

Alexander W. Dowling

Tony & Sarah Earley Collegiate Chair of Energy and the Environment
Associate Professor of Chemical and Biomolecular Engineering (primary)
Concurrent Associate Professor of Applied & Computational Mathematics & Statistics
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EDUCATION

Ph.D. in Chemical Engineering (Process Systems Engineering), 2015
Carnegie Mellon University, Pittsburgh, PA

B.S.E. in Chemical Engineering (*Summa Cum Laude*), 2010
University of Michigan, Ann Arbor, MI

PROFESSIONAL EXPERIENCE

University of Notre Dame, Department of Chemical and Biomolecular Engineering
Tony & Sarah Earley Collegiate Chair of Energy & the Environment. July 2025 - Present
Associate Professor with tenure. July 2023 - Present
Assistant Professor. July 2017 - June 2023
Concurrent Appointment in Applied & Computational Mathematics & Statistics. April 2022 - Present

National Energy Technology Laboratory, Oak Ridge Institute for Science and Education (ORISE)
ORISE Faculty Fellow (part-time). July 2018 - October 2022

University of Wisconsin - Madison, Department of Chemical and Biological Engineering
Postdoctoral Fellow. August 2015 - July 2017

HONORS AND AWARDS

- CAST Outstanding Young Researcher Award, AIChE, 2025
- James A. Burns, C.S.C., Award (mid career, university-wide), Graduate School, U. Notre Dame, 2025
- *Industrial & Engineering Chemistry Research* Class of Influential Researchers, 2024
- FOCAPD Most Viewed/Downloaded Paper, 2024
- FOCAPD Most Contributed Papers (tied), 2024
- Junior Sargent Medal, Institute of Chemical Engineers (IChemE), 2023
- Emerging Star in Digital Chemical Engineering, Invited Paper, 2023
- Outstanding Mentor Award (university-wide), Graduate Student Government, U. Notre Dame, 2023
- Highly read article (top 10% of downloads) in AIChE Journal, 2022
- Inside front cover, *Energy & Environmental Science*, Issue 12, 2022
- AIChE Futures, Invited Paper and Presentation, 2022
- R&D 100 Award, IDAES PSE Computational Platform, 2020
- National Science Foundation CAREER Award, 2019
- R&D 100 Award, Carbon Capture Simulation Initiative (CCSI) Toolset, 2016
- Mark Dennis Karl Outstanding Graduate Teaching Award, Carnegie Mellon University, 2013
- Graduate Research Fellowship Honorable Mention, National Science Foundation, 2010
- 3rd Place in World Solar Challenge (race), U. of Michigan Solar Car Team, 2009
- 1st Place in North American Solar Challenge (race), U. of Michigan Solar Car Team, 2008
- Eagle Scout, Boy Scouts of America, 2005

Legend: [×] Notre Dame (ND) graduate students; [†] ND or visiting undergraduate researchers; [◇] ND post doctoral scholars; * corresponding author(s).

- [M6] D. J. Laky[◇], S. Lilonfe[×], S. B. Martin, K. A. Klise, B. L. Nicholson, J. D. Sirola, and **A. W. Dowling***. “Optimal Experimental Design using Eigenvalue-Based Criteria with Pyomo.DoE” (2026). under review. DOI: 10.48550/arXiv.2604.03354.
- [M5] E. S. Rawlings*, N. Susarla, J. Ghouse, **A. W. Dowling**, J. D. Sirola, and D. C. Miller. “Simultaneous Design and Operation of Integrated Thermal Energy Systems via Disjunctive Multi-Period Nonlinear Optimization” (2026). under review.
- [M4] J. Yao, M. Dougher[×], A. Lee, A. Garciadiego, T. J. Tarka, **A. W. Dowling**, and C. E. Gounaris*. “Robust Optimization of Flexible Diafiltration Systems for Critical Mineral Separations” (2026). under review.
- [M3] X. Chen[×], R. T. Gooty, D. Guittet, B. Knueven, D. J. Laky[◇], X. Gao[×], J. K. Skolfield, J. Ghouse, J. D. Sirola, D. C. Miller, A. P. Burgard, and **A. W. Dowling***. “Beyond Price-taker: Machine Learning Surrogate Assisted Optimization of Integrated Energy Systems to Co-produce Electricity and Hydrogen.” *SSRN* (2025). under revision. DOI: 10.2139/ssrn.5392564.
- [M2] M. S. Mim[×], S. Cini[×], C. Frank[×], Z. Wang, **A. W. Dowling**, and J. J. Zartman*. “Forward Engineering Organ Development and Cancer Therapeutics with Optogenetics.” *bioRxiv* (2025). under review. DOI: 10.1101/2025.05.16.653804.
- [M1] M. J. Watson[×], A. V. da Silva, P. G. Machado, C. O. Ribeiro, C. A. Nascimento, and **A. W. Dowling***. “Incentivizing Sustainable Aviation Fuel: Supply Chain and Policy Insights from Brazil” (2025). under review.

JOURNAL PUBLICATIONS

Notre Dame:

- [J64] M. N. Carlozo[×], N. Wang[×], **A. W. Dowling***, and E. J. Maginn*. “Development of accurate transferable hydrofluorocarbon refrigerant force fields using a machine learning and optimization approach.” *Digital Discovery* (2026). in press. DOI: 10.1039/D5DD00537J.
- [J63] K. D. Jones[×] and **A. W. Dowling***. “BITS for GAPS: Bayesian Information-Theoretic Sampling for hierarchical GAussian Process Surrogates.” *Computers & Chemical Engineering* (2026). in press. DOI: 10.1016/j.compchemeng.2026.109650.
- [J62] B. Agbodekhe[×], M. N. Carlozo[×], D. O. Abranches[×], K. D. Jones[×], **A. W. Dowling***, and E. J. Maginn*. “Enhanced thermophysical property prediction with uncertainty quantification using group contribution-Gaussian process regression.” *Molecular Systems Design & Engineering* 11 (1 Jan. 2026), pp. 85–106. DOI: 10.1039/d5me00126a.
- [J61] S. Kim[◇], S.-W. Ahn, I.-S. Suh, **A. W. Dowling***, E. Lee*, and T. Luo*. “Quantum Annealing for Combinatorial Optimization: A Benchmarking Study.” *npj Quantum Information* (11 2025), p. 77. DOI: 0.1038/s41534-025-01020-1.
- [J60] S. Summits, R. Hughes, C. E. Ezeobinwune, D. Laky, **A. W. Dowling**, and D. Bhattacharyya. “Modeling and Optimization of a Rotating Packed Bed Contactor with a Tetraamine-Appended Metal–Organic Framework for CO₂ Capture.” *Energy & Fuels* 39 (43 Oct. 2025), pp. 20860–20872. DOI: 10.1021/acs.energyfuels.5c03857.
- [J59] M. Carlozo[×], K. Wang[×], and **A. W. Dowling***. “Bayesian Optimization Methods for Nonlinear Model Calibration.” *Industrial & Engineering Chemistry Research* 64 (37 Sept. 2025), pp. 18277–18297. DOI: 10.1021/acs.iecr.4c03468.
- [J58] X. Liu[×], L. Estrada[×], J. Ouimet[×], M. McClure, D. Latulippe, W. A. Phillip*, and **A. W. Dowling***. “Characterizing Transport Properties of Surface Charged Nanofiltration Membranes via Model-based Data Analytics.” *Industrial & Engineering Chemistry Research* 64 (24 June 2025), pp. 12111–12130. DOI: 10.1021/acs.iecr.4c04763.
- [J57] X. Chen[×], X. Gao[×], D. Guittet, R. Tumbalam-Gooty, B. Knueven, J. D. Sirola, D. C. Miller, and **A. W. Dowling***. “Beyond Price-Taker: Multiscale Optimization of Wind and Battery Integrated Energy Systems.” *IEEE Transactions on Energy Markets, Policy, and Regulation* 3 (3 May 2025), pp. 297–308. DOI: 10.1109/TEMPR.2025.3564533.

