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ZACHARY P. SMITH

Professional Appointments

2024–	Associate Professor with Tenure, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA.
2022–2024	Associate Professor, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA.
2017–2022	Assistant Professor, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA. Robert N. Noyce Career Development Chair (2021–2023) Joseph R. Mares Career Development Chair (2017–2019)
2014–2016	Postdoctoral Scholar, Department of Chemistry, University of California, Berkeley, Berkeley, CA.

Education

2008–2014	*Ph.D.*, Chemical Engineering, University of Texas at Austin, Austin, TX. Advisors Donald R. Paul and Benny D. Freeman.
2008–2011	*M.S.*, Chemical Engineering, University of Texas at Austin, Austin, TX.
2004–2008	*B.S. with Honors and Distinction*, Chemical Engineering, Pennsylvania State University, University Park, PA.

Founded Companies

2021	Osmoses Inc., Co-Founder (Winner of MIT $100k Competition)
2017	Flux Technology, Co-Founder

Patents/Patent Applications

8. **Z. P. Smith**, T. Lee, Highly microporous polymer nanofilms by interfacial polymerization of rigid units for ultrafast organic solvent nanofiltration. S/N 63/482,454. *Provisional Patent*.
7. **Z. P. Smith**, G. Han, Thin-film nanocomposite membranes for separating ions and uncharged species in water. S/N 63/342122.
6. T. M. Swager, S. Guo, **Z. P. Smith**, F. M. Benedetti, Poly(aryl ether) based polymers and associated gas separation membranes. US 2022/0282041 A1.
5. H. W. H. Lai, J. M. Ahn, Y. Xia, **Z. P. Smith**, F. M. Benedetti, High-performance ladder polymers for membrane gas separation. US 2022/0411574 A1.
4. **Z. P. Smith**, L. Chi, H. Lee, Branched metal–organic framework nanoparticles and associated methods. US 2021/0130372 A1.
3. **Z. P. Smith**, L. Chi, B. J. Sundell, K. Zhang, S. C. Hayden, D. J. Harrigan, H. Lee, Branched metal–organic framework nanoparticles in mixed-matrix membranes and associated methods. US 11,827,647 B2.
2. T. M. Swager, Y. He, **Z. P. Smith**, S. Lin, F. M. Benedetti, Porous compositions and related methods. US 11,472,915 B2.
1. J. R. Long, J. Bachman, **Z. P. Smith**, Adsorption-enhanced and plasticization resistant composite membranes. US 11,110,405 B2.

Honors and Awards

2022	American Institute of Chemical Engineers (AIChE) Kunesh Award
2022	National Science Foundation (NSF) CAREER Award
2021	Frank E. Perkins Award for Excellence in Graduate Advising – MIT
2021	Office of Naval Research (ONR) Young Investigator Award
2020	American Institute of Chemical Engineers 35 Under 35 Award
2018	Department of Energy (DOE) Early Career Award
2017	North American Membrane Society Young Membrane Scientist Award
2013	U.S. Delegate to the Lindau Nobel Laureate Meeting on Chemistry
2013	American Chemical Society (ACS) Excellence in Graduate Polymer Research
2010	Department of Energy Office of Science Graduate Fellow

Teaching

2017–2024

10.32 – Separation Processes. Undergraduate course on theory and processes for molecular separations.

10.40 – Chemical Engineering Thermodynamics. Graduate course covering the principles, concepts, and laws/postulates of classical and statistical thermodynamics.

10.467 – Polymer Science Lab. Undergraduate laboratory course covering chemistry, physics, and application of polymers.

10.569 – Synthesis of Polymers. Interdisciplinary graduate level course on polymer synthesis methods and applications.

Supervised Graduate Students

2024–	Brandon Tapia, Chemical Engineering, MIT, *Ph.D.*
2024–	Olivia Wilkinson, Chemical Engineering, MIT, *Ph.D.*
2023–	Lauren Burton, Chemical Engineering, MIT, *Ph.D.*
2023–	Megan Herrington, Chemical Engineering, MIT, *Ph.D.*
2023–	Tom Goodwin, Chemical Engineering, MIT, *Ph.D.* (Co-advised with Fikile Brushett)
2023–	Yein Yoon, Chemical Engineering, MIT, *Ph.D.*
2023–	Brenda Zhao, Chemical Engineering, MIT, *Ph.D.*
2022–	Erin Sturd, Chemical Engineering, MIT, *Ph.D.*
2021–	Philippe Jean-Baptiste, Chemical Engineering, MIT, *Ph.D.*
2020–	Simar Mattewal, Chemical Engineering, MIT, *Ph.D.* (Co-advised with Rohit Karnik)
2020–	John Vergados, Chemical Engineering, MIT, *Ph.D.* (Co-advised with Fikile Brushett)
2020–	Pablo Dean, Chemical Engineering, MIT, *Ph.D.*
2020–	Eric Hahnert, Chemical Engineering, MIT, *Ph.D.*
2020–	Jing Ying Yeo, Chemical Engineering, MIT, *Ph.D.*
2019–	Aristotle Grosz, Chemical Engineering, MIT, *Ph.D.*
2019–2024	Wan-Ni Wu, Chemical Engineering, MIT, *Ph.D.*
2019–2024	Samuel Kaser, Chemistry, MIT, *Ph.D.*
2019–2023	Kayla Storme, Chemistry, MIT, *Ph.D.* (Co-advised with Tim Swager)
2018–2024	Taigyu Joo, Chemical Engineering, MIT, *Ph.D.*
2018–2023	Hyunhee Lee, Chemical Engineering, MIT, *Ph.D.*
2017–2022	Katherine Mizrahi Rodriguez, Materials Science and Engineering, MIT, *Ph.D.*
2017–2019	Patrick Asinger, Chemical Engineering, MIT, *M.S. CEP*
2016–2021	Sharon Lin, Chemical Engineering, MIT, *Ph.D.*
2016–2021	Qihui Qian, Chemical Engineering, MIT, *Ph.D.*
2016–2021	Albert Wu, Chemical Engineering, MIT, *Ph.D.*

