Curriculum Vitae

Yunho Hwang

1. Personal Information.

- **Appointment:**
  - Research Professor, Dept. of Mechanical Eng., Univ. of Maryland, College Park, MD since 2013
  - Co-Director of CEEE, Univ. of Maryland, College Park, MD, 2019

- **Professional Background:**
  - Gustav Lorenzen Medal Award from IIR, August 2023
  - The Wilbur T. Pentzer award from USNC/IIR, July 2022
  - A. James Clark Student Competition Advisors Award, December 2021
  - Peter Ritter von Rittinger International Heat Pump Award, IEA HPT, April 2021
  - ASHRAE Fellow, 2019
  - ASME Fellow, 2014
  - ASHRAE, Refrigeration Technology Committee, Chair, 2020-2021; Vice-Chair, 2019-2020.
  - IIR: Commission B1 President, 2020-2023; Vice President, 2014-2019; LCCP Working Group, Chair, 2012-2016
  - Subject Editor in Energy since 2015 and Int. Journal of AC&R since 2013
  - ASME AESD Executive Committee, Chair, 2018-2019
  - ASME IMECE, Energy Track Co-Chair, 2016-2018
  - 9th International Conference on Caloric Cooling and Applications of Caloric Materials (THERMAG IX), General Chair, 2021
  - ASME Energy and Sustainability Conference, General Chair, 2015; Program Chair, 2014
  - International Sorption Heat Pump Conference, General Chair, 2014

- **Educational Background:**

Year	*Degree*	*Field*	*Institution*
1997	Ph.D.	*Mechanical Engineering*	University of Maryland, College Park, MD, USA
1995	M.S.	*Mechanical Engineering*	University of Maryland, College Park, MD, USA
1983	B.E.	*Mechanical Engineering*	Korea University, Seoul, Republic of Korea

- **Employment Background:**

2019-Present	Co-Director, Center for Environmental Energy Engineering, College Park, MD
2009-2019	Associate Director, CEEE, College Park, MD
2013-Present	Research Professor, Mechanical Eng., Univ. of Maryland, College Park, MD
2004-2013	Research Associate Professor, Mechanical Eng., Univ. of Maryland
1996-2004	Faculty Research Assistant, Mechanical Eng., Univ. of Maryland
1993-1996	Graduate Research Assistant, Mechanical Eng., Univ. of Maryland
1983-1993	Senior Researcher, R&D Center, Samsung Electronics Co., Suwon-city, Korea

2. Research Experience.

- Working Fluids
- Heat Transfer
- Compact Heat Exchangers
- Vapor Compression, Sorption Cycles, and Caloric Cooling
- Electrochemical Compression and Separation
- Alternative Cooling Technologies and Applications
- Advanced Energy Conversion Systems and Integration of Thermal Systems
- Renewable Energy
- Waste Heat Utilization

3. Research, Scholarly and Creative Activities.

Total: 382 publications; 12 Books/Book Chapters; 170 Journal papers; 180 Conference papers; 20 patents; Scopus Citations: 7,1571; h-index: 47 (as of August 29, 2023.) (ORCID:0000-0002-0439-0179)

3.1 Books

i. Books authored.

1. Radermacher, R. and Y. Hwang, Vapor Compression Heat Pumps with Refrigerant Mixtures, Published by CRC Press, 2005. DOI: https://doi.org/10.1201/9781420037579.
2. Hwang, Y., Technical Heat Transfer, Published by Samsung Electronics Co., 1988, Original.

ii. Chapters in books.

