VentureWell  
 Collaborators: Dan Lacks (PI – CWRU)  
 Role: co-PI  
 Dollar amounts: \$10,000  
 Dates: May 2019 – April 2021
2. Title: Novel Treatment Train Development for Wastewater from Munitions Constituents  
 Sponsor: CWRU Faculty Investment Fund (internal)  
 Collaborators: Huichun (Judy) Zhang (CWRU Environmental Engineering)  
 Role: co-PI  
 Dollar amounts: \$29,900  
 Dates: April 1, 2018 – March 31, 2019

#### **Before August 2017**

1. Title: Membrane separation processes for clean water and energy  
 Sponsor: Clemson University Creative Inquiry Fund  
 Collaborators: none  
 Role: PI  
 Dollar Amounts: \$11,500  
 Dates: January 2015—May 2017

#### **Pending & planned for 2023**

1. Title: Zwitterionic Membranes for REE separations  
 Sponsor: NSF RAISE  
 Collaborators: Ayse Asatekin (Tufts), Venkat Ganesan (UT Austin)  
 Role: co-PI  
 Dollar Amounts: \$330,000 to CWRU over 3 years  
 Status: LOI pending
2. Title: A new suite of extractive membranes for up and downstream isotope production  
 Sponsor: DOE Isotope Program  
 Collaborators: Metin Karayilan (CWRU Chemistry)  
 Role: PI  
 Dollar Amounts: \$400,000 to CWRU over 2 years  
 Status: Planned for July 2023

3. Title: Revealing the robustness of membrane manufacturing techniques with single molecule microscopy  
 Sponsor: NSF – Interfacial Engineering  
 Collaborators: Lydia Kisley (CWRU Physics)  
 Role: PI  
 Dollar Amounts: \$420,000 to CWRU over 3 years  
 Status: Planned for August 2023
4. Title: Beckman Scholars Program at Case Western Reserve University  
 Sponsor: The Beckman Foundation  
 Collaborators: Don Feke, Sheila Pedigo  
 Role: Senior Personnel (mentor)  
 Dollar Amounts: to CWRU over 3 years  
 Status: Planned for July 2023
5. Title: Filtering used nuclear fuel using 2D membranes  
 Sponsor: DOE Nuclear Energy University Program  
 Collaborators: Piran Kidambi (Vanderbilt Chemical Engineering)  
 Role: PI  
 Dollar Amounts: \$350,000 to CWRU over 3 years  
 Status: Planned for October 2023

#### **Declined proposals (2017-present)**

##### **2023**

15. Title: LOI: Process Adaptation X Intensification  
 Sponsor: NSF ERC  
 Collaborators: Penn State (Lead), University of Kentucky (Partner)  
 Role: Co-PI (lead at CWRU)  
 Dollar amounts: N/A

##### **2022**

14. Title: Upstream processing for radiopharmaceutical production  
 Sponsor: 3M Non-Tenured Faculty Award  
 Collaborators: none  
 Role: Lead PI  
 Dollar amounts: \$45,000 (2 years)
13. Title: Zwitterionic Membranes for Rare Earth Element (REE) Separations  
 Sponsor: DOE, Chemical and Materials Science to Advance Clean Energy Technologies & Low Carbon Manufacturing  
 Collaborators: Ayse Asatekin (Tufts, Lead PI), Venkat Ganesan (University of Texas – Austin)  
 Role: co-PI  
 Dollar amounts: \$1.5 million total (\$462,093 to CWRU)
12. Title: Bio-inspired, REE-selective membranes: a low-carbon technology to support the clean energy supply chain  
 Sponsor: DOE, Chemical and Materials Science to Advance Clean Energy Technologies & Low Carbon Manufacturing  
 Collaborators: Julie Renner (CWRU), Lydia Kisley (CWRU), Lauren Greenlee (Penn State), Rachel Getman (Clemson), Simon Bare (SSRL/SLAC)  
 Role: Lead PI  
 Dollar amounts: \$3.6 million total (\$1.5 million to CWRU)