Supervised Postdoctoral Associates/Fellows

2025–	Ji Wu, *Ph.D. in Chemical Engineering*
2023–	Benjamin Pedretti, *Ph.D. in Chemical Engineering*
2023–2024	Sohum Patel, *Ph.D. in Chemical & Environmental Engineering*
2022–2025	Taehoon Lee, *Ph.D. in Energy Engineering*
2022–2024	Matthew Rivera, *Ph.D. in Chemical & Biomolecular Engineering*
2021–2022	Maha Aljuhani, *Ph.D. in Chemical Science*
2020–2022	Stephen DeWitt, *Ph.D. in Chemical & Biomolecular Engineering*
2020–2021	Fatima Edhaim, *Ph.D. in Chemical Science*
2019–2021	Justin Teesdale, *Ph.D. in Chemistry*
2019–2021	Francesco Benedetti, *Ph.D. in Chemical Engineering*
2019–2021	Moonjoo Lee, *Ph.D. in Chemical Engineering*
2019–2020	Shaofei Wang, *Ph.D. in Chemical Engineering*
2018–2021	Gang (Andy) Han, *Ph.D. in Chemical Engineering*
2017–2019	Won Seok (Lucas) Chi, *Ph.D. in Chemical Engineering*

Visiting Researchers

2025	Cassiano Aimoli, Petrobras, *Visiting Scientist (Industrial Sabbatical)*
2025	Andrea Giovanelli, University of Pisa, *Ph.D. Candidate in Chemistry*
2024–2025	Anna Binnemans, KU Leuven, *M.S. Candidate in Chemical Engineering*
2024–2025	Luca Fois, University of Milan, *Ph.D. Candidate in Chemical Engineering*
2024	Jose Alled, University of Zaragoza, *Research Fellow*
2022	Anand Ayyar, University of Copenhagen, *Ph.D. Candidate in Chemistry*
2022	Mostafa Lotfy, ETH Zürich, *M.S. Candidate in Chemical Engineering*
2022	Tai Xuan Tan, Imperial College London, *M.S. in Chemical Engineering*
2020	Robin Studer, ETH Zürich, *M.S. Candidate in Chemical Engineering*
2018	Holden Lai, Stanford University, *Ph.D. Candidate in Chemistry*
2017–2018	Francesco Maria Benedetti, University of Bologna, *Ph.D. Candidate in Chemical Engineering*

Undergraduate/High School Researchers

2024	Veer Garad, Summer Intern, Malden Catholic High School
2024	An Nguyen, Summer Intern, Malden Catholic High School
2024	Dhruv Vasishta, Summer Intern, Malden Catholic High School
2024	Mia Waldron, Summer Intern, Malden Catholic High School
2023	Gozel Dovranova, Chemical Engineering, MIT, B.S.
2023	Carlos Martinez, Chemical Engineering, MIT, *B.S.*
2022–2023	Gabrielle Moore, Chemical Engineering, MIT, *B.S.*
2022	Alondra Hernandez, Chemical Engineering, MIT, *B.S.*
2022	Iselle Barrios, Chemical Engineering, MIT, *B.S.*
2021–2023	Sherrie Qian, Materials Science and Engineering, MIT, *B.S.*
2021–2023	Ruoxin Lu, Chemical Engineering, MIT, *B.S.*
2021	Nicholas Aiello, Chemical Engineering, MIT, *B.S.*
2020–2023	Duha Syar, Chemical Engineering, MIT, *B.S.*
2020–2022	Naksha Roy, Chemical Engineering, MIT, *B.S.*
2020–2021	Nnedi Okoye, Chemical Engineering, MIT, *B.S.*
2020–2021	Evan Gwozdz, Chemical Engineering, MIT, *B.S.*
2019–2020	Laura Chen, Chemical Engineering, MIT, *B.S.*

2019–2020	Alexander Liu, Chemical Engineering, MIT, *B.S.*
2018–2019	James Drayton, Chemical Engineering, MIT, *B.S.*
2018–2019	Asia Hypsher, Chemical Engineering, MIT, *B.S.*
2018	Shiqi Zhao, Chemistry and Chemical Engineering, Tianjin University and Nankai University, *B.S.*

Department and Institute Service

2024–	Chair of the Safety Committee
2022–	First-year Academic Advisor
2019–2021	Chemical Engineering Seminar Coordinator
2019–	Chemical Engineering Undergraduate Advisor
2018–2019	MIT Committee on Toxic Chemicals
2018–2019	Chemical Engineering Representative for the Program in Polymers and Soft Matter (PPSM)
2018–2019	Chemical Engineering Undergraduate Curriculum Task Force, Chair for Separations (10.32)
2017–	MIT Faculty Member for PPSM
2017–	Chemical Engineering Graduate Admissions Committee

Professional Service

2024–	Associate Editor, *ACS Industrial & Engineering Chemistry Research*
2021–	Editorial Advisory Board for *Macromolecules*
2020–	Editorial Advisory Board for *Polymer*
2020–	Board of Directors, North American Membrane Society
2018–2023	Session Chair, North American Membrane Society National Meeting
2018–2019	Committee Member, National Academies of Sciences, Engineering, and Medicine Report on *A Research Agenda for Transforming Separation Science*
2017–2023	Session Chair, American Institute of Chemical Engineers National Meeting
2013–	Member, American Chemical Society
2010–	Member, American Institute of Chemical Engineers

Peer-Reviewed Publications

(h-index 41, citations 8,045, Source Google Scholar)

79. T. H. Lee, J. K. Jang, B. K. Lee, W.-N. Wu, Z. P. Smith, H. B. Park, Anomalous structural changes and gas transport properties in ultrathin films of polymers of intrinsic microporosity. *Macromolecules*. 57, 11242–11250 (**2024**).

78. M. P. Rivera, G. G. Terrones, T. H. Lee, Z. P. Smith, H. J. Kulik, Data-driven screening and discovery of metal–organic frameworks as C2 adsorbents from over 900 experimental isotherms. *ACS Appl. Mater. Interfaces*. 16, 64759–64773 (**2024**).

77. L. Zhang, R. Xiao, T. Jin, X. Pan, K. A. Fransen, S. K. Alsaiari, A. Lau, R. He, J. Han, B. J. Pedretti, J. Y. Yeo, X. Yang, B. D. Olsen, A. Alexander-Katz, Z. P. Smith, R. Langer, A. Jaklenec, Degradable poly(β-amino ester) microparticles for cleansing products and food fortification. *Nat. Chem. Eng. 2024*, 1–13 (**2024**).

76. T. H. Lee, M. Balcik, W.-N. Wu, I. Pinnau, Z. P. Smith, Dual-phase microporous polymer nanofilms by interfacial polymerization for ultrafast molecular separation. *Sci. Adv.* 10, 6666 (**2024**).