1. Wan, H., Hwang, Y., Radermacher, R. (2023). Variable Refrigerant Flow (VRF) System Field Test and Data Analysis Methodologies. In: Enteria, N., Sawachi, T., Saito, K. (eds) Variable Refrigerant Flow Systems. Springer, Singapore. https://doi.org/10.1007/978-981-19-6833-4_10, Feb. 1, 2023.
2. Cao, T. and Y. Hwang, Development of Advanced Cooling Technologies for Sustainable Future. In: Gupta A., De A., Aggarwal S., Kushari A., Runchal A. (eds) Innovations in Sustainable Energy and Cleaner Environment. Green Energy and Technology. Springer, Singapore, 07/2019, ISBN: Print ISBN 978-981-13-9011-1, DOI: https://doi.org/10.1007/978-981-13-9012-8_19.
3. Li, Gang, Y. Hwang*, R. Radermacher, Chapter 4: Cold Thermal Energy Storage Materials and Applications Toward Sustainability in Book Edition of *Energy Solutions to Combat Global Warming*, ISBN: 978-3-319-26950-4, Springer, pp. 67-117, April 2017, Original.
4. Lee, H. and Y. Hwang*, Chapter 7: Numerical and Experimental Investigation on Solid Desiccant Assisted Mobile Air Conditioning System in Book Edition of *Desiccant Heating, Ventilating and Air-Conditioning System*, ISBN: 978-981-10-3047-5, Springer, pp. 167-195, April 2017, Original.
5. Li, Gang, Y. Hwang*, Chapter 8: Energy Storage Systems for Buildings in Handbook of Integrated and Sustainable Buildings Equipment and Systems; Volume-I: Energy Systems, ISBN: 9780791861271, ASME Press, New York, 2017, Original.
6. Ling, J., Y. Hwang*, R. Radermacher, Chapter: Separate Sensible and Latent Cooling in Book Edition of *Desiccant-Assisted Cooling: Fundamentals and Applications*, ISBN: 978-1-4471-5564-5, Springer, pp. 143-187, December 2013, Original.
7. Hwang, Y.*, A. Alabdulkarem, A. Mortazavi, R. Radermacher, Chapter 5: Natural Gas Liquefaction Cycle Enhancements and Optimization in Fundamentals of LNG Plant Design, in *Handbook of Liquefied Natural Gas*, 1st Edition, ISBN: 9780124045859, The Elsevier, Oct. 24, 2013, Original.
8. Leighton, D., Y. Hwang*, R. Radermacher, Chapter: Heat Pump Water Heaters in Novel Concepts for Energy-Efficient Water Heating Systems: Theoretical Analysis and Experimental Investigation (Energy Science, Engineering and Technology), March 2013, Springer, Inc., ISBN-13: 9781624170706, Original.
9. Gluesenkamp, K., Radermacher, R. and Hwang, Y., Chapter 4: Thermally driven heat pumps for use in combined cooling, heating and power in Kühn, A., ed. *Handbook of International Energy Agency Annex 34: Thermally Driven Heat Pumps for Heating and Cooling*, 2013, Universitätsverlag der TU Berlin, ISBN (online): 978-3-7983-2596-8.
10. Hwang, Y. *, Chapter: Alternative Refrigeration Cycle, in Book Edition of *Automotive Air-Conditioning*, 2nd Edition, Published by Denso Corp., 2002, Original.

3.2 Peer Reviewed Journal Papers (170 papers, *: Corresponding author).

1. Qian, S., D. Catalini, J. Muehlbauer, B. Liu, H. Mevada, H. Hou, Y. Hwang, R. Radermacher, I. Takeuchi, High-performance multimode elastocaloric cooling system, Science. May 19, 2023;380(6646):722-727. DOI:10.1126/science.adg7043.
2. Baker, J., L. Cao, Y. Hwang*, C. Wang, and R. Radermacher, Performance investigation of an electrochemical ammonia compressor stack, Int. J. of Refrigeration, Available online 7 June 2023. https://doi.org/10.1016/j.ijrefrig.2023.05.020.
3. Mei, Z., Y. Hwang*, J. Kim, Thermodynamic analysis and LCCP evaluation of kangaroo heat pump cycle for electric vehicles, Energy, 259: 15, 124995, November 2022. DOI:

https://doi.org/10.1016/j.energy.2022.124995.