- [J56] D. T. Agi[×], H. A. Hawa, K. Hawley, and **A. W. Dowling^{*}**. “Techno-economic Analysis and Optimization of Water-Gas Shift Membrane Reactors for Low-Carbon Hydrogen Production.” *International Journal of Hydrogen Energy* 102 (Feb. 2025), pp. 1010–1025. DOI: 10.1016/j.ijhydene.2024.12.344.
- [J55] M. Watson[×], A. V. da Silva, P. G. Machado, C. de Oliveira Ribeiro, C. A. O. do Nascimento, and **A. W. Dowling^{*}**. “The Case for Biojet Fuel from Bioethanol in Brazil: An Optimization-based Analysis Using Historical Market Data.” *Industrial & Engineering Chemistry Research* 64 (8 Feb. 2025). Special Issue: 2024 Class of Influential Researchers, pp. 4410–4424. DOI: 10.1021/acs.iecr.4c03039.
- [J54] D. J. Laky[◇], N. P. Cortes[×], J. C. Eslick, A. A. Noring, N. Susarla, C. Okoli, M. A. Zamarripa, D. A. Allan, J. H. Brewer, A. K. Iyengar, M. Wang, A. P. Burgard, D. C. Miller, and **A. W. Dowling^{*}**. “Market Optimization and Technoeconomic Analysis of Hydrogen-Electricity Coproduction Systems.” *Energy & Environmental Science* 17 (24 Dec. 2024), pp. 9509–9525. DOI: 10.1039/D4EE02394C.
- [J53] J. Ouimet[×], F. Al-Badani[×], X. Liu[×], L. Lair[×], Z. Muetzel[†], **A. W. Dowling**, and W. A. Phillip^{*}. “Automated membrane characterization: In-situ monitoring of the permeate and retentate solutions using a 3D printed permeate probe device.” *Journal of Membrane Science Letters* 4 (2 Dec. 2024), p. 100087. DOI: 10.1016/j.memlet.2024.100087.
- [J52] X. Liu[×], J. Ouimet[×], J. Hoffman[×], J. Xu[×], W. A. Phillip, and **A. W. Dowling^{*}**. “Optimization of Reactive Ink Formulation for Controlled Additive Manufacturing of Copolymer Membranes Functionalization.” *ACS Applied Materials & Interfaces* (43 Oct. 2024), pp. 59216–59233. DOI: 10.1021/acsami.4c11749.
- [J51] J. Wang[×], Z. Peng, R. Hughes, D. Bhattacharyya, D. E. B. Neira, and **A. W. Dowling^{*}**. “Measure This, Not That: Optimizing the Cost and Model-Based Information Content of Measurements.” *Computers & Chemical Engineering* 189 (Oct. 2024), p. 108786. DOI: 10.1016/j.compchemeng.2024.108786.
- [J50] Z. Cheng[×], K. Wang[×], A. Tanvir[×], W. Shang[×], T. Luo, Y. Zhang, **A. W. Dowling^{*}**, and D. Go^{*}. “Bayesian Optimization of Low-Temperature Nonthermal Plasma Jet Sintering of Nanoinks.” *ACS Applied Materials & Interfaces* 16 (35 Aug. 2024). DOI: 10.1021/acsami.4c07936.
- [J49] L. Lair[×], J. A. Ouimet[×], M. Dougher[×], B. W. Boudouris, **A. W. Dowling**, and W. A. Phillip^{*}. “Critical Mineral Separations: Opportunities for Membrane Materials and Processes to Advance Sustainable Economies and Secure Supplies.” *Annual Review of Chemical and Biomolecular Engineering* 15 (July 2024), pp. 243–266. DOI: 10.1146/annurev-chembioeng-100722-114853.
- [J48] K. Song[◇], G. Xu[×], A. N. M. Tanvir[×], K. Wang[×], M. O. Bappy[×], H. Yang, W. Shang[×], L. Zhou, **A. W. Dowling**, T. Luo, and Y. Zhang^{*}. “Machine learning-assisted 3D printing of thermoelectric materials of ultrahigh performances at room temperature.” *Journal of Materials Chemistry A* 12.32 (July 2024), pp. 21243–21251. DOI: 10.1039/D4TA03062A.
- [J47] K. Ghosh[×], S. D. Salas, A. Garciadiego[×], J. B. Dunn, and **A. W. Dowling^{*}**. “Multiscale Equation-Oriented Optimization Decreases the Carbon Intensity of Shale Gas to Liquid Fuel Processes.” *ACS Sustainable Chemistry & Engineering* 12 (28 June 2024), pp. 10351–10362. DOI: 10.1021/acssuschemeng.4c00933.
- [J46] N. Kumar[×], M. S. Mim[×], **A. W. Dowling**, and J. Zartman^{*}. “Reverse engineering morphogenesis through Bayesian optimization of physics-based models.” *npj Systems Biology and Applications* 10 (May 2024). DOI: 10.1038/s41540-024-00375-z.
- [J45] A. N. M. Tanvir[×], M. O. Bappy, M. Zeng[◇], W. Shang[×], K. Wang[×], K. Song, Y. Liud, E. Isotta, M. G. Kanatzidis, G. J. Snyder, **A. W. Dowling**, T. Luo, and Y. Zhang^{*}. “High performance thermoelectric composites via scalable and low-cost ink processing.” *Energy & Environmental Science* 17 (May 2024), pp. 4560–4568. DOI: 10.1039/D4EE00866A.
- [J44] M. J. Watson[×], P. Machado, A. da Silva, Y. Rivera, C. Ribeiro, C. Nascimento, and **A. W. Dowling^{*}**. “Sustainable aviation fuel technologies, costs, emissions, policies, and markets: a critical review.” *Journal of Cleaner Production* 449 (Apr. 2024), p. 141472. DOI: 10.1016/j.jclepro.2024.141472.
- [J43] D. T. Agi[×], K. D. Jones[×], M. J. Watson[×], H. G. Lynch[×], M. Dougher[×], X. Chen[×], M. N. Carlozo[×], and **A. W. Dowling^{*}**. “Computational Toolkits for model-based design and optimization.” *Current Opinion in Chemical Engineering* 43 (Mar. 2024), p. 100994. DOI: 10.1016/j.coche.2023.100994.
- [J42] B. Agbodekhe[×], E. Marin-Rimoldi, Y. Zhang, **A. W. Dowling**, and E. J. Maginn^{*}. “Assessment and Ranking of Difluoromethane (R32) and Pentafluoroethane (R125) Interatomic Potentials Using Several Thermophysical and Transport Properties Across Multiple State Points.” 69 (2 Feb. 2024), pp. 427–444. DOI: 10.1021/acs.jced.3c00379.

- [J41] J. Jalving, J. Ghouse, N. Cortes[×], X. Gao[×], B. Knueven, D. Agi[×], S. Martin, X. Chen[×], D. Guittet, R. Tumbalam-Gooty, L. Bianchi, K. Beattie, D. Gunter, J. Sirola, D. Miller, and **A. W. Dowling^{*}**. “Beyond price taker: Conceptual design and optimization of integrated energy systems using machine learning market surrogates.” *Applied Energy* 351 (Dec. 2023), p. 121767. DOI: 10.1016/j.apenergy.2023.121767.
- [J40] E. Eugene[×], K. Jones[×], X. Gao[×], J. Wang[×], and **A. W. Dowling^{*}**. “Learning and optimization under epistemic uncertainty with Bayesian hybrid models.” *Computers & Chemical Engineering* 179 (Nov. 2023), p. 108430. DOI: 10.1016/j.compchemeng.2023.108430.
- [J39] J. A. Ouimet[×], **A. W. Dowling**, and W. A. Phillip^{*}. “Isolating the effects of gate layer permeability and sorbent density on the performance of solute-selective polymeric ion pumps.” *Molecular Systems Design & Engineering* 8 (11 Nov. 2023), pp. 1418–1429. DOI: 10.1039/d3me00073g.
- [J38] W. Shang[×], M. Zeng[◊], A. Tanvir[×], K. Wang[×], M. Saeidi-Javash[×], **A. W. Dowling^{*}**, T. Luo^{*}, and Y. Zhang^{*}. “Hybrid Data-driven Discovery of High-performance Silver Selenide-based Thermoelectric Composites.” *Advanced Materials* 35 (47 Nov. 2023), p. 2212230. DOI: 10.1002/adma.202212230.
- [J37] B. J. Befort[×], A. Garciadiego[×], J. Wang[×], K. Wang[×], G. Franco[†], E. J. Maginn, and **A. W. Dowling^{*}**. “Data Science for Thermodynamic Modeling: A Case Study for Ionic Liquid and Hydrofluorocarbon Refrigerant Mixtures.” *Fluid Phase Equilibria (invited special issue)* 572 (Sept. 2023), p. 113833. DOI: 10.1016/j.fluid.2023.113833.
- [J36] R. González-Pérez[×], S. Adams[×], **A. W. Dowling**, W. Phillip, and J. Whitmer^{*}. “Thermodynamics of Li+–Crown Ether Interactions in Aqueous Solvent.” *The Journal of Physical Chemistry A* 127 (21 May 2023), pp. 4624–4631. DOI: 10.1021/acs.jpca.3c00094.
- [J35] N. Wang[×], M. Carlozo[×], E. Marin-Rimoldi, B. Befort[×], **A. W. Dowling**, and E. J. Maginn^{*}. “Machine Learning Enabled Development of Accurate Force Fields for Refrigerants.” *Journal of Chemical Theory and Computation* 19 (14 May 2023), pp. 4546–4558. DOI: 10.1021/acs.jctc.3c00338.
- [J34] K. Wang[×], M. Zeng[◊], J. Wang[×], W. Shang[×], Y. Zhang, T. Luo, and **A. W. Dowling^{*}**. “When Physics-Informed Data Analytics Outperforms Black-box Machine Learning: A Case Study in Thickness Control for Additive Manufacturing.” *Digital Chemical Engineering (Invited Rising Stars Special Issue)* 6 (Mar. 2023), p. 100076. DOI: 10.1016/j.dche.2022.100076.
- [J33] A. Garciadiego[×], B. J. Befort[×], G. Franco[†], M. Mazumder[◊], and **A. W. Dowling^{*}**. “What data are most valuable to screen ionic liquid entrainers for hydrofluorocarbon refrigerant reuse and recycling?” *Industrial & Engineering Chemistry Research* 61 (50 Dec. 2022), pp. 18412–18425. DOI: 10.1021/acs.iecr.2c01928.
- [J32] K. Mukherjee[×], **A. W. Dowling**, and Y. J. Colón^{*}. “Sequential design of adsorption simulations in metal–organic frameworks.” *Molecular Systems Design & Engineering* 7 (Dec. 2022), pp. 248–259. DOI: 10.1039/D1ME00138H.
- [J31] J. Wang[×] and **A. W. Dowling^{*}**. “Pyomo.DOE: An Open-Source Package for Model-Based Design of Experiments in Python.” *AIChE Journal (invited Futures 2022 special issue)* (Dec. 2022), e17813. DOI: 10.1002/aic.17813.
- [J30] M. Saeidi-Javash[×], K. Wang[×], M. Zeng[◊], T. Luo, **A. W. Dowling**, and Y. Zhang^{*}. “Machine Learning-Assisted Ultrafast Flash Sintering of High-Performance and Wearable Silver-Selenide Thermoelectric Devices.” *Energy & Environmental Science* (Oct. 2022), pp. 5093–5104. DOI: 10.1039/D2EE01844F.
- [J29] C. P. O’Brien^{*}, M. J. Watson[×], and **A. W. Dowling**. “Challenges and Opportunities in Converting CO₂ to Carbohydrates.” *ACS Energy Letters* 7.10 (Sept. 2022), pp. 3509–3523. DOI: 10.1021/acsenergylett.2c01550.
- [J28] N. P. Wamble[†], E. A. Eugene[×], W. A. Phillip, and **A. W. Dowling^{*}**. “Optimal Diafiltration Membrane Cascades Enable Green Recycling of Spent Lithium-Ion Batteries.” *ACS Sustainable Chemistry & Engineering* 10 (37 Sept. 2022), pp. 12207–12225. DOI: 10.1021/acssuschemeng.2c02862.
- [J27] K. Ghosh[×], S. Vernuccio, and **A. W. Dowling^{*}**. “Nonlinear Reactor Design Optimization with Embedded Microkinetic Model Information.” *Frontiers in Chemical Engineering (Editors’ Showcase: Computational Methods in Chemical Engineering special issue)* (July 2022). DOI: 10.3389/fceng.2022.898685.
- [J26] X. Gao[×], B. Knueven, J. D. Sirola, D. C. Miller, and **A. W. Dowling^{*}**. “Multiscale Simulation of Integrated Energy System and Electricity Market Interactions.” *Applied Energy* 316 (June 2022), p. 119017. DOI: 10.1016/j.apenergy.2022.119017.