75. T. H. Lee, T. Joo, P. Jean-Baptiste, P. A. Dean, J. Y. Yeo, Z. P. Smith, Fine-tuning ultramicroporosity in PIM-1 membranes by aldehyde functionalization for efficient hydrogen separation. *J. Mater. Chem. A*. 12, 24519–24529 (**2024**).

74. O. Boloki, S. Dewitt, E. T. Hahnert, Z. Smith, S. Vasenkov, Gas self-diffusion in different local environments of mixed-matrix membranes as a function of UiO-66-NH_2 metal–organic framework loading. *Microporous Mesoporous Mater.* 378, 113249 (**2024**).

73. S. J. Kaser, P. Dean, P. Jean-Baptiste, S. K. Mattewal, T. Joo, J. Y. Yeo, Z. P. Smith, High-selectivity CO_2 mixture separations by a guanylated polymer of intrinsic microporosity (PIM-G) membrane. *Macromolecules*. 21, 44 (**2024**).

72. P. A. Dean, Y. Wu, S. Guo, T. M. Swager, Z. P. Smith, Tertiary-amine-functional poly(arylene ether)s for acid-gas separations. *JACS Au*. 36, 54 (**2024**).

71. K. R. Storme, B. S. Schreib, Z. P. Smith, T. M. Swager, Tuning porosity in triptycene-poly(arylene ether)s. *Macromolecules*. 57, 7065–7073 (**2024**).

70. G. Han, R. M. Studer, M. Lee, K. M. Rodriguez, J. J. Teesdale, Z. P. Smith, Engineering interfacial structure and channels of polyamide thin-film nanocomposite membranes to enhance permselectivity for water purification. *Chem. Mater.* 36, 7005–7015 (**2024**).

69. T. Joo, T. H. Lee, S. J. Kaser, W.-N. Wu, S. Wi, J. Y. Yeo, Z. P. Smith, Free volume manipulation and in situ oxidative crosslinking of amine-functionalized microporous polymer membranes. *Chem. Mater.* 36, 4275–4290 (**2024**).

68. G. H. Yang, J. Lin, H. Cheung, G. Rui, Y. Zhao, L. Balachander, T. Joo, H. Lee, Z. P. Smith, L. Zhu, C. Ma, Y. Fink, Single Layer Silk and Cotton Woven Fabrics for Acoustic Emission and Active Sound Suppression. *Adv. Mater.* 36, 2313328 (**2024**).

67. K. R. Storme, S. Lin, Y. C. M. Wu, S. X. Qian, T. M. Swager, Z. P. Smith, Role of grafting density and nitrile functionalization on gas transport in polymers with side-chain porosity. *Macromolecules*. 57, 2458–2467 (**2024**).

66. P. A. Dean, K. Mizrahi Rodriguez, S. Guo, N. Roy, T. M. Swager, Z. P. Smith, Elucidating the role of micropore-generating backbone motifs and amine functionality on H_2S, CO_2, CH_4 and N_2 sorption. *J. Membr. Sci.* 696, 122465 (**2024**).

65. K. Mizrahi Rodriguez, P. A. Dean, S. Guo, N. Roy, T. M. Swager, Z. P. Smith, Elucidating the role of micropore-generating backbone motifs and amine functionality on membrane separation performance in complex mixtures. *J. Membr. Sci.* 696, 122464 (**2024**).

64. K. Mizrahi Rodriguez, S. Lin, A. X. Wu, K. R. Storme, T. Joo, A. F. Grosz, N. Roy, D. Syar, F. M. Benedetti, Z. P. Smith, Penetrant-induced plasticization in microporous polymer membranes. *Chem. Soc. Rev.* 53, 2435–2529 (**2024**).

63. S. Guo, J. Y. Yeo, F. M. Benedetti, D. Syar, T. M. Swager, Z. P. Smith, A microporous poly(arylene ether) platform for membrane-based gas separation. *Angew. Chemie Int. Ed.* 63 (**2024**).

62. T. H. Lee, Z. P. Smith, Better standards are needed for membrane materials. *Nat. Mater.* 23, 11–12 (**2024**).

61. T. H. Lee, B. K. Lee, S. Y. Yoo, H. Lee, W. N. Wu, Z. P. Smith, H. B. Park, PolyMOF nanoparticles constructed from intrinsically microporous polymer ligand towards scalable composite membranes for CO_2 separation. *Nat. Commun.* 14, 1–13 (**2023**).

60. W. N. Wu, K. Mizrahi Rodriguez, N. Roy, J. J. Teesdale, G. Han, A. Liu, Z. P. Smith, Engineering the polymer–MOF interface in microporous composites to address complex mixture separations. *ACS Appl. Mater. Interfaces*. 15, 52893–52907 (**2023**).

59. R. J. Tannenbaum, N. Cislo, E. Ruzicka, P. A. Dean, Z. P. Smith, B. C. Benicewicz, S. K. Kumar, Activated gas transport in polymer-grafted nanoparticle membranes. *Macromolecules*. 56, 3954–3961 (**2023**).

58. T. Joo, K. Mizrahi Rodriguez, H. Lee, D. Acharya, C. M. Doherty, Z. P. Smith, The role of free volume, hydrogen bonds, and crosslinks on physical aging in polymers of intrinsic microporosity (PIMs). *J. Mater. Chem. A*. 11, 15943–15957 (**2023**).

57. J. J. Teesdale, M. Lee, R. Lu, Z. P. Smith, Uncertainty in composite membranes: From defect engineering to film processing. *J. Am. Chem. Soc.* 145, 830–840 (**2023**).

56. G. Han, R. M. Studer, M. Lee, K. M. Rodriguez, J. J. Teesdale, Z. P. Smith, Post-synthetic modification of MOFs to enhance interfacial compatibility and selectivity of thin-film nanocomposite (TFN) membranes for water purification. *J. Membr. Sci.* 666, 121133 (**2023**).

55. S. Lin, K. R. Storme, Y.-C. M. Wu, F. M. Benedetti, T. M. Swager, Z. P. Smith, Role of side-chain length on gas transport of CO_2/CH_4 mixtures in polymers with side-chain porosity. *J. Membr. Sci.* 668, 121194 (**2023**).

54. H. Lee, W. S. Chi, M. J. Lee, K. Zhang, F. Edhaim, K. Mizrahi Rodriguez, S. J. A. DeWitt, Z. P. Smith, Network-nanostructured ZIF-8 to enable percolation for enhanced gas transport. *Adv. Funct. Mater.* 32, 2207775 (**2022**).