4. Emaikwu, N., D. Catalini, J. Muehlbauer, Y. Hwang, I. Takeuchi, R. Radermacher, Experimental Investigation of A Staggered-Tube Active Elastocaloric Regenerator, Int. J. of Refrigeration, Available Online, September 16, 2022. DOI: https://doi.org/10.1016/j.ijrefrig.2022.09.006.
5. Kim, T., C. Lee, Y. Hwang*, R. Radermacher, A Review on Nearly Isothermal Compression Technology, Int. J. of Refrigeration, 144, 145-162, December 2022. DOI: https://doi.org/10.1016/j.ijrefrig.2022.07.008.
6. Tancabel, J., V. Aute, E. Klein, C. Lee, Y. Hwang, J. Ling, J. Muehlbauer, R. Radermacher, Multi- Scale and Multi-Physics Analysis, Design Optimization, and Experimental Validation of Heat Exchangers utilizing High Performance, Non-Round Tubes, ATE, 216 (5), 118965, November 2022.
7. Kim, G., Y. Hwang*, Wave-Powered and Zero-Discharging Membrane-Distillation Desalination System: Conceptual Design and Analysis, Water, 14(2), 2022. DOI: https://doi.org/10.3390/w14121897
8. Lin, L., L. Gao, M. Kedzierski, Y. Hwang, A general model for flow boiling heat transfer in microfine tubes based on a new neural network architecture, Energy and AI, 8, 100151, May 2022.
9. Gao, L., T. Cao, Y. Hwang, R. Radermacher, Robustness analysis in supercritical CO_2 power generation system configuration optimization, Energy, 242, 122956, March 1, 2022. DOI: https://doi.org/10.1016/j.energy.2021.122956.
10. Gao, L., T. Liu, T. Cao, Y. Hwang, R. Radermacher, Comparing deep learning models for multi-energy vectors prediction on multiple types of building, Applied Energy, 301, 117486, August 17, 2021.
11. Wan, H., T. Cao, Y. Hwang*, S. Andersen, S. Chin, A Comprehensive Review of Life Cycle Climate Performance for Air Conditioning Systems, Int. J. of Refrigeration, 130, 187-198, October 2021. DOI: https://doi.org/10.1016/j.ijrefrig.2021.06.026.
12. Gao, L., T. Cao, Y. Hwang, R. Radermacher, Graph-based configuration optimization for S-CO_2 power generation systems, Energy Conversion and Management, 244, 15, 114448, Sep. 15, 2021.
13. Wan, H., T. Cao, Y. Hwang*, R. Radermacher, S. Chin, Comprehensive Investigations on Life Cycle Climate Performance of Unitary Air-Conditioners, Int. J. of Refrigeration, 129, 332-341, September 2021. DOI: https://doi.org/10.1016/j.ijrefrig.2021.04.033.