**2021**

11. Title: Bio-inspired, entropy-driven separation materials to purify critical lanthanides from waste streams: speciation and mechanisms  
Sponsor: Department of Energy, Office of Science: Critical Materials  
Collaborators: Julie Renner (CWRU), Lydia Kisley (CWRU), Lauren Greenlee (Penn State), Rachel Getman (Clemson), Simon Bare (SSRL/SLAC)  
Role: Lead PI  
Dollar amounts: \$3,600,000 (3 years)
10. Title: Beckman Scholars Program at Case Western Reserve University  
Sponsor: The Beckman Foundation  
Collaborators: Done Feke (CWRU), Sheila Pedigo (CWRU)  
Role: Senior Personnel
9. Title: Next generation materials for radiochemistry and f-element separations  
Sponsor: The Camille & Henry Dreyfus Foundation  
Collaborators: none  
Role: Lead PI  
Dollar amounts: \$100,000 (5 years, unrestricted)

**2020**

8. Title: Chemically resistant membranes with tailorable surface chemistry  
Sponsor: Lubrizol Innovation Fund  
Collaborators: none  
Role: PI  
Dollar amounts: \$39,698 (6 months)
7. Title: Patterned membrane adsorbers to remove radium from fracking wastewater  
Sponsor: NSF Environmental Engineering  
Collaborators: Steven Weinman (University of Alabama)  
Role: PI  
Dollar amounts: \$420,000 over 3 years

**2019**

6. Title: Advanced Separation Materials for Radiopharmaceutical Production and Purification  
Sponsor: 3M, Non-tenured faculty program  
Collaborators: none  
Role: PI  
Dollar amounts \$30,000 (3 years)
5. Title: Production and Rapid Purification of Radioisotope Pm-147  
Sponsor: DOE, Isotope Research and Production Program  
Collaborators: Vaibhav Sinha (PI: Ohio State University), Raymond Cao (co-PI: Ohio State University)  
Role: co-PI  
Dollar amounts: \$339,366 to CWRU (2 years)
4. Title: Center for the science and engineering of plasma-water interactions  
Sponsor: DOE—Fusion Energy Sciences  
Collaborators: Mohan Sankaran (co-PI: CWRU), David Go (PI: Notre Dame)  
Role: co-PI  
Dollar amounts: \$800,000 to CWRU (5 years)
3. Title: CAREER: Next generation membrane adsorbers for radiochemical separations  
Sponsor: NSF Molecular Separations  
Role: PI  
Dollar amounts: \$558,046 (5 years)

2. Title: Automated high-throughput radiochromatography for medical isotope production  
Sponsor: DOE Early Career Program (Nuclear Physics – Isotope Program)  
Collaborators: none  
Role: PI  
Dollar amounts: \$753,805 (5 years)

## 2018

1. Title: Novel Treatment Train Development for Wastewater from Munitions Constituents (MCs)  
Sponsor: Strategic Environmental Research and Development Program (SERDP)  
Collaborators: Huichun (Judy) Zhang (CWRU, PI), UIUC, UC-Riverside  
Role: co-PI Dollar amounts: \$1.5 million (3 years)

## INVITED TALKS

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### Scheduled for 2023

28. "Environmental radiation protection & the power of mentoring." *American Chemical Society, Symposium on "Early Career Women in Environmental Science & Engineering."* San Francisco, CA. August 2023.
27. "Lanmodulin peptide-functionalized separation materials for REE recovery." *American Chemical Society, Symposium on "Separations Chemistry for Critical Minerals."* San Francisco, CA. August 2023.

### Prior to June 1, 2023

25. "Developing new tools for rapid Ac-225 purification in support of targeted alpha therapy." *University of Alabama Birmingham, Department of Radiology Seminar.* May 2023.
24. "DGA membrane adsorbers: developing a chemical engineering solution for rapid Ac/Ln separations." *Angular Momentum: Online Symposium on f-elements.* April 2023, Online.
23. "Chelating membranes provide high selectivity for f-elements." *American Chemical Society, PMSE Symposium on Membranes for Molecular Separations.* Indianapolis, IL. March 2023.
22. "Membrane-based approaches for purifying medically relevant radionuclides." *University of Kentucky, Department of Chemical and Materials Engineering,* September 2022.
21. "Membrane adsorbers: a scalable technique for radionuclide purification." *Colorado State University, Department of Radiological and Health Sciences,* April 2022.
20. "Opportunities for Membranes in Nuclear Medicine." *North American Membrane Society, Virtual Seminar Series,* March 2022.
19. "Moving beyond resins in radiochemistry: membranes can lead the way." *Tufts University, Chemical and Biomolecular Engineering Seminar,* December 2021.
18. "Moving beyond resins in radiochemistry: membranes can lead the way." *University of Washington, Chemical Engineering Seminar,* October 2021.
17. "Membrane-based devices for medical isotope purification." *2020 TechConnect World,* Washington, DC, October 2021.
16. "Radiopharmaceutical production and purification: opportunities for innovation." *Vanderbilt University, Chemical and Biomolecular Engineering Seminar,* October 2021.