- [J25] K. Wang[×] and **A. W. Dowling**^{*}. “Bayesian optimization for chemical products and functional materials.” *Current Opinion in Chemical Engineering* 36 (June 2022), p. 100728. DOI: 10.1016/j.coche.2021.100728.
- [J24] J. A. Ouimet[×], X. Liu[×], D. J. Brown[†], E. A. Eugene[×], T. Popps[†], Z. W. Muetzel[†], **A. W. Dowling**, and W. A. Phillip^{*}. “DATA: Diafiltration Apparatus for high-Throughput Analysis.” *Journal of Membrane Science* 641 (Jan. 2022), p. 119743. DOI: 10.1016/j.memsci.2021.119743.
- [J23] K. R. Baca, G. M. Olsen, L. Matamoros Valenciano, M. G. Bennett, D. M. Haggard, B. J. Befort[×], A. Garciadiego[×], **A. W. Dowling**, E. J. Maginn, and M. B. Shiflett^{*}. “Phase Equilibria and Diffusivities of HFC-32 and HFC-125 in Ionic Liquids for the Separation of R-410A.” *ACS Sustainable Chemistry & Engineering* 10.2 (Dec. 2021), pp. 816–830. DOI: 10.1021/acssuschemeng.1c06252.
- [J22] C. T. Elmore[†] and **A. W. Dowling**^{*}. “Learning Spatiotemporal Dynamics in Wholesale Energy Markets with Dynamic Mode Decomposition.” *Energy* 232 (Oct. 2021), p. 121013. DOI: 10.1016/j.energy.2021.121013.
- [J21] C. P. Kilmartin[†], J. A. Ouimet[×], **A. W. Dowling**, and W. A. Phillip^{*}. “Staged Diafiltration Cascades Provide Opportunities to Execute Highly Selective Separations.” *Industrial & Engineering Chemistry Research* 60.43 (Oct. 2021), pp. 15706–15719. DOI: 10.1021/acs.iecr.1c02984.
- [J20] B. J. Befort[×], R. S. DeFever[◊], G. M. Tow[×], **A. W. Dowling**, and E. J. Maginn^{*}. “Machine Learning Directed Optimization of Classical Molecular Modeling Force Fields.” *Journal of Chemical Information and Modeling* 61.9 (Aug. 2021), pp. 4400–4414. DOI: 10.1021/acs.jcim.1c00448.
- [J19] E. A. Eugene[×], W. A. Phillip, and **A. W. Dowling**^{*}. “Material property targets to enable adsorptive water treatment and resource recovery systems.” *ACS ES&T Engineering* 1.8 (June 2021), pp. 1171–1182. DOI: 10.1021/acsestengg.0c00046.
- [J18] A. Garciadiego[×], T. Luo, and **A. W. Dowling**^{*}. “Molecular design targets and optimization of low-temperature thermal desalination systems.” *Desalination* 504 (May 2021), p. 114941. DOI: 10.1016/j.desal.2021.114941.
- [J17] R. S. DeFever[◊], R. A. Matsumoto, **A. W. Dowling**, P. T. Cummings, and E. J. Maginn^{*}. “MoS-DeF Cassandra: A complete Python interface for the Cassandra Monte Carlo software.” *Journal of Computational Chemistry* 42.18 (Apr. 2021), pp. 1321–1331. DOI: 10.1002/jcc.26544.
- [J16] A. Lee^{*}, J. H. Ghouse, J. C. Eslick, C. D. Laird, J. D. Sirola, M. A. Zamarripa, D. Gunter, J. H. Shinn, **A. W. Dowling**, D. Bhattacharyya, L. T. Biegler, A. P. Burgard, and D. C. Miller. “The IDAES process modeling framework and model library—Flexibility for process simulation and optimization.” *Journal of Advanced Manufacturing and Processing* (Apr. 2021), e10095. DOI: 10.1002/amp2.10095.
- [J15] A. Morais, A. Harders, K. Baca, G. Olson, Befort, Bridgette[×], **A. W. Dowling**, E. Maginn, and M. Shiflett^{*}. “Phase Equilibria, Diffusivities, and Equation of State Modeling of HFC-32 and HFC-125 in Imidazolium-based Ionic Liquids for the Separation of R-410A.” *Industrial & Engineering Chemistry Research* 59.40 (Sept. 2020), pp. 18222–18235. DOI: 10.1021/acs.iecr.0c02820.
- [J14] J. Verrett^{*}, F. Boukouvala, **A. W. Dowling**, Z. Ulissi, and V. Zavala. “Computational Notebooks in Chemical Engineering Curricula.” *Chemical Engineering Education* 54.3 (July 2020), pp. 143–150.
- [J13] F. Sorourifar, V. M. Zavala, and **A. W. Dowling**^{*}. “Integrated Multiscale Design, Market Participation, and Replacement Strategies for Battery Energy Storage Systems.” *IEEE Transactions on Sustainable Energy* 11.1 (Jan. 2020), pp. 84–92. DOI: 10.1109/TSTE.2018.2884317.
- [J12] Elvis A. Eugene[×], W. A. Phillip, and **A. W. Dowling**^{*}. “Data science-enabled molecular-to-systems engineering for sustainable water treatment.” *Current Opinion in Chemical Engineering* 26 (Dec. 2019), pp. 122–130. DOI: 10.1016/j.coche.2019.10.002.

Before Notre Dame:

- [J11] **A. W. Dowling** and V. M. Zavala. “Economic Opportunities for Industrial Systems in Frequency Regulation Markets.” *Computers & Chemical Engineering* 114.9 (2018), pp. 254–264. DOI: 10.1016/j.compchemeng.2017.09.018.
- [J10] **A. W. Dowling**, T. Zheng, and V. M. Zavala. “A decomposition algorithm for simultaneous scheduling and control of CSP systems.” *AIChE Journal* 64.7 (2018), pp. 2408–2417. DOI: 10.1002/aic.16101.
- [J9] J. A. Renteria, Y. Cao, **A. W. Dowling**, and V. M. Zavala. “Optimal PID Controller Tuning using Stochastic Programming Techniques.” *AIChE Journal* 64.8 (2018), pp. 2997–3010. DOI: 10.1002/aic.16030.

- [J8] **A. W. Dowling**, T. Zheng, and V. M. Zavala. “Economic Assessment of Concentrated Solar Power Technologies: A review.” *Renewable & Sustainable Energy Review* 72 (May 2017), pp. 1019–1032. DOI: 10.1016/j.rser.2017.01.006.
- [J7] **A. W. Dowling**, R. Kumar, and V. M. Zavala. “A Multi-Scale Optimization Framework for Electricity Market Participation.” *Applied Energy* 190 (Mar. 2017), pp. 147–164. DOI: 10.1016/j.apenergy.2016.12.081.
- [J6] L. F. Fuentes-Cortes, **A. W. Dowling**, C. Rubio-Maya, V. M. Zavala, and J. Ponce-Ortega. “Integrated Design and Control of Multigeneration Systems for Building Complexes.” *Energy* 116.2 (Dec. 2016), pp. 1403–1416. DOI: 10.1016/j.energy.2016.05.093.
- [J5] **A. W. Dowling**, G. Ruiz-Mercado, and V. M. Zavala. “A Framework for Multi-Stakeholder Decision-Making and Conflict Resolution.” *Computers & Chemical Engineering* 90 (July 2016), pp. 136–150. DOI: 10.1016/j.compchemeng.2016.03.034.
- [J4] J. Ma, J. P. Eason, **A. W. Dowling**, L. T. Biegler, and D. C. Miller. “Development of a first-principles hybrid boiler model for oxy-combustion power generation system.” *International Journal of Greenhouse Gas Control* 46 (Mar. 2016), pp. 136–157. DOI: 10.1016/j.ijggc.2015.12.036.
- [J3] **A. W. Dowling**, C. Balwani, Q. Gao, and L. T. Biegler. “Optimization of Sub-Ambient Separation Systems with Embedded Cubic Equation of State Thermodynamic Models and Complementarity Constraints.” *Computers & Chemical Engineering* 81 (Oct. 2015), pp. 323–343. DOI: 10.1016/j.compchemeng.2015.04.038.
- [J2] **A. W. Dowling** and L. T. Biegler. “A Framework for Efficient Large Scale Equation-Oriented Flow-sheet Optimization.” *Computers & Chemical Engineering* 72 (Jan. 2015), pp. 3–20. DOI: 10.1016/j.compchemeng.2014.05.013.
- [J1] **A. W. Dowling**, S. R. R. Vetukuri, and L. T. Biegler. “Large-Scale Optimization Strategies for Pressure Swing Adsorption Cycle Synthesis.” *AIChE Journal* 58.12 (Oct. 2012), pp. 3777–3791. DOI: 10.1002/aic.13928.