14. Dhumane, R., T. Qiu, J. Ling*, V. Aute, Y. Hwang, R. Radermacher, A. C. Kirkwood, J. Esformes, Investigation of the variability in the measurement of cyclic degradation coefficient of air conditioning systems, Int. J. of Refrigeration, 128, 1-11, August 2021.
15. Ling, J., D. Dalgo, S. Zhu, Y. Qiao, L. Wang, V. Aute, J. Srebric, J. Muehlbauer, Y. Hwang, R. Radermacher, Energy Savings and Thermal Comfort Evaluation of A Novel Personal Conditioning Device, Energy and Buildings, 241, 110917, June 15, 2021.
16. Ayyagari, V, J. Kim, Y. Hwang, Design and Development of Potassium Format Based Atmospheric Water Harvester, Energy, 221, 119726, April 15, 2021.
17. Wan, H., T. Cao, Y. Hwang*, S. Chang, Y. Yoon, Machine-learning-based compressor models: A case study for variable refrigerant flow systems, Int. J. of Refrigeration, 123, 23-33, March 2021.
18. Lee, H.*, H. Kang, U. Han, H. Lim, Y. Hwang, Numerical investigation and design optimization of a novel polymer heat exchanger with ogive sinusoidal wavy tube, International Journal of Heat and Mass Transfer, 166, 120785, February 2021.
19. Tu, R., J. Li, Y. Hwang*, Study of temperature uniformity and thermal storage performances of a shell-and-tube type phase change plate, Int. J. of Refrigeration, 122, pp. 69-80, February 2021.
20. Choi, S. Y. Jung, Y. Kim, H. Lee*, Y. Hwang, Environmental Effect Evaluation of Refrigerator Cycle with Life Cycle Climate Performance, Int. J. of Refrigeration, 122, pp. 134-146, February 2021.
21. Yang, J., L. Gao, Z. Ye, Y, Hwang, J. Chen, Binary-objective optimization of latest low-GWP alternatives to R245fa for Organic Rankine Cycle application, Energy, 217, 119336, February 2021.
22. Kim, G., T. Cao, Y. Hwang*, Thermoeconomic investigation for a multi-stage solar-thermal vacuum membrane distillation system for coastal cities, Desalination, 498: 114797, January 2021.
23. Tu, R., J. Li, Y. Hwang*, Performance analysis of desiccant wheels assisted fresh air humidifiers in winter for cold and dry climate region, Int. J. of Refrigeration, 119:24-36, November 2020.