15. "Radiopharmaceuticals: a new frontier for membrane separations." *University of Notre Dame*, Chemical and Biomolecular Engineering Seminar, May 2021.
14. "The role of separation science in nuclear medicine." *Northeast Ohio American Chemical Society*, Keynote at Annual Award Ceremony, Cleveland OH, April 2021.
13. "Radiopharmaceuticals: a new frontier for membrane separations." *University of Alabama*, Chemical and Biomolecular Engineering Seminar, April 2021.
12. "From nuclear forensics to medical isotopes: membranes enable rapid separations." *University of Illinois Urbana Champaign*. Department of Nuclear, Plasma and Radiological Engineering Seminar, April 2021.
11. "Countering Weapons of Mass Destruction with Advanced Separations." *Case Western Reserve University*, Physics Department Colloquium, Cleveland, OH, Fall 2019.
10. "Moving beyond extractive resins in radiochemistry: membranes can lead the way." *Lawrence Livermore National Laboratory*, August 2019.
9. "Moving beyond extractive resins in radiochemistry: membranes can lead the way." *Argonne National Laboratory*, July 2019.
8. "Advanced materials for radiochemical separations." *University of Toledo*, Chemical Engineering Seminar, Toledo, OH, Spring 2019.
7. "US and International Nuclear Policy." *Science & Human Rights Coalition Meeting*, Case Western Reserve University, Cleveland OH, Spring 2019.
6. "High-capacity membrane adsorbers for radiochemical separations." *Cleveland State University*, Chemical Engineering Department Seminar, Cleveland, OH, Fall 2018.
5. "Nuclear Forensics: It's like CSI except everything is radioactive." *Rose Hulman Institute of Technology*, Chemical Engineering Department Seminar, Terre Haute, IN, May 2018.

#### **Prior to 2017**

4. "Uranium sorbent materials for environmental radiation monitoring." Case Western Reserve University, Department of Chemical and Biomolecular Engineering Seminar, Cleveland, OH, January 2017.
3. "Membranes for the selective concentration of waterborne uranium." Bucknell University, Chemical Engineering Senior Seminar, Lewisburg, PA, January 2017.
2. "Uranium sorbent materials for environmental radiation monitoring." New Jersey Institute of Technology, Chemical and Materials Engineering Seminar, Newark, NJ, December 2016.
1. "Confocal microscopy as a tool in radiation sensor design." *Focus on Microscopy Symposium*, Clemson University, Clemson, SC, April 2015.



## TEACHING EXPERIENCE

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### Case Western Reserve University

#### **ECHE 260:** Introduction to Chemical Systems (Fall 2018-present)

- Implemented active learning techniques into course lectures. Introduced students to careers in chemical engineering, fundamentals of mass and energy balances for non-reactive and reactive systems. Incorporated examples of nuclear, pharmaceutical, and environmental engineering applications such as wastewater treatment, uranium enrichment, membrane separations, nuclear reactor cooling, and cosmetics production in homework and class exercises.
  - Fall 2022 instructor rating: (4.55/5.00), Course rating (4.29/5.00)
  - Fall 2021 instructor rating: (4.57/5.00), Course rating (4.40/5.00)
  - Fall 2020 Instructor rating: (4.91/5.00), Course rating (4.79/5.00)
  - Fall 2019 Instructor rating: (4.72/5.00), Course rating: (4.47/5.00)
  - Fall 2018 Instructor rating: (4.26/5.00), Course rating: (4.20/5.00)