53. K. Mizrahi Rodriguez, W.-N. Wu, T. Alebrahim, Y. Cao, B. D. Freeman, D. Harrigan, M. Jhalaria, A. Kratochvil, S. Kumar, W. H. Lee, Y. M. Lee, H. Lin, J. M. Richardson, Q. Song, B. Sundell, R. Thür, I. Vankelecom, A. Wang, L. Wang, C. Wiscount, Z. P. Smith, Multi-lab study on the pure-gas permeation of commercial polysulfone (PSf) membranes: Measurement standards and best practices. *J. Membr. Sci.* 659, 120746 (**2022**).

52. F. M. Benedetti, Y.-C. M. Wu, S. Lin, Y. He, E. Flear, K. R. Storme, C. Liu, Y. Zhao, T. M. Swager, Z. P. Smith, Side-chain length and dispersity in ROMP polymers with pore-generating side chains for gas separations. *JACS Au*. 2, 1610–1615 (**2022**).

51. H. W. H. Lai, F. M. Benedetti, J. M. Ahn, A. M. Robinson, Y. Wang, I. Pinnau, Z. P. Smith, Y. Xia, Hydrocarbon ladder polymers with ultrahigh permselectivity for membrane gas separations. *Science.* 375, 1390–1392 (**2022**).

50. X. Qian, M. Ostwal, A. Asatekin, G. M. Geise, Z. P. Smith, W. A. Phillip, R. P. Lively, J. R. McCutcheon, A critical review and commentary on recent progress of additive manufacturing and its impact on membrane technology. *J. Membr. Sci.* 645, 120041 (**2022**).

49. K. Mizrahi Rodriguez, F. M. Benedetti, N. Roy, A. X. Wu, Z. P. Smith, Sorption-enhanced mixed-gas transport in amine functionalized polymers of intrinsic microporosity (PIMs). *J. Mater. Chem. A*. 9, 23631–23642 (**2021**).

48. Q. Qian, A. M. Wright, H. Lee, M. Dincă, Z. P. Smith, Low-temperature $H_2S/CO_2/CH_4$ separation in mixed-matrix membranes containing MFU-4. *Chem. Mater.* 33, 6825–6831 (**2021**).

47. A. X. Wu, J. A. Drayton, X. Ren, K. Mizrahi Rodriguez, A. F. Grosz, J.-W. Lee, Z. P. Smith, Non-equilibrium lattice fluid modeling of gas sorption for fluorinated poly(ether imide)s. *Macromolecules*. 54, 6628–6638 (**2021**).

46. A. X. Wu, S. Lin, K. Mizrahi Rodriguez, F. M. Benedetti, T. Joo, A. F. Grosz, K. R. Storme, N. Roy, D. Syar, Z. P. Smith, Revisiting group contribution theory for estimating fractional free volume of microporous polymer membranes. *J. Membr. Sci.* 636, 119526 (**2021**).

45. A. X. Wu, J. A. Drayton, K. Mizrahi Rodriguez, F. M. Benedetti, Q. Qian, S. Lin, Z. P. Smith, Elucidating the role of fluorine content on gas sorption properties of fluorinated polyimides. *Macromolecules*. 54, 22–34 (**2021**).

44. S. Lin, T. Joo, F. M. Benedetti, L. C. Chen, A. X. Wu, K. Mizrahi Rodriguez, Q. Qian, C. M. Doherty, Z. P. Smith, Free volume manipulation of a 6FDA-HAB polyimide using a solid-state protection/deprotection strategy. *Polymer.* 212, 123121 (**2021**).

43. K. Mizrahi Rodriguez, S. Lin, A. X. Wu, G. Han, J. J. Teesdale, C. M. Doherty, Z. P. Smith, Leveraging free volume manipulation to improve the membrane separation performance of amine-functionalized PIM-1. *Angew. Chemie Int. Ed.* 60, 6593–6599 (**2021**).

42. Q. Qian, W. S. Chi, G. Han, Z. P. Smith, Impact of post-synthetic modification routes on filler structure and performance in metal–organic framework-based mixed-matrix membranes. *Ind. Eng. Chem. Res.* 59, 5432–5438 (**2020**).

41. K. Mizrahi Rodriguez, A. X. Wu, Q. Qian, G. Han, S. Lin, F. M. Benedetti, H. Lee, W. S. Chi, C. M. Doherty, Z. P. Smith, Facile and time-efficient carboxylic acid functionalization of PIM-1: Effect on molecular packing and gas separation performance. *Macromolecules*. 53, 6220–6234 (**2020**).

40. G. Han, Q. Qian, K. Mizrahi Rodriguez, Z. P. Smith, Hydrothermal synthesis of sub-20 nm amine-functionalized MIL-101(Cr) nanoparticles with high surface area and enhanced CO_2 uptake. *Ind. Eng. Chem. Res.* 59, 7888–7900 (**2020**).

39. G. Han, K. M. Rodriguez, Q. Qian, Z. P. Smith, Acid-modulated synthesis of high surface area amine-functionalized MIL-101(Cr) nanoparticles for CO_2 separations. *Ind. Eng. Chem. Res.* 59, 18139–18150 (**2020**).

38. C. R. Bilchak, M. Jhalaria, Y. Huang, Z. Abbas, J. Midya, F. M. Benedetti, D. Parisi, W. Egger, M. Dickmann, M. Minelli, F. Doghieri, A. Nikoubashman, C. J. Durning, D. Vlassopoulos, J. Jestin, Z. P. Smith, B. C. Benicewicz, M. Rubinstein, L. Leibler, S. K. Kumar, Tuning selectivities in gas separation membranes based on polymer-grafted nanoparticles. *ACS Nano*. 14, 17174–17183 (**2020**).

37. A. X. Wu, J. A. Drayton, K. M. Rodriguez, Q. Qian, S. Lin, Z. P. Smith, Influence of aliphatic and aromatic fluorine groups on gas permeability and morphology of fluorinated polyimide films. *Macromolecules*. 53, 5085–5095 (**2020**).

36. Q. Qian, P. A. Asinger, M. J. Lee, G. Han, K. Mizrahi Rodriguez, S. Lin, F. M. Benedetti, A. X. Wu, W. S. Chi, Z. P. Smith, MOF-based membranes for gas separations. *Chem. Rev.* 120, 8161–8266 (**2020**).

35. Y. He, F. M. Benedetti, S. Lin, C. Liu, Y. Zhao, H. Ye, T. Van Voorhis, M. G. De Angelis, T. M. Swager, Z. P. Smith, Polymers with side chain porosity for ultrapermeable and plasticization resistant materials for gas separations. *Adv. Mater.* 31, 1807871 (**2019**).