INVITED PRESENTATIONS, WORKSHOPS, AND SHORT-COURSES

Notre Dame:

- [T57] *Optimizing Experiments: From Data-Driven to Intrusive Model-Based Methods*. Department Seminar, Oklahoma State University. Stillwater, OK, Apr. 2026.
- [T56] *Optimizing Experiments: From Data-Driven to Intrusive Model-Based Methods*. Department Seminar, Carnegie Mellon University. Pittsburgh, PA, Feb. 2026.
- [T55] *Optimizing Experiments: From Data-Driven to Intrusive Model-Based Methods*. Department Seminar, McMaster University. Hamilton, ON, Jan. 2026.
- [T54] *Optimizing Experiments: From Data-Driven to Intrusive Model-Based Methods*. Department Seminar, University of Waterloo. Waterloo, ON, Jan. 2026.
- [T53] *Optimizing Experiments: From Data-Driven to Intrusive Model-Based Methods*. Department Seminar, Virginia Commonwealth University. Richmond, VA, Nov. 2025.
- [T52] *Optimizing Experiments: From Data-Driven to Intrusive Model-Based Methods*. PSE Seminar, Massachusetts Institute of Technology. virtual, Sept. 2025.
- [T51] *Optimizing Experiments: From Data-Driven to Intrusive Model-Based Methods*. Seminar, Procter & Gamble. Manson, OH, Aug. 2025.
- [T50] *Artificial Intelligence, Machine Learning, and Data Science for Sustainable Molecular-to-Systems Engineering*. Department Seminar, Kansas State University. Manhattan, KS, May 2025.
- [T49] *Optimizing Experiments: From Data-Driven to Model-Based Approaches*. AIChE Spring Meeting, Invited Tutorial, Industry 4.0 Topical Conference. Dallas, TX, Apr. 2025.
- [T48] *Accelerating Research Convergence: Opportunities for Systems Engineering in ERC EARTH*. Invited Dinner Presentation, EARTH ERC Meeting. University of Kansas, Lawrence, KS, Mar. 2025.
- [T47] *Optimizing Experiments with Pyomo.DoE*. Spark Scientific AI Workshop. University of Notre Dame, Notre Dame, IN, Mar. 2025.
- [T46] *Artificial Intelligence, Machine Learning, and Data Science for Sustainable Molecular-to-Systems Engineering*. Department Seminar, Rowan University. Glassboro, NJ, Feb. 2025.

- [T45] *Artificial Intelligence, Machine Learning, and Data Science for Sustainable Molecular-to-Systems Engineering*. Department of Chemical Engineering Seminar. University of São Paulo, Brazil, Oct. 2024.
- [T44] *Artificial Intelligence, Machine Learning, and Data Science in Chemical Engineering*. PAIC Town Hall, AIChE Annual Meeting. San Diego, CA, Oct. 2024.
- [T43] *Optimization in Python*. Four-Day Short Course. University of São Paulo, Brazil, Oct. 2024.
- [T42] *Optimizing Experiments with Pyomo.DoE*. Seminar/Tutorial at Sandia National Laboratory. Albuquerque, NM, Oct. 2024.
- [T41] *Artificial Intelligence, Machine Learning, and Data Science for Sustainable Molecular-to-Systems Engineering*. NDnano Lunch Seminar Series. University of Notre Dame, Notre Dame, IN, Sept. 2024.
- [T40] *Optimizing Experiments with Pyomo.DoE*. Software Workshop at Process Systems Engineering Summit. Pittsburgh, PA, Sept. 2024.
- [T39] *Artificial Intelligence, Machine Learning, and Data Science for Sustainable Molecular-to-Systems Engineering*. AIChE Environmental Division Webinar (Invited). virtual, Aug. 2024.
- [T38] *Towards Molecular-to-Systems Optimization of Membrane Separations*. American Chemical Society Meeting (Invited Presentation). Denver, CO, Aug. 2024.
- [T37] *Artificial Intelligence, Machine Learning, and Data Science for Sustainable Molecular-to-Systems Engineering*. Foundations of Computer-Aided Process Design (FOCAPD) Conference (Keynote Presentation). Breckenridge, CO, July 2024.
- [T36] *Optimizing Experiments with Pyomo.DoE*. Workshop and Software Tutorial at European Symposium on Computer Aided Process Engineering (ESCAPE). Florence, Italy, June 2024. URL: <https://dowlinglab.github.io/pyomo-doe/>.
- [T35] *Pyomo.DoE: An Open-Source Python Package for Model-based (Science-based) Design of Experiments*. BASF Data Science Seminar. virtual, Feb. 2024.
- [T34] *Measure This, Not That: Pareto Optimal Trade-Offs between Model-Based Information Content and Measurements Cost*. CAST Planery, AIChE Annual Meeting. Orlando, FL, Nov. 2023.
- [T33] *Pyomo.DoE: An Open-Source Python Package for Model-based (Science-based) Design of Experiments*. Dow Chemical Company Data Science Seminar. virtual, Sept. 2023.
- [T32] *Beyond Price Taker: Optimization of Integrated Energy Systems that Co-Produce Hydrogen and Electricity*. Institution of Chemical Engineers (IChemE) Virtual Seminar Series. virtual, July 2023.
- [T31] *Pyomo.DoE: Enabling model-based design of experiments in the Pyomo ecosystem*. Symposium on Model Based Design of Experiments (Invited Presentation). Sargent Centre for Process Systems Engineering, Imperial College London, UK, June 2023.
- [T30] *Adaptively Optimizing Experiments: Past, Present, and Future*. SIAM Conference on Optimization Mini-Symposium (Invited Presentation). Seattle, WA, May 2023.
- [T29] *Beyond Price Taker: Market-Based Technoeconomic Optimization of Integrated Energy Systems that Co-Produce Hydrogen and Electricity using Machine Learning Surrogate Models*. McMaster Advanced Control Consortium (MACC) Annual Meeting (Invited Presentation). McMaster University, Hamilton, ON (virtual), May 2023.
- [T28] *Optimizing Manufacturing of Thermoelectrical Material using Machine Learning and Data Science*. ND Energy Lunch Seminar Series. University of Notre Dame, Notre Dame, IN, Dec. 2022.
- [T27] *Bayesian Optimization for Additive Manufacturing of Thermoelectric Materials and Devices*. Session Keynote. AIChE Annual Meeting, Phoenix, AZ, Nov. 2022.
- [T26] *Faster Science-Based Data Analytics with Pyomo.DOE*. Invited Presentation in AIChE Futures Session. AIChE Annual Meeting, Phoenix, AZ, Nov. 2022.
- [T25] *Multiscale Design, Operations and Control Optimization of Integrated Energy Systems Considering Energy Market Interactions*. Chemical and Biological Engineering Department Seminar. Illinois Institute of Technology, Chicago, IL, Nov. 2022.
- [T24] *Integrating Data, Molecular Simulations, and Process Design for Sustainable Engineering*. Planery Lecture. Equifase 2022 (XII Iberoamerican Conference on Phase Equilibria and Fluid Properties for Process Design), Campinas, Brazil, Oct. 2022.
- [T23] *Multiscale Design, Operations and Control Optimization of Integrated Energy Systems Considering Energy Market Interactions*. Invited Seminar. Instituto Tecnológico de Celaya (virtual), Mexico, Oct. 2022.

- [T22] *Multiscale Design, Operations and Control Optimization of Integrated Energy Systems Considering Energy Market Interactions*. Invited Seminar Sponsored by Production Engineering. University of São Paulo, Brazil, Oct. 2022.
- [T21] *Science-Based Data Analytics for Molecular-to-Systems Engineering*. Chemical and Biological Engineering Department Seminar. University of Wisconsin, Madison, WI, Oct. 2022.
- [T20] *Science-Based Data Analytics for Molecular-to-Systems Engineering*. Invited Talk. Eli Lilly and Company, Indianapolis, IN, Sept. 2022.
- [T19] *Science-Based Data Analytics for Molecular-to-Systems Engineering*. Honeywell UOP Invitational Lecture. Des Plaines, Illinois, June 2022.
- [T18] *Science-Based Data Analytics for Molecular-to-Systems Engineering*. Invited Tutorial. American Control Conference, Atlanta, GA, June 2022.
- [T17] *Multiscale Design, Control, and Optimization of Energy Systems Considering Market Interactions*. Energy Systems Initiative Seminar. Carnegie Mellon University (virtual), Apr. 2022.
- [T16] *Design and Optimization of Integrated Energy Systems*. ND Energy Research Symposium Invited Talk. University of Notre Dame, Notre Dame, IN, Mar. 2022.
- [T15] *Building Science-based Mathematical Models from Data*. Department of Chemical Engineering. Auburn University, Auburn, AL, Jan. 2022.
- [T14] *Integrating Data, Molecular Simulations, and Process Design for Sustainable Engineering*. CBE Computing Seminar. University of Wisconsin-Madison (virtual), Dec. 2021.
- [T13] *From Data to Process Design: Modeling Azeotropic Separation of High Global Warming Potential Hydrofluorocarbon Refrigerants Using Ionic Liquids*. CAST Plenary (joint presentation with E. Maginn). AIChE Annual Meeting, Boston, MA, Nov. 2021.
- [T12] *Molecular-to-Systems Engineering for Diafiltration Membranes*. Department of Chemical Engineering. Instituto Tecnológico de Celaya (Technological Institute of Celaya, Mexico) (virtual), June 2021.
- [T11] *Molecular-to-Systems Engineering for Diafiltration Membranes*. Department of Chemical Engineering and Materials Science Seminar. Wayne State University (virtual), Mar. 2021.
- [T10] *Multiscale Simulation of Electricity Market and Energy Resource Interactions*. Ezra's Round Table: Systems Engineering Seminar. Cornell University (virtual), Dec. 2020. URL: <https://www.youtube.com/watch?v=XWjCEM8s8Xk>.
- [T9] *Making Money in Energy Markets: Probabilistic Forecasting and Stochastic Programming Paradigms*. Rapid-Interactive Keynote at American Control Conference. virtual, July 2020. URL: <https://www.youtube.com/watch?v=h1gzZXcsY-g>.
- [T8] *Exploiting Opportunities in Energy and Ancillary Markets: A Chemical Engineer's Perspective*. Sandia National Laboratory. Albuquerque, NM, Oct. 2018.