#### **ECHE 375:** Chemical Engineering Design Laboratory (New Undergraduate Course for Spring 2019)

- Developed a new laboratory-based course in water filtration. Students were given an open-ended design problem and designed, constructed and evaluated a bench-top water treatment system to remove an emerging contaminant. This course was piloted in Spring 2019.
  - Spring 2019 Instructor rating: (4.00/5.00), course rating: (3.86/5.00)

#### **ECHE 478:** Membrane Separations (New Graduate Course for Spring 2018)

- Developed a new graduate level course which covered transport phenomena in porous media, membrane manufacturing, reverse osmosis, microfiltration, ultrafiltration, nanofiltration, electrodialysis, fouling and special topics in membrane research.
  - Spring 2023 Instructor rating: (5.00/5.00), course rating: (4.00/5.00)
  - Spring 2020 Instructor rating: (4.67/5.00), course rating: (4.53/5.00)
  - Spring 2018 Instructor rating: (4.33/5.00), course rating: (4.33/5.00)

#### **ECHE 479:** Radiochemistry (New Graduate Course for Spring 2021)

- Developed a new graduate level course which covered fundamentals of radioactive decay, radioanalytical chemistry and radiometric methods. Homework assignments involved working with real radioanalytical data with applications in medical isotope production, nuclear forensics, and separations.
  - Spring 2022 Instructor rating: (4.80/5.00), course rating (4.80/5.00)
  - Spring 2021 Instructor rating: (4.17/5.00), course rating: (4.00/5.00)

### Clemson University

#### **CHE 499:** Membrane Separation Processes for Clean Water and Energy (*Fall 2015-Spring 2017*)

- Role: Instructor
- Proposed and designed a hands-on course for membrane module design and construction
- Applied for and received \$11,500 from Clemson University for supplies and materials

#### **CHE 211:** Introduction to Chemical Engineering (*Fall 2014 & 2015*)

- Role: Co-instructor
- Designed and presented lecture material twice per week to 120 students
- Aided the instructor in designing and grading all quizzes and exams

**ChBE Honors Thesis Project (Spring 2013-2015)**

- Role: Mentor to undergraduate student researcher
- Guidance resulted in 2 honors theses and 1 peer-reviewed publication

**CHE 211: Introduction to Chemical Engineering (Fall 2012)**

- Role: Teaching assistant
- Graded weekly homework assignments, proctored exams, led problem solving sessions

**STUDENTS AND MENTORING**

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**Current Research Mentees****Postdoctoral**

1. Bernadette Schneider (October 2022 – present)  
Project: Peptide-functionalized membranes for resource recovery

**Doctoral**

1. Maura Sepesy (August 2018 – present)  
Dissertation: Aminated membrane adsorbers in pursuit of radiopharmaceutical separation  
Defense Date: June 23, 2023  
Next position: Assistant Professor (Teaching Track), Department of Chemical and Biomolecular Engineering, University of Buffalo (Fall 2023)
2. Bethany Kersten (August 2019 – present)  
Dissertation: Electrochemical studies of actinides in molten salt and aqueous electrolytes in support of nuclear material management  
Defense Date: June 28, 2023  
Next position: Postdoctoral Researcher at Argonne National Laboratory (Fall 2023)
3. Lianna Johnson (August 2021 – present)  
Dissertation: Recovering rare earth elements from fertilizer tailings
4. TBD: Incoming Fall 2023  
Dissertation: DGA membrane adsorbers for medical isotope purification  
Funding: DOE Early Career Research Award
5. TBD: Incoming Fall 2023  
Dissertation: Rotating packed beds for radiochemical separations  
Funding: ARPA-E CURIE
6. TBD: Incoming Fall 2023  
Dissertation: Polymeric ligands for f-element separations  
Funding: NSF CAREER

**Undergraduates**

Timothy Yen	CWRU Chemical Engineering (Class of 2024)	DOE-funded project
Chae Young Yoon	CWRU Chemical Engineering (Class of 2025)	SOURCE, EHI-funded 2022
Sanaa Abu Asaad	CWRU Chemical Engineering (Class of 2026)	Bayer-funded project
Isabel Wang	CWRU Chemical Engineering (Class of 2025)	SOURCE-funded 2023
Luke Venturina	UNMT Chemical Engineering (Class of 2024)	NSF & DOE funded projects