34. W. S. Chi, B. J. Sundell, K. Zhang, D. J. Harrigan, S. C. Hayden, Z. P. Smith, Mixed-matrix membranes formed from multi-dimensional metal–organic frameworks for enhanced gas transport and plasticization resistance. *ChemSusChem*. 12, 2355–2360 (**2019**).

33. Q. Qian, A. X. Wu, W. S. Chi, P. A. Asinger, S. Lin, A. Hypsher, Z. P. Smith, Mixed-matrix membranes formed from imide-functionalized UiO-66-NH_2 for improved interfacial compatibility. *ACS Appl. Mater. Interfaces*. 11, 31257–31269 (**2019**).

32. H. W. H. Lai, F. M. Benedetti, Z. Jin, Y. C. Teo, A. X. Wu, M. G. De Angelis, Z. P. Smith, Y. Xia, Tuning the molecular weights, chain packing, and gas-transport properties of CANAL ladder polymers by short alkyl substitutions. *Macromolecules*. 52, 6294–6302 (**2019**).

31. A. X. Wu, J. A. Drayton, Z. P. Smith, The perfluoropolymer upper bound. *AIChE J.* 65, e16700 (**2019**).

30. C. Li, S. M. Meckler, Z. P. Smith, J. E. Bachman, L. Maserati, J. R. Long, B. A. Helms, Engineered transport in microporous materials and membranes for clean energy technologies. *Adv. Mater.* 30, 1704953 (**2018**).

29. M. Shete, P. Kumar, J. E. Bachman, X. Ma, Z. P. Smith, W. Xu, K. A. Mkhoyan, J. R. Long, M. Tsapatsis, On the direct synthesis of Cu(BDC) MOF nanosheets and their performance in mixed matrix membranes. *J. Membr. Sci.* 549, 312–320 (**2018**).

28. Z. P. Smith, J. E. Bachman, T. Li, B. Gludovatz, V. A. Kusuma, T. Xu, D. P. Hopkinson, R. O. Ritchie, J. R. Long, Increasing M_2(dobdc) loading in selective mixed-matrix membranes: A rubber toughening approach. *Chem. Mater.* 30, 1484–1495 (**2018**).

27. K. A. Stevens, Z. P. Smith, K. L. Gleason, M. Galizia, D. R. Paul, B. D. Freeman, Influence of temperature on gas solubility in thermally rearranged (TR) polymers. *J. Membr. Sci.* 533, 75–83 (**2017**).

26. M. Galizia, W. S. Chi, Z. P. Smith, T. C. Merkel, R. W. Baker, B. D. Freeman, 50th anniversary perspective: Polymers and mixed matrix membranes for gas and vapor separation: A review and prospective opportunities. *Macromolecules*. 50, 7809–7843 (**2017**).

25. J. E. Bachman, Z. P. Smith, T. Li, T. Xu, J. R. Long, Enhanced ethylene separation and plasticization resistance in polymer membranes incorporating metal–organic framework nanocrystals. *Nat. Mater.* 15, 845–849 (**2016**).

24. M. Galizia, K. A. Stevens, Z. P. Smith, D. R. Paul, B. D. Freeman, Nonequilibrium lattice fluid modeling of gas solubility in HAB-6FDA polyimide and its thermally rearranged analogues. *Macromolecules*. 49, 8768–8779 (**2016**).

23. M. Galizia, Z. P. Smith, G. C. Sarti, B. D. Freeman, D. R. Paul, Predictive calculation of hydrogen and helium solubility in glassy and rubbery polymers. *J. Membr. Sci.* 475, 110–121 (**2015**).

22. K. L. Gleason, Z. P. Smith, Q. Liu, D. R. Paul, B. D. Freeman, Pure- and mixed-gas permeation of CO_2 and CH_4 in thermally rearranged polymers based on 3,3′-dihydroxy-4,4′-diamino-biphenyl (HAB) and 2,2′-bis-(3,4-dicarboxyphenyl) hexafluoropropane dianhydride (6FDA). *J. Membr. Sci.* 475, 204–214 (**2015**).

21. N. C. Su, Z. P. Smith, B. D. Freeman, J. J. Urban, Size-dependent permeability deviations from Maxwells Model in hybrid cross-linked poly(ethylene glycol)/silica nanoparticle membranes. *Chem. Mater.* 27, 2421–2429 (**2015**).

20. R. R. Tiwari, Z. P. Smith, H. Lin, B. D. Freeman, D. R. Paul, Gas permeation in thin films of "high free-volume" glassy perfluoropolymers: Part II. CO_2 plasticization and sorption. *Polymer.* 61, 1–14 (**2015**).

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14. Z. P. Smith, R. R. Tiwari, M. E. Dose, K. L. Gleason, T. M. Murphy, D. F. Sanders, G. Gunawan, L. M. Robeson, D. R. Paul, B. D. Freeman, Influence of diffusivity and sorption on helium and hydrogen separations in hydrocarbon, silicon, and fluorocarbon-based polymers. *Macromolecules*. 47, 3170–3184 (**2014**).

13. J. R. Wiegand, Z. P. Smith, Q. Liu, C. T. Patterson, B. D. Freeman, R. Guo, Synthesis and characterization of triptycene-based polyimides with tunable high fractional free volume for gas separation membranes. *J. Mater. Chem. A*. 2, 13309–13320 (**2014**).

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11. R. R. Tiwari, Z. P. Smith, H. Lin, B. D. Freeman, D. R. Paul, Gas permeation in thin films of "high free-volume" glassy perfluoropolymers: Part I. Physical aging. *Polymer.* 55, 5788–5800 (**2014**).

10. Z. P. Smith, B. D. Freeman, Graphene oxide: A new platform for high-performance gas- and liquid-separation membranes. *Angew. Chemie Int. Ed.* 53, 10286–10288 (**2014**).

9. R. Guo, D. F. Sanders, Z. P. Smith, B. D. Freeman, D. R. Paul, J. E. McGrath, Synthesis and characterization of thermally rearranged (TR) polymers: Effect of glass transition temperature of aromatic poly(hydroxyimide) precursors on TR process and gas permeation properties. *J. Mater. Chem. A*. 1, 6063–6072 (**2013**).

8. Z. P. Smith, R. R. Tiwari, T. M. Murphy, D. F. Sanders, K. L. Gleason, D. R. Paul, B. D. Freeman, Hydrogen sorption in polymers for membrane applications. *Polymer.* 54, 3026–3037 (**2013**).