24. Huang, Z., J. Ling, Y. Hwang*, V. Aute, R. Radermacher, Airside Heat Transfer and Friction Characteristics of a 0.8 mm Diameter Bare Tube Heat Exchanger, Heat Transfer Engineering, Heat Transfer Engineering Journal, 41:19-20, 1720-1730, 2020.
25. Tu, R., Y. Hwang*, Reviews of atmospheric water harvesting technologies, Energy, 201, 117630, June 15, 2020.
26. Tu, R., J. Li, Y. Hwang*, Fresh air humidification in winter using desiccant wheels for cold and dry climate regions: optimization study of humidification processes, Int. J. of Refrigeration, 118: 121-130, October 2020.
27. Qiao, Y., T. Cao, J. Muehlbauer, Y. Hwang*, R. Radermacher, Experimental study of a personal cooling system integrated with phase change material, Applied Thermal Engineering, 170, 115026, April 2020.
28. Wan, H., T. Cao, Y. Hwang, S. Oh, A Review of Recent Advancements of Variable Refrigerant Flow Air-conditioning Systems, Applied Thermal Engineering, 165, 114893, March 25, 2020.
29. Huang, Z., J. Ling, D. Bacellar, Y. Hwang*, V. Aute, R. Radermacher, Air-side thermal and hydraulic characteristics of compact bare tube heat exchanger under dry and wet conditions, Int. J. of Refrigeration, 110, 295-307, February 2020.
30. Yan, G., Q. Chen, Y. Hwang, J. Yu, Theoretical investigation on the performance of an ejector enhanced refrigeration cycle using hydrocarbon mixture R290/R600a, Applied Thermal Engineering, 110, 295-307, February 2020.
31. Hou, H, E. Simsek, T. Ma, N.S. Johnson, S. Qian, C. Cissé, D. Stasak, N.A. Hasan, L. Zhou, Y. Hwang, R. Radermacher, V. I. Levitas, M. J. Kramer, M. A. Zaeem, A. P. Stebner, R. T. Ott, J. Cui, I. Takeuchi, Fatigue-resistant high-performance elastocaloric materials via additive manufacturing, Science, 366, 1116-1121, November 2019.
32. Wan, H., T. Cao, Y. Hwang, S. Oh, An Electronic Expansion Valve Modeling Framework Development Using Artificial Neural Network: A Case Study on VRF Systems, Int. J. of Refrigeration, 107, 114-127, November 2019.
33. Dhumane, R., Y. Qiao, J. Muehlbauer, J. Ling*, V. Aute, Y. Hwang, Evaluating Recharge Options for Phase Change Material Storage of a Personal Conditioning System, Science and Technology for the Built Environment, 25:10, 1337-1351, October 2019, DOI: 10.1080/23744731.2019.1667699.
34. Gao, L., Y. Hwang, T. Cao, An overview of optimization technologies applied in combined cooling, heating and power systems, Renewable and Sustainable Energy Reviews, 114, 109344, October 2019.
35. Tu, R. and Y. Hwang, Performance analyses of a new system for water harvesting from moist air that combines multi-stage desiccant wheels and vapor compression cycles, Energy Conversion and Management, 198, 111811, October 2019.
36. Tao., Y, Y. Hwang, R. Radermacher, C. Wang, Experimental Study on Electrochemical Compression of Ammonia and Carbon Dioxide for Vapor Compression Refrigeration System, Int, J. of Refrigeration, 104, 180-188, June 2019.
37. Qiao, Y., Y. Du, J. Muehlbauer, Y. Hwang*, R. Radermacher, Experimental study of enhanced PCM exchangers applied in a thermal energy storage system for personal cooling, Int, J. of Refrigeration, 102, 22-34, June 2019.
38. Kennett, R., T. Cao, Y. Hwang*, CFD Modeling and Testing of an Extended-duct Air Delivery System in High Bay Buildings, Science and Technology for the Built Environment, 25(1), 46-57, June 2019.
39. Dhumane, R., Y. Qiao, J. Ling*, J. Muehlbauer, V. Aute, Y. Hwang, R. Radermacher, Improving System Performance of a Personal Conditioning System integrated with Thermal Storage, Applied Thermal Engineering, 147, 40-51, January 2019.
40. Su, W., Y. Hwang, Y. Shao, S. Deng, L. Zhao, X. Nie, Y. Zhang, Error analysis of ORC performance calculation based on the Helmholtz equation with different binary interaction parameters of mixture, Energy, 166, 414-425, January 2019.
41. Su, W., Y. Hwang, S. Deng, N. Zheng, S. Deng, L. Zhao*, Experimental study on the constituent separation performance of binary zeotropic mixtures in horizontal branch T-junctions, Int. J. of Heat and Mass Transfer, 127B, 76-87, December 2018.
42. Wang, J., M. Li, Y. Hwang*, Modeling of Film Condensation Flow in Oval Microchannels, Int. J. of Heat and Mass Transfer, 126A, 1194-1205, November 2018.
43. Su, W., Y. Hwang, S. Deng, N. Zheng, L. Zhao*, P. Liu, Experimental study on phase separation of refrigerant at horizontal T-junction, Int. J. of Multiphase Flow, 105, 217-233, August 2018.