## **Duval Lab Alumni**

### **Postdoctoral Researchers**

- |                 |             |  |
|-----------------|-------------|--|
| 1. Megan Sibley | (2021-2023) | Current: Postdoc at Oak Ridge National Lab |
|-----------------|-------------|--|

### **Doctoral Students**

- |                    |                 |   |
|--------------------|-----------------|---|
| 1. Priyanka Suresh | PhD August 2022 | Current: Associate Consultant, McKinsey & Co. |
|--------------------|-----------------|---|

### **Masters' Students (non-thesis)**

- |               |                |   |
|---------------|----------------|---|
| 1. Jialing Xu | MS Spring 2019 | Current: Ph.D. student, University of Notre Dame      |
| 2. Ming Yu    | MS Spring 2020 | Current: Ph.D. student, University of Melbourne       |
| 3. Tuli Banik | MS Spring 2023 | Next: Ph.D. student, Texas A&M University (Jan. 2024) |

### **Undergraduate Students**

- |                    |             |   |
|--------------------|-------------|---|
| 1. Kevin Pataroque | BS May 2021 | Current: Ph.D. student at Yale University, NSF GRFP |
| 2. Dylan Kulbacki  | BS May 2021 | Current: Engineer at RoviSys                        |
| 3. Manan Gupta     | BS May 2021 | Current: Engineer at Intel                          |
| 4. Spencer Schmidt | BS Dec 2021 | Current: Post-bachelors' researcher at LLNL         |
| 5. Joelle Scott    | BS Dec 2021 | Current: PhD student at U. Washington               |
| 6. Niko Kamlet     | BS May 2022 | Current: Engineer at Nike                           |
| 7. Alec Johnson    | BS May 2022 | Current: Ph.D. student at Carnegie Mellon           |
| 8. Ben Fugate      | BS Dec 2023 | Current: Patent Law Intern, CWRU Law in Fall 2023   |
| 9. Amy Che         | BS May 2023 | Current: Engineer at Regeneron                      |
| 10. Alexa Ford*    | BS May 2023 | Current: Pursuing next steps                        |

\*Alexa Ford was an undergraduate chemistry student who completed her Capstone research project in my research group. She also conducted research for credit in Fall 2022.

### **First proposition committee member: CWRU Chemical & Biomolecular Engineering**

1. Charles Loney, Fall 2017
2. Yukun "Jack" Gong, Fall 2018
3. Yun-Yang Lee, Fall 2019
4. Sara Jorgenson, Spring 2021
5. Drace Penley, Spring 2021
6. Geeta Verma, Fall 2022
7. Hairou Yu, Fall 2022
8. KangJin Lee, Fall 2022

### **Second proposition committee member: CWRU Chemical & Biomolecular Engineering**

1. Kailash Venkatraman, Fall 2018
2. Nabil Abuyazid, Fall 2019
3. Yukun "Jack" Gong, Spring 2020
4. Yun-Yang Lee, Spring 2021
5. Jacob Hostert, Spring 2021
6. Marola Issa, Fall 2022
7. Aidan Klemm, Spring 2023
8. Hairou Yu, Spring 2023

**Dissertation committee member: CWRU Chemical & Biomolecular Engineering**

1. Kailash Venkatraman. "Electrochemical Atomic Layer Deposition of Metals for Applications in Semiconductor Interconnect Metallization." October 2018, Advisor: Rohan Akolkar.
2. Yukun "Jack" Gong. "Electrochemical Atomic Layer Etching of Copper and Ruthenium" July 2021, Advisor: Rohan Akolkar
3. Yun-Yang Lee. "Composite Materials of Reactive Ionic Liquids for Selective Separation of CO<sub>2</sub> at Low Concentration " Summer 2022, Advisor: Burcu Gurkan
4. Jacob Hostert. "Peptides for nutrient and rare earth recovery" April 2023, Advisor: Julie Renner

**External Dissertation committee member**

1. Luca Mazzaferro. "Charged Self-Assembled Membranes for Efficient Separations." Tufts University, Advisor: Ayse Asatekin