7. R. Guo, D. F. Sanders, Z. P. Smith, B. D. Freeman, D. R. Paul, J. E. McGrath, Synthesis and characterization of thermally rearranged (TR) polymers: Influence of ortho-positioned functional

groups of polyimide precursors on TR process and gas transport properties. *J. Mater. Chem. A*. 1, 262–272 (**2013**).

6. D. F. Sanders, Z. P. Smith, R. Guo, L. M. Robeson, J. E. McGrath, D. R. Paul, B. D. Freeman, Energy-efficient polymeric gas separation membranes for a sustainable future: A review. *Polymer.* 54, 4729–4761 (**2013**).

5. D. F. Sanders, Z. P. Smith, C. P. Ribeiro, R. Guo, J. E. McGrath, D. R. Paul, B. D. Freeman, Gas permeability, diffusivity, and free volume of thermally rearranged polymers based on 3,3′-dihydroxy-4,4′-diamino-biphenyl (HAB) and 2,2′-bis-(3,4-dicarboxyphenyl) hexafluoropropane dianhydride (6FDA). *J. Membr. Sci.* 409–410, 232–241 (**2012**).

4. Z. P. Smith, D. F. Sanders, C. P. Ribeiro, R. Guo, B. D. Freeman, D. R. Paul, J. E. McGrath, S. Swinnea, Gas sorption and characterization of thermally rearranged polyimides based on 3,3′-dihydroxy-4,4′-diamino-biphenyl (HAB) and 2,2′-bis-(3,4-dicarboxyphenyl) hexafluoropropane dianhydride (6FDA). *J. Membr. Sci.* 415–416, 558–567 (**2012**).

3. Y. Jiang, F. T. Willmore, D. Sanders, Z. P. Smith, C. P. Ribeiro, C. M. Doherty, A. Thornton, A. J. Hill, B. D. Freeman, I. C. Sanchez, Cavity size, sorption and transport characteristics of thermally rearranged (TR) polymers. *Polymer.* 52, 2244–2254 (**2011**).

2. V. A. Kusuma, G. Gunawan, Z. P. Smith, B. D. Freeman, Gas permeability of cross-linked poly(ethylene-oxide) based on poly(ethylene glycol) dimethacrylate and a miscible siloxane co-monomer. *Polymer.* 51, 5734–5743 (**2010**).

1. G. L. Matters, J. F. Harms, C. O. McGovern, C. Jayakumar, K. Crepin, Z. P. Smith, M. C. Nelson, H. Stock, C. W. Fenn, J. Kaiser, M. Kester, J. P. Smith, Growth of human pancreatic cancer is inhibited by down-regulation of gastrin gene expression. *Pancreas*. 38, e151 (**2009**).

Additional Publications

2. **Z. P. Smith**, *Fundamentals of gas sorption and transport in thermally rearranged polyimides*, Ph.D. Dissertation in Chemical Engineering. **2014**, The University of Texas at Austin.

1. **Z. P. Smith**, *The fabrication of selective coal tar pitch membranes and their application in air separations*, B.S. Honors Thesis in Chemical Engineering. **2008**, The Pennsylvania State University.

Invited Talks and Award Presentations

65. **Z. P. Smith**, T. Lee, F. M. Benedetti, H. Lai, Y. Xia, M. Balcik, I. Pinnau, J. Y. Yeo, P. Dean, P. Jean-Baptiste, T. M. Swager, "Installing ladder motifs in polymers for gas and solvent separations" AIChE Annual Meeting, San Diego, CA, Nov. **2024**.
64. **Z. P. Smith**, "Separations reimagined: A membrane approach" MIT-San Diego Alumni Association Meeting, San Diego, CA, Nov. **2024**.
63. **Z. P. Smith**, F. Benedetti, P. Dean, K. M. Rodriguez, J. Y. Yeo, J. Teesdale, "Emerging opportunities in membrane design for molecular separations" Department of Chemical Engineering Seminar, University of Michigan, Nov. **2024**.
62. **Z. P. Smith**, F. Benedetti, P. Dean, K. M. Rodriguez, J. Y. Yeo, J. Teesdale, "MIT-MISTI: Gas separations with new membrane materials" Department of Bioscience Engineering, KU Leuven, Leuven, Belgium, Aug., **2024**.
61. **Z. P. Smith**, H. Lee, T. Lee, T. Joo, J. Howe, M. Hajian, "Network MOF structures to access percolation for mixed-matrix membranes" MOF 2024, Singapore, July **2024**.