44. Su, W., Y. Hwang, S. Deng, L. Zhao*, D. Zhao, Thermodynamic performance comparison of Organic Rankine Cycle between zeotropic mixtures and pure fluids under open heat source, Energy Conversion and Management, 165, 720-737, June 2018.
45. Lin, X., J. Ling, Y. Hwang*, R. Radermacher, B. Kim, Improvement of variable refrigerant flow system performance using energy saving control strategy and chilled water storage, Science and Technology for the Built Environment, 24(5), 483-491, 02/26/2018.
46. Tu, R., Y. Hwang*, Efficient configurations for desiccant wheel cooling systems using different heat sources for regeneration, Int. J. of Refrigeration, 86, 14-27, February 2018.
47. Tu, R., Y. Hwang*, T. Cao, M. Hou, H. Xiao, Investigation of adsorption isotherms and rotational speeds for low temperature regeneration of desiccant wheel systems, Int. J. of Refrigeration, 86, 495-509, February 2018.
48. Cao, T., Y. Hwang*, R. Radermacher, Development of an Optimization Based Design Framework for Microgrid Energy Systems, Energy, 140(1), 340-351, December 2017.
49. Huang, Z., J. Ling, Y. Hwang*, V. Aute, R. Radermacher, Design and Numerical Parametric Study of a Compact Air-Cooled Heat Exchanger, STBE, 23(6), June 28, 2017.
50. Huang, Z., Y. Hwang*, R. Radermacher, **Review Article**: Review of Nature-Inspired-Heat Exchanger Technology, Int. J. of Refrigeration, 78., 1-17, June 2017.
51. Choi, S., J. Oh, Y. Hwang, H. Lee*, Life Cycle Climate Performance Evaluation (LCCP) on Cooling and Heating Systems in South Korea, Applied Thermal Engineering, 120(25), 88-98, June 2017.
52. Tu, R, Yunho Hwang, Fei Ma, Performance analysis of a new heat pump driven multi-stage fresh air handler using solid desiccant plates, Applied Thermal Engineering, 117 (5), 553-567, May 2017.
53. Ye Tao, William Gibbons, Yunho Hwang, Reinhard Radermacher and Chunsheng Wang, Electrochemical ammonia compression, ChemComm, 53, 5637, April 2017.
54. Wang, J, Jun Ming Li, Yunho Hwang, Flow Pattern Transition During Condensation of R134a and R1234ze(E) in Microchannel Arrays, Applied Thermal Engineering, 115, 244-255, March 2017.
55. Lee, M., H. Lee, Y. Hwang, R. Radermacher, H.M. Jeong, Optimization of Two-phase R600a Ejector Geometries Using a Non-Equilibrium CFD Model, Applied Thermal Engineering, V. 109(A), pp. 272-282, Oct. 2016.
56. Huang, Z., Z. Li, Y. Hwang*, R. Radermacher, Application of entransy dissipation based thermal resistance to design optimization of a novel finless evaporator, Science China Technological Sciences, V. 59, Issue 10, pp 1486–1493, October 2016.
57. Rang Tu, Xiao-Hua Liu, Yunho Hwang, Fei Ma, Performance analysis of ventilation systems with desiccant wheel cooling based on exergy destruction, Energy Conversion and Management, V. 123 (1), pp. 265-279, September 2016.
58. Mortazavi, Amir, Alabdulkarem, A., Y. Hwang*, R. Radermacher, Development of a Robust Refrigerant Mixture for Liquefaction of Uncertain Natural Gas Compositions, Energy, V 113, pp. 1042-1050, August 2016.
59. Qian, S., Y. Geng, Y. Wang, T. Pillsbury, Y. Hada, Y. Yamaguchi, K. Fujimoto, Y. Hwang, et al., Elastocaloric effect in CuAlZn and CuAlMn shape memory alloys under compression, Philosophical Transactions of The Royal Society A Mathematical Physical and Engineering Sciences 374(2074):20150309, August 2016.
60. Lee, H., X. Lin, Y. Hwang*, R. Radermacher, LCCP Evaluation on Various Vapor Compression Cycle options and Low GWP Refrigerants, Int. J. of Refrigeration V.70, pp. 128-137, July 2016.
61. Cao, T., H. Lee, Y. Hwang*, R. Radermacher, H. Chun, Modeling of Waste Heat Powered Energy System for Container Ships, Energy, V.106, pp 408-421, July 2016.
62. Zheng, N, Yunho Hwang, Li Zhao, Shuai Deng*, Experimental study on the distribution of constituents of binary zeotropic mixtures in vertical impacting T-junction, IJHMT, V.97, pp. 242-252, 2016.
63. Zheng, N, Li Zhao, Yunho Hwang, Jing Zhang, Xingyang Yang, Experimental study on two-phase separation performance of impacting T-junction, Int. J. of Multiphase Flow, V. 83, pp. 172-182, July 2016.
64. Lee, H., X. Lin, Y. Hwang*, R. Radermacher, Performance Investigation on Solid Desiccant Assisted Mobile Air Conditioning System, Applied Thermal Engineering, V.103, pp. 1370-1380, June 2016.