**Masters' thesis committee: CWRU Chemical & Biomolecular Engineering**

1. Blaire Volbers. "Vapor Deposition Method for Surface Modifications of Cotton Fabric in Waterproofing Applications." January 2021, Advisor: Dan Lacks
2. Jason Pickering. "Understanding Coulombic Efficiency Limitations in an Acid-Base Energy Storage System: Mass Transport Through Nafion." November 2017, Advisors: Jesse Wainright and Bob Savinell

**CWRU candidacy exam committee member (outside of ECHE)**

1. Yidao Gao. "Fe(II)-associated reductants and reduction of organic pollutants in anoxic environments." November 2020, (ECIV Advisor: Judy Zhang)
2. Monge Neria, Ricardo. "Single molecule microscopy for f-element and chiral molecule separations. " March 2022, (PHYS Advisor: Lydia Kisley)

**PROFESSIONAL SERVICE**

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**American Institute of Chemical Engineers (AIChE)**

- Separations Division
  - Co-Chair of Programming for Area 2D: Membrane Separations 2022-present
  - Chaired session in Area 2D: Membranes Separations 2017-present
    - Highly selective membranes
    - Membranes for wastewater treatment and reuse
    - Charged membranes for water separations
  - TED-Sep competition judge 2017
- Education Division
  - Mentor for the Future Faculty Mentoring Program 2017-present
  - Co-chair for 'Young Faculty Forum' session 2020-2021
  - National Student Paper Competition Judge 2019
- North Central Regional Student Conference
  - Panelist in "Is Graduate School a Choice for Me?" Workshop 2022

**North American Membrane Society**

- Board of Directors 2022-present
  - Member of DEI and Workshops committee
- Session chair: Membranes in Medicine & Public Health Fall 2021
- Session chair: Membrane Synthesis and Casting 2020-2022
- Organizer: Student Workshop on Careers in Industry August 2020
- Panelist: Work-Life Balance June 2021

**Journal Reviewer**

- Nature Photonics, ACS Macro Letters, ACS Analytical Chemistry, ACS Applied Materials and Interfaces, Cellulose, J of Radioanalytical and Nuclear Chemistry, Separation Science and Technology, ACS Applied Engineering Materials

**National Science Foundation**

- CBET Panelist: Environmental Engineering, Interfacial Engineering
- Ad-hoc reviewer (Science and Technology Centers)

**US Department of Energy**

- DOE Office of Science Graduate Student Research Program (Heavy Elements, Isotope Program)
- DOE Early Career Research Award Program
- DOE RENEW
- DOE Isotope Program

**Gordon Research Conference, Membranes: Materials and Processes**

- Discussion Leader August 2018

**Phi Sigma Rho, National Engineering Sorority**

- Scholarship Foundation Review Committee Member 2014-2018
- University of Connecticut Alumnae Association Representative 2012-2013
- Alumnae Organization Member 2011-present

**INSTITUTIONAL SERVICE**

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**Case Western Reserve University****University-level**

- CWRU Working Group on Reproductive Health 2022-2023
- CWRU Radiation Safety Committee 2020-present
- UCITE- and NSF-cosponsored Mobile Institute on Scientific Teaching
  - Participant 2018
  - Co-leader for workshop on Inclusive Teaching 2019
- CWRU Board of Trustees AASL Committee, Panelist 2018

**School-level (CSE)**

- CSE Awards Committee 2021
- CSE The Engineering Game, Faculty Team 2021
- CSE Undergraduate Studies Committee 2019-2023
- CSE Dean's Welcome Event 2017-2020
- CSE Presentation to the Dean's Visiting Committee 2018

## **Department-level (Chemical & Biomolecular Engineering)**

### Seminar Coordinator

2020-present

Invite and schedule 8-12 seminar speakers per semester with new streamlined workflow using googledocs. I developed to advertise seminars through Dept. Twitter Account & Lobby TV. I also arrange meals or meetings between Speakers and relevant identity-based groups (NSBE, WISE, oSTEM, etc.)

### Current Students Committee

2021-2023

In 2021, I wrote the initial version of graduate student manual which we now update annually. In 2022, I created the Canvas site for the graduate programs.