60. **Z. P. Smith**, F. Benedetti, P. Dean, K. M. Rodriguez, J. Y. Yeo, T. Joo, P. Jean-Baptiste, "Chasing a moving target: Time and composition dependent gas separation membranes" Gordon Research Conference on Polymer Physics, Mount Holyoke, MA, July **2024**.
59. **Z. P. Smith**, F. Benedetti, P. Dean, K. M. Rodriguez, J. Y. Yeo, J. Teesdale, "Designing microporous materials for membrane separations" Department of Chemical Engineering, National University of Singapore, July **2024**.
58. **Z. P. Smith**, F. Benedetti, P. Dean, K. M. Rodriguez, J. Y. Yeo, J. Teesdale, "Gas separation membranes for a sustainable future" Department of Energy Engineering, Kentech University, Nanju, South Korea (Virtual Presentation), July **2024**.
57. H. Lee, M. Hajian, T. Joo, T. H. Lee, W.-N. Wu, J. Howe, **Z. P. Smith**, "Facet-specific gas transport properties for metal–organic framework mixed-matrix membranes" ACS National Meeting, New Orleans, LA, April **2024**.
56. **Z. P. Smith**, "Opportunities and challenges for direct air capture of CH_4", National Academies of Sciences, Engineering, and Medicine, Washington, D.C., Oct. **2023**.
55. **Z. P. Smith**, P. Dean, F. M. Benedetti, S. Lin, A. X. Wu, K. Mizrahi Rodriguez, "Gas Separation Membranes for a Sustainable Future", 3M Tech Forum, St. Paul, MN, Sept. **2023**.
54. **Z. P. Smith**, P. Dean, F. M. Benedetti, S. Lin, K. Mizrahi Rodriguez, "Designing microporous materials for membrane separations", Department of Chemical Engineering Seminar, Penn State University, Aug. **2023**.
53. **Z. P. Smith**, P. Dean, J. Y. Yeo, F. M. Benedetti, K. Mizrahi Rodriguez, J. J. Teesdale, "Engineering membrane materials for complex molecular separations", Department of Chemical Engineering Seminar, University of Texas at Austin, April **2023**.
52. **Z. P. Smith**, "Developing membrane materials for a sustainable future", MIT Japan Conference, Tokyo, JP, Jan. **2023**.
51. **Z. P. Smith**, P. Dean, F. M. Benedetti, S. Lin, K. Mizrahi Rodriguez, "Membrane materials under complex conditions", AIChE National Meeting, Phoenix, AZ, Nov. **2022**. *Kunesh Award Presentation.*
50. **Z. P. Smith**, F. M. Benedetti, S. Lin, K. Mizrahi Rodriguez, J. J. Teesdale, "Microporous materials for gas separations", Department of Chemical Engineering Seminar, University of California, Berkeley, Oct. **2022**.
49. **Z. P. Smith**, F. M. Benedetti, S. Lin, T. J. Joo, K. Mizrahi Rodriguez, "Designing polymers and MOFs for membrane-based gas separations", Gordon Research Conference on Chemical Separations, Ventura, CA, Oct. **2022**.
48. **Z. P. Smith**, F. M. Benedetti, S. Lin, K. Mizrahi Rodriguez, "Leveraging microporous materials for gas separations", Gordon Research Conference on Membranes: Materials and Processes, New London, NH, Aug. **2022**.
47. **Z. P. Smith**, F. M. Benedetti, S. Lin, K. Mizrahi Rodriguez, "Intrinsically porous polymers for gas separations", Scheme for Promotion of Academic and Research Collaborations (SPARC) Conference (Virtual Visit), Bangalore, India, Jan. **2022**.
46. **Z. P. Smith**, F. M. Benedetti, S. Lin, K. Mizrahi Rodriguez, "Top-down and bottom-up strategies to engineer microporous materials for membrane-based gas separations", Department of Chemical Engineering Seminar, KAUST (Virtual Visit), Thuwal, Saudi Arabia, Nov. **2021**.
45. **Z. P. Smith**, "Upper bound theory and membranes for gas separations", North American Membrane Society Webinar, Dec. **2020**.
44. **Z. P. Smith**, F. M. Benedetti, S. Lin, K. Mizrahi Rodriguez, "Processable porous materials for membrane-based gas separations", Network Young Membranes Plenary Lecture (Virtual Conference), Manchester, UK, Dec. **2020**.

43. A. X. Wu, J. Drayton, **Z. P. Smith**, "The perfluoropolymer upper bound", AIChE National Meeting (Virtual Conference), San Francesco, CA, Nov. **2020**. *Futures: New Directions in Chemical Engineering Research Presentation*
40. **Z. P. Smith**, F. M. Benedetti, S. Lin, Q. Qian, "Engineering polymer microstructure and MOF–polymer interfaces for membrane-based separations", Soft Matter Seminar Series, Purdue University (Virtual Visit), Oct. **2020**.
41. **Z. P. Smith**, F. M. Benedetti, S. Lin, Q. Qian, "Designing polymers and MOFs for efficient and productive gas separations", Department of Chemical and Biological Engineering Seminar, University of Alabama (Virtual Visit), Sept. **2020**.
40. **Z. P. Smith**, F. M. Benedetti, S. Lin, Q. Qian, "Designing polymers for energy-efficient gas separation membranes", Student Polymer Collective, Stanford University (Virtual Visit), April **2020**.
39. **Z. P. Smith**, F. M. Benedetti, S. Lin, Q. Qian, "Designing polymers for molecular separations", Student Polymer Network Seminar, Georgia Tech, Oct. **2019**.
38. W. S. Chi, B. J. Sundell, K. Zhang, D. J. Harrigan, S. C. Hayden, **Z. P. Smith**, "Mixed-matrix membranes for natural gas purification", NanoTech 2019, Boston, MA, June **2019**.
37. F. M. Benedetti, Y. He, S. Lin, C. Liu, Y. Zhao, H. Ye, T. A. Van Voorhis, M. G. de Angelis, T. M. Swager, **Z. P. Smith**, "Solution-processable porous polymers for membrane-based separations", NanoTech 2019, Boston, MA, June **2019**.
36. Y. He, F. M. Benedetti, S. Lin, C. Liu, Y. Zhao, H. Ye, T. A. Van Voorhis, M. G. De Angelis, T. M. Swager, **Z. P. Smith**, "Membrane-based gas separations with a new class of ultrapermeable porous polymers", ACS National Meeting, Orlando, FL, April **2019**.
35. Q. Qian, **Z. P. Smith**, "Creating an ideal interface to form defect-free mixed-matrix membranes with UiO-66-NH_2", ACS National Meeting, Orlando, FL, March **2019**.
34. **Z. P. Smith**, F. M. Benedetti, S. Lin, T. M. Swager, T. A. Van Voorhis, Y. He, Q. Qian, A. Wu, W. S. Chi, P. Asinger, A. Hypsher, "Designing new materials for energy-efficient membrane separations", Department of Chemical Engineering Seminar, Auburn University, Jan. **2019**.
33. **Z. P. Smith**, F. M. Benedetti, S. Lin, T. M. Swager, T. A. Van Voorhis, Y. He, Q. Qian, A. Wu, W. S. Chi, P. Asinger, A. Hypsher, "Molecular design of materials for membrane-based separations", Polymer Program Seminar, University of Connecticut, Nov. **2018**.
32. **Z. P. Smith**, J. E. Bachman, T. Li, B. Gludovatz, V. Kusuma, T. Xu, D. P. Hopkinson, R. O. Ritchie, J. R. Long, "Evaluating an open metal site MOF for mixed-matrix membranes", ACS National Meeting, PMSE-NAMS Symposium, New Orleans, LA, March **2018**.
31. **Z. P. Smith**, "Polymers and metal–organic frameworks for energy-efficient separations", Department of Chemical Engineering Seminar, Tianjin University, Tianjin, CN, Jan. **2018**.
30. **Z. P. Smith**, "Hybrid polymer and MOF materials for membrane-based separations", Department of Materials Science Seminar, Tianjin Polytechnic University, Tianjin, CN, Jan. **2018**.
29. **Z. P. Smith**, "Membranes for energy-efficient separations", School of Physical Science and Technology Seminar, ShanghaiTech University, Shanghai, CN, Jan. **2018**.
28. **Z. P. Smith**, "From fundamentals to application: Taking Don Paul's guidance to develop new membrane materials", Department of Chemical Engineering Seminar, 50 Year Symposium and Celebration Honoring Don Paul, University of Texas at Austin, Sept. **2017**.
27. **Z. P. Smith**, "Polymers and MOFs for gas-phase separations", Department of Chemical Engineering Seminar, University of Queensland, Brisbane, AU, Sept. **2017**.
26. **Z. P. Smith**, "Molecular level design of polymers and MOFs for energy-efficient separations", Department of Chemical Engineering Seminar, University of New South Wales, Kensington, AU, Sept. **2017**.