Before Notre Dame:

- [T7] *Multiscale Systems Engineering for Energy Technology Innovation*. Delft University of Technology (TU Delft). Delft, Netherlands, Mar. 2017.
- [T6] *Multiscale Systems Engineering for Energy Technology Innovation*. University of Notre Dame. Notre Dame, IN, Feb. 2017.
- [T5] *Multiscale Systems Engineering for Energy Technology Innovation*. Purdue University. West Lafayette, IN, Feb. 2017.
- [T4] *Multiscale Systems Engineering for Energy Technology Innovation*. Princeton University. Princeton, NJ, Jan. 2017.
- [T3] *Multiscale Systems Engineering for Energy Technology Innovation*. Washington University in St. Louis. St. Louis, MO, Jan. 2017.
- [T2] *Multiscale Systems Engineering for Energy Technology Innovation*. Northwestern University. Evanston, IL, Jan. 2017.
- [T1] *A Framework for Multi-Stakeholder Decision-Making and Conflict Resolution*. Distinguished Junior Researchers Seminar Series, Northwestern University. Evanston, IL, Feb. 2016.

BOOK CHAPTERS

Before Notre Dame:

- [B2] **A. W. Dowling**, J. P. Eason, J. Ma, D. C. Miller, and L. T. Biegler. “Equation-based Design, Integration and Optimization of Oxycombustion Power Systems.” *Alternative Energy Sources and Technologies: Process Design and Operation*. Ed. by M. M. Martín. Springer, 2016. ISBN: 978-3-319-28750-8.
- [B1] Y. Wang, **A. W. Dowling**, C. Krieff, A. Walther, and L. T. Biegler. “Pressure Swing Adsorption Optimization Strategies for CO₂ Capture.” *Sustainability of Products, Processes and Supply Chains: Theory and Applications*. Ed. by F. You. Vol. 36. Elsevier, 2015, pp. 197–223. ISBN: 9780444634726.

CONFERENCE PUBLICATIONS (PEER-REVIEWED)

Notre Dame:

- [C29] **A. W. Dowling**^{*}, M. Dougher[×], M. J. Watson[×], H. G. Lynch[×], Z. Lu[×], and D. J. Laky. “Teaching Digital Twins in Process Control Using the Temperature Control Lab.” *Systems and Control Transactions* 4 (July 2025), pp. 2215–2221. DOI: 10.69997/sct.180577.
- [C28] **A. W. Dowling**^{*}. “Artificial Intelligence and Machine Learning for Sustainable Molecular-to-Systems Engineering.” *Systems and Control Transactions* 3 (July 2024). Proceedings of the 10th International Conference on Foundations of Computer Aided Process Design (FOCAPD 2024), pp. 22–31. DOI: 10.69997/sct.114705.
- [C27] D. T. Agi[×], H. A. E. Hawa, and **A. W. Dowling**^{*}. “Equation-Oriented Modeling of Water-Gas Shift Membrane Reactor for Blue Hydrogen Production.” *Systems and Control Transactions* 3 (July 2024). Proceedings of the 10th International Conference on Foundations of Computer Aided Process Design (FOCAPD 2024), pp. 395–402. DOI: 10.69997/sct.152308.
- [C26] X. Chen[×], R. Tumbalam-Gooty, D. Guittet, B. Knueven, J. D. Sirola, and **A. W. Dowling**^{*}. “Conceptual Design of Integrated Energy Systems with Market Interaction Surrogate Models.” *Systems and Control Transactions* 3 (July 2024). Proceedings of the 10th International Conference on Foundations of Computer Aided Process Design (FOCAPD 2024), pp. 434–441. DOI: 10.69997/sct.168255.
- [C25] M. Dougher[×], L. Lair[×], J. A. Ouimet[×], W. A. Phillip, T. J. Tarka, and **A. W. Dowling**^{*}. “Opportunities for Process Intensification with Membranes to Promote Circular Economy Development for Critical Minerals.” *Systems and Control Transactions* 3 (July 2024). Proceedings of the 10th International Conference on Foundations of Computer Aided Process Design (FOCAPD 2024), pp. 490–495. DOI: 10.69997/sct.127504.
- [C24] D. J. Laky[◊], R. Tumbalam-Gooty, T. Jaffe, M. Holly, A. Atia, X. Chen[×], and **A. W. Dowling**^{*}. “IDAES-PSE Software Tools for Optimizing Energy Systems and Market Interactions.” *Systems and Control Transactions* 3 (July 2024). Proceedings of the 10th International Conference on Foundations of Computer Aided Process Design (FOCAPD 2024), pp. 490–495. DOI: 10.69997/sct.137860.
- [C23] A. Lee^{*}, R. B. Parker, S. Poon, D. Gunter, **A. W. Dowling**, and B. Nicholson. “Model Diagnostics for Equation-Oriented Models: Roadblocks and the Path Forward.” *Systems and Control Transactions* 3 (July 2024). Proceedings of the 10th International Conference on Foundations of Computer Aided Process Design (FOCAPD 2024), pp. 966–974. DOI: 10.69997/sct.147875.
- [C22] H. G. Lynch[×], A. Bjarnason, D. J. Laky[◊], C. J. Brown, and **A. W. Dowling**^{*}. “Optimizing Batch Crystallization with Model-based Design of Experiments.” *Systems and Control Transactions* 3 (July 2024). Proceedings of the 10th International Conference on Foundations of Computer Aided Process Design (FOCAPD 2024), pp. 308–315. DOI: 10.69997/sct.152239.
- [C21] M. J. Watson[×], A. V. da Silva, P. G. Machado, C. O. Ribeiro, C. A. Nascimento, and **A. W. Dowling**^{*}. “Sustainable Aviation Fuels (SAF) from Ethanol: An Integrated Systems Modeling Approach.” *Systems and Control Transactions* 3 (July 2024). Proceedings of the 10th International Conference on Foundations of Computer Aided Process Design (FOCAPD 2024), pp. 927–932. DOI: 10.69997/sct.154109.
- [C20] B. Befort[×], R. DeFever[◊], E. Maginn, and **A. W. Dowling**. “Machine Learning-Enabled Optimization of Force Fields for Hydrofluorocarbons.” *14th International Symposium on Process Systems Engineering (PSE 2021+)*. Computer Aided Chemical Engineering. 2022. DOI: 10.1016/B978-0-323-85159-6.50208-6.
- [C19] N. Cortes[×], X. Gao[×], B. Knueven, and **A. W. Dowling**^{*}. “Estimating Energy Market Schedules using Historical Price Data.” *14th International Symposium on Process Systems Engineering (PSE 2021+)*. Computer Aided Chemical Engineering. 2022. DOI: 10.1016/B978-0-323-85159-6.50086-5.
- [C18] A. Garciadiego[×], M. Mazumder[◊], B. Befort[×], and **A. W. Dowling**^{*}. “Modeling and Optimization of Ionic Liquid Enabled Extractive Distillation of Ternary Azeotrope Mixtures.” *14th International Symposium on Process Systems Engineering (PSE 2021+)*. Computer Aided Chemical Engineering. 2022. DOI: 10.1016/B978-0-323-85159-6.50051-8.

- [C17] X. Liu[×], R. De[°], A. Perez[†], J. Hoffman[×], W. Phillip, and **A. W. Dowling***. “Mathematical Modelling of Reactive Inks for Additive Manufacturing of Charged Membranes.” *14th International Symposium on Process Systems Engineering (PSE 2021+)*. Computer Aided Chemical Engineering. 2022. DOI: 10.1016/B978-0-323-85159-6.50177-9.
- [C16] X. Liu[×], J. Wang[×], J. Ouimet[×], W. Phillip, and **A. W. Dowling***. “Membrane Characterization with Model-Based Design of Experiments.” *14th International Symposium on Process Systems Engineering (PSE 2021+)*. Computer Aided Chemical Engineering. 2022. DOI: 10.1016/B978-0-323-85159-6.50143-3.
- [C15] J. Wang[×], E. Eugene[×], and **A. W. Dowling***. “Scalable Stochastic Programming with Bayesian Hybrid Models.” *14th International Symposium on Process Systems Engineering (PSE 2021+)*. Computer Aided Chemical Engineering. 2022. DOI: 10.1016/B978-0-323-85159-6.50218-9.
- [C14] K. Wang[×], M. Saeidi-Javash[×], M. Zeng[°], Z. Liu[×], Y. Zhang, T. Luo, and **A. W. Dowling***. “Gaussian Process Regression Machine Learning Models for Photonic Sintering.” *14th International Symposium on Process Systems Engineering (PSE 2021+)*. Computer Aided Chemical Engineering. 2022. DOI: 10.1016/B978-0-323-85159-6.50303-1.
- [C13] E. A. Eugene[×], X. Gao[×], and **A. W. Dowling***. “Learning and Optimization with Bayesian Hybrid Models.” *American Control Conference (ACC)*. July 2020, pp. 3997–4002. DOI: 10.23919/ACC45564.2020.9148007.
- [C12] X. Gao[×] and **A. W. Dowling***. “Making Money in Energy Markets: Probabilistic Forecasting and Stochastic Programming Paradigms.” *American Control Conference (ACC)*. July 2020, pp. 168–173. DOI: 10.23919/ACC45564.2020.9147380.
- [C11] E. A. Eugene[×], W. A. Phillip, and **A. W. Dowling***. “Material Property Goals to Enable Continuous Diafiltration Membrane Cascades for Lithium-Ion Battery Recycling.” *Proceedings of the 9th International Conference on Foundations of Computer-Aided Process Design (FOCAPD)*. Ed. by S. G. Muñoz, C. D. Laird, and M. J. Realff. Vol. 47. Computer Aided Chemical Engineering. Elsevier, 2019, pp. 469–474. DOI: 10.1016/B978-0-12-818597-1.50075-8.
- [C10] **A. W. Dowling*** and B. L. Nicholson. “Uncovering New Opportunities from Frequency Regulation Markets with Dynamic Optimization and Pyomo.DAE.” *Computer Aided Chemical Engineering*. Ed. by M. R. Eden, M. G. Ierapetritou, and G. P. Towler. Vol. 44. 13th International Symposium on Process Systems Engineering (PSE 2018). 2018, pp. 2509–2514. DOI: 10.1016/B978-0-444-64241-7.50413-4.