### Ombudsperson for Graduate Students

2020-present

Meet with students seeking guidance ~ 6 times/semester and serve as a liaison between the students and the ChBE DEI committee.

### Graduate Admissions Committee

Developed a rubric for admissions (2020); Developed & Implemented SOPs for department-level review using new Slate Software; Recruited 30 new PhD students over 3 years.

- Chair
- Member

2022-present

2020-present

### Graduate Student Recruitment Committee

- Chair
- Member

2017-2019

2022-2023

As Chair, I organized the first open house visitation weekend (2018) where we hosted prospective students on campus. Each year, I lead marketing campaign through drip emails, and twitter. Coordinated with University Marketing & Communications to get a dedicated webpage for PhD program applications. I prepared the original slides for AIChE open house and virtual open houses which are now edited annually.

### Faculty Search Committee

2018-2019

Reviewed >200 applications and conducted 20 Zoom interviews for a process yielded 8 on-site interviews and 1 accepted offer

### Representative at Choice's Fair

2017-2019, 2022

## **Student life**

- Faculty Advisor, The Women's Network 2021-present
- Faculty Advisor, oSTEM, professional society for LGBTQ+ students in STEM 2021-present
- Faculty Advisor, Phi Sigma Rho, national engineering sorority 2018-2022
- Workshop, Applying to Graduate School, oSTEM 2022
- Judge, Student Drag Competition at oSTEM Rainbow Gala 2022
- Faculty Advisor, American Institute of Chemical Engineers Student Chapter 2017-2021
- Panelist, Women in STEM Career Panel, Phi Sigma Rho Eng. Sorority 2018-2020
- Workshop, Building Your Academic Online Presence, WISHED 2021
- Panelist, Engineering the Talk: Women in STEM panel, SWE and WISER 2021
- Workshop, How to get involved in research at CWRU, AIChE Student Chapter 2019
- Workshop, Applying to Graduate School, Phi Sigma Rho Eng. Sorority 2019
- Workshop, Applying to Graduate School, AIChE Student Chapter 2018

## OUTREACH AND VOLUNTEERING EXPERIENCE

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### After Fall 2017

#### **Girl Scouts of Northeast Ohio “Get to Know Nuclear”** (40 total participants: 2020, 2023)

- Organized a workshop for middle school aged-girl scouts
- Coordinated CWRU graduate and undergraduate student volunteers to co-lead activities

#### **CWRU Engineering Challenges Carnival** (12 total participants: 2021, 100 attendees: 2020)

- Online radioactive mystery “Help me find my radioactive puppy” that taught elementary school students about nuclear forensics

#### **Sciencepalooza: The Reverse Science Fair** (30 total participants: 2020)

- Organized a virtual demonstration related to radiation detection for students at John Hay High School located in Cleveland, OH

#### **Clemson Young Alumni Panel**, (March 2020)

#### **The Beaumont School, Junior Shadowing Day** (1 participant: 2018)

- Sponsored a student from an all-women’s high school for her professional shadowing experience to expose her to career options in chemical engineering

### Before Fall 2017

#### **Girl Scouts of the Upstate “Get to Know Nuclear”** (30 total participants: 2016)

- Designed a two-day workshop for girls in 4<sup>th</sup> - 8<sup>th</sup> grade
- Coordinated activities with 10 graduate student volunteers across 2 departments

#### **WISE “Introduce a Girl to Engineering and Science” Day** (75 total participants: 2015)

- Organized and led a hands-on filtration experiment for middle school girls
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#### **Project WISE Activity Leader** (30 total participants: 2015)

- Coordinated graduate and undergraduate student volunteers to lead hands-on chemical engineering separations through use of enzymes and filtration with middle school girls

#### **PEER/WISE Summer School Leader for Chemical Engineering** (20 total participants: 2014)

- Led underrepresented, incoming freshman in hands-on learning modules
- Taught students how to use radiation detectors and construct filtration units

#### **Stone Academy “Science is Fun Day,” Volunteer** (40 total participants: 2014, 2015)

- Led science activities with groups of first grade students focused on filtration

#### **Youth Soccer and Basketball Coach, Pickens County YMCA** (60 total participants: 2013-2016)