25. **Z. P. Smith**, "Rational design of polymers and MOFs for membrane separations", Department of Chemistry Seminar, University of Sydney, Sydney, AU, Sept. **2017**.
24. **Z. P. Smith**, "Transport of small molecules in amorphous and crystalline membrane materials", Department of Chemistry Seminar, University of Adelaide, Adelaide, AU, Sept. **2017**.
23. **Z. P. Smith**, "Designing polymers and MOFs for small molecule diffusion and (ad)sorption selectivity", Department of Chemical Engineering Seminar, University of Melbourne, Melbourne, AU, Sept. **2017**.
22. **Z. P. Smith**, "Molecular level design of polymers and MOFs for energy-efficient separations", Joint Seminar, Monash University and Commonwealth Industrial Research Organization (CSIRO), Clayton, AU, Sept. **2017**.
21. **Z. P. Smith**, "Controlled transport in polymers and MOFs for molecular separations", Department of Chemistry Seminar, University of Copenhagen, Copenhagen, DK, Aug. **2017**.
20. **Z. P. Smith**, J. E. Bachman, T. Li, B. Gludovatz, V. A. Kusuma, T. Xu, D. P. Hopkinson, R. O. Ritchie, J. R. Long, "Transport and mechanical properties of mixed-matrix membranes containing M_2(dobdc) nanoparticles", International Congress of Membranes, San Francisco, CA, July **2017**. *Young Membrane Scientist Award Presentation.*
19. **Z. P. Smith**, J. E. Bachman, T. Li, T. Xu, B. Gludovatz, R. O. Ritchie, J. R. Long, "Gas transport and mechanical properties of mixed-matrix membranes formed with M_2(dobdc) nanoparticles", Gordon Research Conference on Membranes: Materials and Processes, New London, NH, Aug. **2016**.
18. **Z. P. Smith**, "Polymer and mixed-matrix membranes for gas separations", Golden Gate Polymer Forum, Mountain View, CA, May **2016**.
17. **Z. P. Smith**, "Molecular scale engineering of new materials for energy-efficient separations" Department of Chemical and Biological Engineering Seminar, University of Colorado, Boulder, March **2016**.
16. **Z. P. Smith**, "Molecular scale engineering of new materials for energy-efficient separations" Department of Chemical and Biological Engineering Seminar, Rensselaer Polytechnic Institute, March **2016**.
15. **Z. P. Smith**, "Molecular scale engineering of new materials for energy-efficient separations" Department of Chemical Engineering Seminar, Massachusetts Institute of Technology, Feb. **2016**.
14. **Z. P. Smith**, "Molecular scale engineering of new materials for energy-efficient separations" Department of Chemical Engineering Seminar, Virginia Polytechnic Institute and State University, Feb. **2016**.
13. **Z. P. Smith**, "Molecular scale engineering of new materials for energy-efficient separations" Department of Chemical Engineering Seminar, University of Florida, Feb. **2016**.
12. **Z. P. Smith**, "Molecular scale engineering of new materials for energy-efficient separations" Department of Chemical and Biomolecular Engineering Seminar, University of Houston, Feb. **2016**.
11. **Z. P. Smith**, "Molecular scale engineering of new materials for energy-efficient separations" Department of Chemical Engineering Seminar, Stanford University, Feb. **2016**.
10. **Z. P. Smith**, "Molecular scale engineering of new materials for energy-efficient separations" Department of Chemical Engineering Seminar, Penn State University, Feb. **2016**.
9. **Z. P. Smith**, "Molecular scale engineering of new materials for energy-efficient separations" Department of Chemical Engineering and Materials Science Seminar, University of Minnesota, Jan. **2016**.
8. **Z. P. Smith**, "Molecular scale engineering of new materials for energy-efficient separations" Department of Chemical and Biomolecular Engineering Seminar, University of Illinois Urbana-Champaign, Jan. **2016**.

7. **Z. P. Smith**, "Molecular scale engineering of new materials for energy-efficient separations" Department of Chemical and Biological Engineering Seminar, Northwestern University, Jan. **2016**.
6. **Z. P. Smith**, J.E. Bachman, T. Li, T. Xu, J.R. Long, "Mixed-matrix membranes formed from M_2(dobdc) nanocrystals and polyimide-based copolymers", National Energy Technology Laboratory (NETL), Pittsburgh, PA, July **2015**.
5. **Z. P. Smith**, G. Hernández, Á. E. Lozano, K. M. Czenkusch, D. F. Sanders, K. L. Gleason, R. Guo, J. E. McGrath, B. D. Freeman, D. R. Paul, "Gas sorption and transport in thermally rearranged polymers for membrane applications", Universidad de Valladolid, Valladolid, ES, July **2013**.
4. **Z. P. Smith**, G. Hernández, Á. E. Lozano, K. M. Czenkusch, D. F. Sanders, K. L. Gleason, R. Guo, J. E. McGrath, B. D. Freeman, D. R. Paul, "Influence of chemical structure on gas sorption and transport in thermally rearranged polymers", Consejo Superior de Investigaciones Científicas (CSIC), Madrid, ES, July **2013**.
3. **Z. P. Smith**, D. F. Sanders, B. D. Freeman, D. R. Paul, "Synthesis, characterization, and transport properties of thermally rearranged polyimides for gas separations", ACS National Meeting, New Orleans, LA, April **2013**. *Excellence in Graduate Polymer Research Award Presentation.*
2. **Z. P. Smith**, "Fundamentals of gas transport in thermally rearranged polyimides", Commonwealth Scientific and Industrial Research Organization (CSIRO), Clayton, AU, July **2012**.
1. **Z. P. Smith**, C. Tran, G. Gunawan, D. F. Sanders, C. P. Ribeiro Jr., B. D. Freeman, D. R. Paul, "Thermally rearranged ortho-functional polyimides for olefin/paraffin separations", Membrane Technology and Research, Inc., Menlo Park, CA, Aug. **2011**.