Before Notre Dame:

- [C9] **A. W. Dowling**, A. Dyreson, F. Miller, and V. Zavala. “Economic assessment and optimal operation of CSP systems with TES in California electricity markets.” *AIP Conference Proceedings*. Vol. 1850. SolarPACES 2016: International Conference on Concentrated Solar Power and Chemical Energy Systems. 2017, p. 160006. DOI: 10.1063/1.4984540.
- [C8] **A. W. Dowling** and V. M. Zavala. “Redesigning Decision-Making Architectures to Exploit Multi-Scale Electricity Markets.” *Proceeding for Foundations of Computer Aided Process Operations and Chemical Process Control*. 2017.
- [C7] **A. W. Dowling** and V. M. Zavala. “Resolving Conflicts Among Stakeholders in Real-Time Operations.” *Proceeding for Foundations of Computer Aided Process Operations and Chemical Process Control*. 2017.
- [C6] **A. W. Dowling** and L. T. Biegler. “Degeneracy Hunter: An Algorithm for Determining Irreducible Sets of Degenerate Constraints in Mathematical Programs.” *Computer Aided Chemical Engineering*. Ed. by K. V. Gernaey, J. K. Huusom, and R. Gani. Vol. 37. 12th International Symposium on Process Systems Engineering and 25th European Symposium on Computer Aided Process Engineering. 2015, pp. 809–814. DOI: 10.1016/B978-0-444-63578-5.50130-4.
- [C5] **A. W. Dowling**, C. Balwani, Q. Gao, and L. T. Biegler. “Equation-oriented Optimization of Cryogenic Systems for Coal Oxycombustion Power Generation.” *Energy Procedia* 63 (2014). 12th International Conference on Greenhouse Gas Control Technologies (GHGT-12), pp. 421–430. DOI: 10.1016/j.egypro.2014.11.044.
- [C4] **A. W. Dowling** and L. T. Biegler. “Rigorous Optimization-based Synthesis of Distillation Cascades without Integer Variables.” *Computer Aided Chemical Engineering*. Ed. by J. J. Klemeš, P. S. Varbanov, and P. Y. Liew. Vol. 33. 24th European Symposium on Computer Aided Process Engineering. 2014, pp. 55–60. DOI: 10.1016/B978-0-444-63456-6.50010-7.

- [C3] **A. W. Dowling**, J. P. Eason, J. Ma, D. C. Miller, and L. T. Biegler. “Coal Oxycombustion Power Plant Optimization Using First Principles and Surrogate Boiler Models.” *Energy Procedia* 63 (2014). 12th International Conf. on Greenhouse Gas Control Technologies (GHGT-12), pp. 352–361. DOI: 10.1016/j.egypro.2014.11.038.
- [C2] **A. W. Dowling**, Q. Gao, and L. T. Biegler. “Equation-Oriented Optimization of Cryogenic Systems for Coal Oxycombustion Power Plants.” *Computer Aided Chemical Engineering*. Ed. by M. Eden, J. D. Sirola, and G. P. Towler. Vol. 34. Proceedings of the 8th Int. Conf. on Foundations of Computer-Aided Process Design. 2014, pp. 501–506. DOI: 10.1016/B978-0-444-63433-7.50068-7.
- [C1] **A. W. Dowling** and L. T. Biegler. “Optimization-based Process Synthesis for Sustainable Power Generation.” *Chemical Engineering Transactions*. Vol. 35. 2013, pp. 1–12. DOI: 10.3303/CET1335001.

RESEARCH FUNDING

Current Awards:

1. National Science Foundation CBET-1941596. *CAREER: Uncertainty Quantification and Optimization with Hybrid Models for Molecular-to-Systems Engineering*. Sole Principal Investigator. February 2020 – January 2026, \$515,570 (100% Dowling).
2. National Science Foundation ECC-1647722. *Engineering Research Center for Innovative and Strategic Transformation of Alkane Resources - CISTAR*. UND PI: Schneider. UND Co-PIs: Guo, Hicks, O’Brien, Dowling. October 2017 - September 2027, \$4,589,261 (20% Dowling).
3. National Science Foundation EFMA-2203670. *EAGER GERMINATION: Immersive Training Studio for Technology-Environment-Energy-Water-Society (TEEWS) Grand Challenges*. PI: Dowling, Co-PI: Wood, Tank, Kijewski-Correa. September 2022 - August 2025, \$297,356 (40% Dowling, 40% Wood, 10% Tank, 10% Kijewski-Correa).
4. National Science Foundation. CBET-2225601 *RECODE: Vascular Differentiation and Morphogenesis Controlled with Hybrid Memristors*. PI: Hanjaya Putra, Co-PIs: Dowling, Chang, Zartman, Senapati. August 2022 - July 2026, \$1,500,000 (20% each for all investigators)
5. National Science Foundation. CBET-2147605 *Elucidating Molecular Design Principles for Copolymer Membranes with Solute-Tailored Selectivity for the Separations of Rare Earth Elements*. PI: Phillip, Co-PI: Dowling. September 2022 - August 2025, \$475,172 (50% each PI).
6. National Science Foundation. CBET-2347040 *CDS&E: Novel Hybrid Modeling Paradigm for Multi-Component Water Vapor Adsorption*. PI: Colón, Co-PI: Dowling. July 2024 - June 2027, \$502,972 (50% each PI).
7. National Science Foundation. DMS-2424827 *Collaborative Research: eMB: Data-driven mechano-chemical models of morphogenesis on deforming domains*. PI: Zartman, Co-PI: Dowling, Xu. September 2024 - August 2027, \$257,591.
8. National Science Foundation. ECC-2330175 *Engineering Research Center for Environmentally Applied Refrigerant Technology Hub (EARTH)*. ND PI: Schaefer, ND Co-PIs: Colón, Dowling, Huber, Guo, Maginn, Myung, O’Brien, Onyango, Phillip, Zhang. September 2024 - August 2029, \$5,950,431 (9% Dowling).
9. US Department of Energy (via NETL/KeyLogic). *Carbon Capture Simulation for Industrial Impact (CCSI2) and Carbon Dioxide Removal (CDR)*. Sole UND Principal Investigator. May 2019 - April 2026, \$523,796 (100% Dowling).
10. US Department of Energy (via NETL/KeyLogic). *Institute for the Design of Advanced Energy Systems (IDAES)*. Sole UND Principal Investigator. September 2019 - April 2026, \$558,069 (100% Dowling).
11. US Department of Energy (via NETL/KeyLogic). *Process Optimization and Modeling for Mineral Sustainability (PrOMMiS)*. April 2023 - April 2026 \$569,280 (100% Dowling).
12. Amazon Web Services (AWS). *Community-Led Environmental AI for Resilient (CLEAR) Watersheds: Optimizing Flood, Water Quantity, and Quality Management Across Rural-Urban Landscapes*. PI: Tank, Co-PI: Bolster, Dowling, Hamlet, Wood. October 2025 - October 2028. \$1,895,000 (20% Dowling)

Past Awards:

1. National Science Foundation DMS-2029814. *MODULUS: Integrative multiscale modeling and multimodal experiments to decode systems-level molecular mechanisms of epithelial systems*. PI: Alber (UC-Riverside), Co-PI: Chowdhury (UCR), Chen (UCR), Zartman (UND), Dowling (UND). August 2020 - July 2025, \$369,064 (50% Zartman, 50% Dowling).
2. National Science Foundation CMMI-1932206-S001. *Unifying Principles for the Design and Manufacture of Chemically-Patterned Polymeric Membranes* (Supplement). PI: Phillip, Key Participant: Dowling. 1 year, \$59,479 (50% Phillip, 50% Dowling).
3. Simons Foundation. *Morphogenetic cartography: Mapping morphogens to tissue shape through surrogate models and optimization of model-based design of experiments*. PI: Zartman, Co-PI: Dowling. 1 year (July 2020 - June 2021), \$40,000 (50% Zartman, 50% Dowling).
4. US Department of Energy. *Design and Optimization Infrastructure for Tightly Coupled Hybrid Systems*. Sole UND Principal Investigator. 3.5 years (August 2020 - December 2023), \$225,000 (100% Dowling).
5. US Department of Energy DE-SC0022409. *SBIR Subcontract with Precision Combustion, Inc.*. Sole UND Principal Investigator. 7 months (May 2022 - December 2022), \$45,000 (100% Dowling).
6. National Science Foundation CBET-1917474. *Collaborative Research: Development and Application of a Molecular and Process Design Framework for the Separation of Hydrofluorocarbon*. PIs: Shiflett (U Kansas), Maginn (UND), Co-PI: Dowling (UND). 3+ years (September 2019 - August 2023), \$299,999 (50% Maginn, 50% Dowling).
7. US Department of Energy DE-EE0009103. *Optimizing Additive Manufacturing of Thermoelectric Materials using Bayesian Optimization-Enhanced Transfer Learning*. PI: Luo, Co-PIs: Go, Zhang, Dowling. September 2020 - February 2025, \$1,840,000 (25% each for all investigators).

RESEARCH TRAINING (INCLUDING MENTEES' AWARDS)

• Postdoctoral Scholars

1. Dr. Mozammel Mazumder, Notre Dame, 2020 - 2021. Placement: Engineer, OQ Chemicals, Houston, TX
2. Dr. Riju De, Notre Dame, 2020 - 2021. Placement: Assistant Professor of Chemical Engineering, Birla Institute of Technology and Science, Pilani, India
3. Dr. Daniel Laky, Notre Dame, 2023 - 2025. Placement: Assistant Professor of Chemical Engineering (tenure-track), Auburn University
4. Dr. Vivek Saini, Notre Dame, 2025 - Present.
5. Dr. Keshav Kasturi Rangan, Notre Dame, 2025 - Present.
6. Dr. Hainan Wang, 2025 - Present.
7. Dr. Shilpa Narasimhan, 2025 - Present.

• PhD Students

1. Elvis Eugene, Notre Dame, 2017 - 2022. Placement: Senior Scientist, Pfizer. Awards:
 - The Patrick and Jana Eilers Graduate Student Fellowship for Energy Related Research, 2020
 - Notre Dame Graduate Student Union Conference Presentation Grant, 06-2019, 10-2019
 - Notre Dame Graduate School Professional Development Award, 06-2019, 10-2019
2. Alejandro Garciadiego, Notre Dame, 2017 - 2022. Placement: Research Engineer, National Energy Technology Laboratory (KeyLogic). Awards:
 - Notre Dame Graduate School Professional Development Award, 2019
 - Notre Dame Graduate Student Union Conference Presentation Grant, 2019
3. Xian Gao, Notre Dame, 2017 - 2022. Placement: Decision / Operations Research Scientist, Grubhub
 - Notre Dame Graduate Student Union Conference Presentation Grant, 2019
 - Notre Dame Graduate School Professional Development Award, 2019
4. Bridgette Befort (co-advised with Dr. Edward Maginn), Notre Dame, 2018 - 2022. Placement: Machine Learning Engineer, Diveplane Corporation. Awards:

- Richard and Peggy Notebaert Premier Fellow, University of Notre Dame, 2018
 - Outstanding Graduate Student Paper Award, University of Notre Dame, Chemical and Biomolecular Engineering, 2022
 - Notre Dame Graduate School Professional Development Award (7/19, 11/19)
 - Notre Dame Graduate Student Union Conference Presentation Grant (7/19, 11/19, 11/21)
5. Kanishka Ghosh, Notre Dame, 2018 - 2023. Placement: Research Scientist, Eli Lilly. Awards:
 - Notre Dame Graduate School Professional Development Award, 06-2019, 10-2019, 11-2021, 10-2022
 - Notre Dame Graduate Student Union Conference Presentation Grant, 06-2019, 10-2019, 11-2021, 10-2022
 - CBEGSO Research Symposium Best Poster Award, 09-2021
 - CISTAR Student Leadership Council Professional Development Award, 09-2021, 09-2022
 6. Jialu Wang, Notre Dame, 2019 - 2024. Placement: Machine Learning Engineer, TikTok (USA). Awards:
 - Highly read article (top 10% of downloads) in AIChE Journal, 2022
 7. Xinhong Liu, Notre Dame, 2019 - 2024. Placement: mRNA Process Modelling Senior Scientist, Sanofi. Awards:
 - WIC Travel Award, Women in Chemical Engineering (WIC @ AIChE) , 2023
 - NSF-AWM Travel Grant, Association for Women in Mathematics at SIAM Conference on Optimization (AWM @ SIAM OP 2023), 2023
 - Young Researcher Travel Grant, Foundations of Computer Aided Process Operations / Chemical Process Control (FOCAPO/CPC 2023), 2023
 - Graduate Water Fellowship, University of Notre Dame, 2022
 - Notebaert Professional Development Award, University of Notre Dame, 2021, 2022
 8. Ke Wang, Notre Dame, 2021 - 2025. Placement: Research Scientist, Amazon. Awards:
 - The Patrick and Jana Eilers Graduate Student Fellowship for Energy Related Research, 2023
 9. Damian Agi, 2021 - Present. Awards:
 - Best Poster Presentation Award, 11th Annual CBE Symposium, University of Notre Dame, 2025
 - The Patrick and Jana Eilers Graduate Student Fellowship for Energy Related Research, December 2025
 - Best Poster Presentation Award, 9th Annual CBE Symposium, University of Notre Dame, 2023
 - Lyman Taylor & W Stuart Fund, offered by the College of Engineering, University of Notre Dame, 2023
 - Advancing Science Conference Grant, offered by the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE), 2022, 2023
 - Graduate School Professional Development Awards (GSPDA), University of Notre Dame, 2022, 2023
 - Graduate Student Government Conference Presentation Grant (GSG-CPG), University of Notre Dame, 2022
 - TEEWS Grand Challenges Fellow, 2023
 10. Kyla Jones, 2021 - Present. Awards:
 - Lucy Family Institute for Data & Society Graduate Scholar, 2023 - 2024
 - Materials Engineering To Realize Innovative Technologies for Sustainability (MERITS) Fellow, 2022 - 2024
 - 9th Annual CBEGSO Research Symposium Best Poster Award, 2023
 - Foundations of Process/product Analytics and Machine learning (FOPAM) Travel Grant, 2023
 - Foundations of Computer Aided Process Operations / Chemical Process Control (FOCAPO/CPC) Best Poster Award & Young Researcher Travel Grant, 2023
 - TEEWS Grand Challenges Fellow, 2023
 11. Madelynn (Maddie) Watson, 2021 - Present. Awards:
 - Schmitt Leadership Fellowship, 2021

- Materials Engineering to Realize Innovative Technologies for Sustainability (MERITS) Fellow, 2022-2024
- Notre Dame Graduate School Professional Development Award, 2023, 2024, 2025
- 12. Montana Carlozo (co-advised with Dr. Edward Maginn), 2021 - Present. Awards:
 - Materials Engineering to Realize Innovative Technologies for Sustainability (MERITS) Fellow, 2022-2024
 - TEEWS Grand Challenges Fellow, 2023
- 13. Xinhe Chen, 2021 - Present. Awards:
 - TEEWS Grand Challenges Fellow, 2024
 - Notre Dame Graduate School Professional Development Award, 2024, 2025
 - FOCAPD Travel Award, 2024
 - FOPAM Travel Award, 2023
- 14. Molly Dougher, 2022 - Present. Awards:
 - Schmitt Presidential Leadership Fellowship, 2022
 - Kaneb Center Outstanding Graduate Student Teaching Assistant Award, 2025
- 15. Hailey Lynch, 2022 - 2024. Placement: Transferred to Dr. Jonathan Whitmer's research group (same program). Awards:
 - Remick Graduate Fellowship in Engineering, 2022
 - TEEWS Grand Challenges Fellow, 2023
- 16. Shammah Lilonfe, 2024 - Present. Awards:
 - First Place Judge's Award, Three Minute Thesis (3MT) Competition, AIChE Annual Meeting, 2025
- 17. Stephen Cini, 2024 - Present. Awards:
 - Scientific Artificial Intelligence Initiative (SAI) Graduate Fellowship, Notre Dame, Fall 2025
 - NITMB MathBio Convergence Student Travel Award, 2025
 - Berthiaume Institute for Precision Health Summer Graduate Fellowship, 2025
 - Notre Dame Graduate School Professional Development Award, 2024
 - Notre Dame Graduate Student Union Conference Presentation Grant, 2024
- 18. Kay Lu, 2024 - Present
- 19. Shuvashish Mondal, 2024 - Present
- 20. Zhongyu Cheng, 2025 - Present
- 21. Kathan Desai, 2025 - Present

• Master's Students

- Michael Dunn, 2025 - Present
- Zhicheng Lu, 2023 - Present
- Nicole Cortes, Notre Dame, 2021 - 2023. Placement: Market Analyst, NextEra Energy
- Cheshta Balwani, Carnegie Mellon, 2014
- Qianwen Gao, Carnegie Mellon, 2014
- Zixiang Gao, Carnegie Mellon, 2014
- Yajun Wang, Carnegie Mellon, 2013

• Undergraduate Students

- Johnny Phan, Business Analytics, Honors Mathematics, Notre Dame, 2025
- William Richardson, Electrical Engineering, Economics, Notre Dame, 2025
- Yingxin (Cindy) Liu, Applied & Computational Mathematics & Statistics, Economics, Notre Dame, 2025
- Allen Uy, Computer Engineering, Notre Dame, 2024 - 2025
- Jillian Skurski, Aerospace Engineering, Notre Dame, 2024 - 2025

- Joe Jackson, Computer Science, Notre Dame, 2024
- Kylie Brewster, Aerospace Engineering, Notre Dame, 2024 - 2025
- Leonardo Molina, Computer Science, Notre Dame, 2024
- Meagan O'Connor, Chemical Engineering, Notre Dame, 2024
- Yohannes Mariam, Computer Science, Notre Dame, 2024
- Ray Yang, Computer Science, Notre Dame, 2025
- Sofia Cardona, Computer Science, Notre Dame, 2025
- David Meininger, Computer Science, Notre Dame, 2025
- Yan M. Saltar-Rivera, Notre Dame/University of Puerto Rico Mayagüez, 2021 - 2023
- Alexander Perez Reyes, Notre Dame/University of Puerto Rico Mayagüez, 2021 - 2022
- Gregory Cooper, Chemical Engineering, Notre Dame, 2021
- Caroline Lubbe, Chemical Engineering, Notre Dame, 2021 - 2022
- Tipton Lichtenstein, Notre Dame/University of Florida, 2021
- Gabriela Franco Hernandez, Chemical Engineering, Notre Dame, 2020 - 2021
- Samuel De La Paz, Mechanical Engineering, Notre Dame, 2020 - 2022
- Noah Wamble, Chemical Engineering, Notre Dame, 2020 - 2021
- Erick J. Mendez Rios, Notre Dame/University of Puerto Rico Mayagüez, 2020
- Clay Elmore, Chemical Engineering, Notre Dame, 2019
- Mahad Siad, UW-Madison, 2016-2017
- Jose Renteria, UW-Madison, 2016-2017
- Farshud Sorourifar, UW-Madison, 2016-2017
- Mauricio Tombini, UW-Madison/UNIOESTE (Brazil), 2016
- Tian Zheng, UW-Madison, 2015-2017
- Jeehwan Lee, UW-Madison, 2015
- Yannic Vaupel, Carnegie Mellon/RWTH Aachen (Germany), 2012
- Dominik Meinel, Carnegie Mellon/TU Munich (Germany), 2011 - 2012

TEACHING EXPERIENCE, TRAINING, AND AWARDS

• University of Notre Dame

- Data Analytics, Optimization, and Control (CBE 30338), Instructor: Spring 2024, Co-Instructor: Spring 2025 <https://ndcbe.github.io/controls/>
- Advanced Data and Computing for Chemical Engineers (CBE 40258/60258), Instructor: Fall 2022, Fall 2023 <https://ndcbe.github.io/data-and-computing/intro.html>
- Nonlinear and Stochastic Optimization (ACMS/CBE 40499/60499), Instructor: Fall 2018, Spring 2021, Spring 2023 <https://ndcbe.github.io/optimization/>
- Designing Research for Grand Challenges (EG 62005), Co-Instructor: Spring 2023, Fall 2024
- Numerical and Statistical Analysis (CBE 20258), Instructor: Spring 2019, Fall 2019, Fall 2021, Co-Instructor: Spring 2018, Spring 2020 <https://ndcbe.github.io/data-and-computing/intro.html>
- Topics in Computation & Data Science (CBE 67701), Co-Instructor: Summer 2020, <https://ndcbe.github.io/cbe67701-uncertainty-quantification/>
- Separation Processes (CBE 40443), Instructor: Fall 2017
- Kaneb Center Course Design Academy, Participant, 2019 - 2020
- Kaneb Center Reading Group: *Distracted: Why Students Can't Focus and What You Can Do About It*, Participant, Summer 2021
- *A Practical Guide to Teaching and Learning STEM* Workshop, Participant, January 2018

• Carnegie Mellon University

- Future Faculty Program (pedagogical training), 2015
- Assistant Course Coordinator/TA, Process Systems Modeling (CMU 06-665), Spring 2014
- Mark Dennis Karl Outstanding Graduate Teaching Award, 2013
- Statistics Teaching Assistant, Transport Process Laboratory (CMU 06-363) Spring 2013
- Teaching Assistant, Unit Operations of Chemical Engineering (CMU 06-361), Spring 2012
- Teaching Assistant, Chemical Reaction Engineering (CMU 06-364), Fall 2011
- Teaching Assistant, Mathematical Methods for Chemical Engineering (CMU 06-262), Spring 2011
- Teaching Assistant, Introduction to Chemical Engineering (CMU 06-100), Fall 2010

SERVICE: NOTRE DAME

- ND Energy Director Search Committee, 2024 - 2025
- Undergraduate Program Committee, Department of Chemical and Biomolecular Engineering, 2024 - 2025
- Graduate Program Committee, Department of Chemical and Biomolecular Engineering, 2023 - 2024
- Sustainability Initiative Working Group, College of Engineering Representative, 2023 - 2024
- Coordinator for Pre-Candidacy Proposal Writing Workshop, Department of Chemical and Biomolecular Engineering, December 2022, 2023, 2024
- Faculty Search Committee, Department of Chemical and Biomolecular Engineering, 2022 - 2023
- Graduate Student Admissions Committee, Department of Chemical and Biomolecular Engineering, 2017 - 2023
- College of Engineering Honesty Committee, 2020 - 2023
- Guest Lecturer for Introduction to Complex Problem-Solving in the Public Sphere (ESTS 23005/CSC 23005), Spring 2021, Spring 2022, Spring 2023
- Coordinator of Industrial Career Panels for CBE Graduate Students, Spring 2021
- Zahm Retreat 1: *Laudato Si'* and Sustainability Scholarship at Notre Dame, Participant, June 2021
- Tester for Transition to Canvas LMS, Summer 2021
- Panelist, ND Forum: *Laudato Si'*, Fall 2021
- Panelist, NSF CAREER Discussion (Office of Research), January 2022
- Presenter, How to Create an Effective Research Poster, ND Summer Programs, June 2022, 2023, 2024

SERVICE: SCIENTIFIC COMMUNITY AND OUTREACH ACTIVITIES

- AIChE CAST (Computing and Systems Technology) Division
 - CAST Director (Elected), 2025 - 2027
 - Young Professional Academic Liaison, 2020 - 2023
- Conference Organization
 - AIChE Annual Meeting, 2025, Boston, MA
 - * Co-Organizer, Topical Conference “Critical Minerals for the Clean Energy Transition”
 - * Reviewer for three sessions. (Did not attend conference.)
 - AIChE Annual Meeting, 2024, San Diego, CA
 - * Co-Organizer, Topical Conference “Critical Minerals for the Clean Energy Transition”
 - * Abstract Reviewer, *Data-Driven Optimization*
 - International Scientific Committee Member, Foundations of Computer-Aided Process Design (FO-CAPD), 2024
 - Associate Editor, American Control Conference, 2024

- Abstract Reviewer, NOBCChE Annual Meeting, 2023, 2024
- AIChE Annual Meeting, 2023, Orlando, FL
 - * Session Chair, *Design and Optimization of Integrated Energy Systems*
 - * Session Chair, *Remediation of Emerging Contaminants and Legacy Compounds*
- AIChE Annual Meeting, 2022, Phoenix, AZ
 - * Session Chair, *Advances in Process Design*
 - * Session Chair, *Design and Optimization of Integrated Energy Systems*
 - * Session Chair, *Next-Gen Manufacturing in Chemical and Energy Systems*
 - * Session Chair, *Remediation of Emerging Contaminants and Legacy Compounds*
- International Program Committee Member, 14th International Symposium on Process Systems Engineering (PSE 2021+), Kyoto, Japan
- AIChE Annual Meeting, 2021, Boston, MA
 - * Session Chair, *Advances in Machine Learning and Intelligent Systems II*
 - * Session Co-Chair, *Integrated Product and Process Design*
 - * Session Chair, *Remediation of Emerging Contaminants and Legacy Compounds*
 - * Session Co-Chair, *Remediation of Emerging Contaminants and Legacy Compounds II*
 - * Session Chair, *Design and Optimization of Integrated Energy Systems*
 - * Session Co-Chair, *Innovations in Concept-to-Manufacturing and Distribution I*
 - * Session Chair, *Innovations in Concept-to-Manufacturing and Distribution II*
 - * Session Co-Chair, *Design and Optimization of Integrated Energy Systems - Virtual*
 - * Session Co-Chair, *Remediation of Emerging Contaminants and Legacy Compounds - Virtual*
- AIChE Annual Meeting, 2020, Virtual
 - * Session Chair, *Data-Driven and Hybrid Modeling for Decision Making*
 - * Session Chair, *Advanced Treatment for Water: Reuse and Recycling I*
 - * Session Chair, *Advanced Treatment for Water: Reuse and Recycling II*
 - * Session Co-Chair, *Modeling, Control & Optimization of Energy Systems*
 - * Session Co-Chair, *Big Data and Data Analytics*
- Session Chair, *Modeling, Control, & Optimization of Energy Systems*, AIChE Annual M., 2019
- Poster Session Chair, Foundations of Process Analytics and Machine learning (FOPAM), 2019
- Associate Editor, AIChE Contribution Area, American Control Conference, 2019
- Session Chair, *Modeling, Control & Optimization of Energy Systems*, AIChE Annual M., 2018
- Mini-Symposia Organizer, *UQ & Stochastic Opt. for Complex Energy Sys.*, SIAM UQ, 2018
- Session Chair, *Modeling, Control & Optimization of Energy Systems*, AIChE Annual M., 2017
- Session Co-Chair, *Energy System Design*, AIChE Annual M., 2017
- Session Chair, *Energy Systems I*, International Conf. on Continuous Optimization (ICCOPT), 2016
- Session Chair, *Process Operation & Control*, AIChE Midwest Regional Conf., 2016
- Session Co-Chair, *Process Modeling & Estimation*, AIChE Midwest Regional Conf., 2016
- Session Co-Chair, *Process Design*, AIChE Annual Meeting, 2015
- Student Volunteer, 22nd International Symposium on Mathematical Programming, 2015
- Session Co-Chair, *Advancing Efficient Fossil Energy Based Power Gen.*, AIChE Annual M., 2013
- Manuscript Review
 - ACS Sustainable Chemistry & Engineering
 - AIChE Journal
 - AIMS Energy
 - Applied Energy
 - American Control Conference
 - Biofuels, Bioproducts and Biorefining

- The Canadian Journal of Chemical Engineering
- Chemical Engineering Education
- Chemical Engineering Research & Design
- Chemical Engineering Science
- Computers & Chemical Engineering
- Combustion and Flame
- Current Opinion in Chemical Engineering
- Energy & Fuels
- Energy Reports
- European Journal of Operations Research
- Frontiers in Chemical Engineering
- IEEE Transactions on Power Systems
- IEEE Conference of Decision and Control
- IEEE Conference on Control Technology and Applications
- IFAC Symposium on Advanced Control of Chemical Processes (ADCHEM)
- IFAC Symposium on Dynamics and Control of Process Systems (DYCOPS)
- Industrial & Engineering Chemistry Research
- Journal of Cleaner Production
- Journal of Ionic Liquids
- Journal of Materials Informatics
- Journal of Membrane Science
- Journal of Molecular Liquids
- Journal of the Royal Society Interface
- The Journal of Physical Chemistry
- Journal of Process Control
- npj Computational Materials
- Optimal Control Applications and Methods
- Optimization and Engineering
- Processes
- Proceedings of the ASME Turbo Expo
- Proceedings of the 14th International Symposium on Process Systems Engineering (PSE 2021+)
- Reaction Chemistry & Engineering
- Renewable and Sustainable Energy Review
- Editorial Board Member, Systems and Control Transactions, 2025 - present
- Editorial Board Member and Review Editor, Computational Methods in Chemical Engineering, Frontiers in Chemical Engineering, 2019 – present
- Science Fair Judge
 - Grand Awards Judge, Intel International Science and Engineering Fair, 2012 & 2015
 - Category Judge, Pittsburgh Regional Science and Engineering Fair, 2011 & 2012
- Graduate Student Advisor, Carnegie Mellon ChemE Car Team, 2012 - 2014
- Member, American Institute of Chemical Engineers (AIChE), 2010 - Present
- Member, Society of Industrial and Applied Mathematics (SIAM), 2017 - Present
- Student Member, Society of Industrial and Applied Mathematics (SIAM), 2010 - 2015
- Volunteer: Assistant Cubmaster, Committee Chair (Boy Scouts of America), Pack 10, Granger, IN, 2021 - Present