65. Zili Yang, Kaisheng Zhang, Yunho Hwang, Zhiwei Lian*, Performance investigation on the ultrasonic atomization liquid desiccant regeneration system, Applied Energy, V. 171, 12-25, June 2016.
66. Pesaran, A., H. Lee, Y. Hwang*, R. Radermacher, H. Chun, **Review Article:** Numerical Simulation of Adsorption Heat Pumps, Energy, V.100, pp. 310-320, April 2016.
67. Qian, S., Y. Geng, Y. Wang, J. Ling, Y. Hwang*, R. Radermacher, Ichiro Takeuchi, Jun Cui, **Review Article:** A review of elastocaloric cooling: materials, cycles and system integrations, Int. J. of Refrigeration, V. 64, pp. 1-19, April 2016.
68. Qian, S., Y. Geng, Y. Wang, J. Muehlbauer, J. Ling, Y. Hwang*, R. Radermacher, Ichiro Takeuchi, Design of a hydraulically driven compressive elastocaloric cooling system, STBE, V. 22 (5), 500-506, 03/2016.
69. Ali Al-Alili, Yunho Hwang and Reinhard Radermacher, Solar hybrid air conditioner: Model validation and optimization, J. of Solar Engineering, V.138, Paper No.: SOL-15-1174, 06/2016.
70. Lin, X., Hoseong Lee*, Yunho Hwang, Reinhard Radermacher, Byungsoon Kim, A New Variable Refrigerant Flow System Simulation Approach in EnergyPlus, Int. Journal of Air-Conditioning and Refrigeration, V.24 (1), 03/2016.
71. Qian, S., D. Nasuta, A. Rhoads, Y. Wang, Y. Geng, Y. Hwang*, R. Radermacher, I. Takeuchi, Not-in-kind cooling technologies: A quantitative comparison of refrigerants and system performance, Int. J. of Refrigeration, V. 62, pp. 177-192, 02/2016.
72. Tao, Y., H. Lee, Y. Hwang, R. Radermacher, C. Wang, Electrochemical Compressor Driven Metal Hydride Heat Pump, Int. J. of Refrigeration, V.60, pp. 278-288, 08/2015.
73. Lin, X., Lee, H., Y. Hwang*, R. Radermacher, **Review Article:** A Review of Recent Development in Variable Refrigerant Flow Systems, Science and Technology for the Built Environment, 21(7), pp. 917-933, 07/2015.
74. Lin, X., Lee, H*., Hwang, Y., Radermacher, R., Oh, S., Field Test of Multi-Functional Variable Refrigerant Flow System, Science and Technology for the Built Environment, 21(5), pp. 648-6547, 05/2015.
75. Lee, H., Y. Hwang*, I. Song, K. Jang, Transient thermal model of passenger car's cabin and implementation to saturation cycle with alternative working fluids, Energy, V.90(2), pp. 1859-1868, 07/26/2015.
76. Park, C., H. Lee, Y. Hwang*, R. Radermacher, **Review Article:** Recent advances in vapor compression cycle technologies, Int. J. of Refrigeration, V. 60, pp. 118-134, 12/2015.
77. Alabdulkarem, A.., R. Eldeeb, Y. Hwang*, V. Aute, R. Radermacher, Testing, Simulation and Soft-Optimization of R410A Low-GWP Alternatives in Heat Pump System, Int. J. of Refrigeration, V. 60, pp. 106-117, 12/2015.
78. Cao, T., H. Lee, Y. Hwang*, R. Radermacher, H, Chun, Performance investigation of engine waste heat powered absorption cycle cooling system for shipboard applications, Applied Thermal Engineering, V. 90 (5), pp. 820-830,11/2015.
79. Qian, S., Alabdulkarem, A., Ling, J., Muehlbauer, J., Hwang, Y., Radermacher, R., Takeuchi, I., Performance enhancement of a compressive thermoelastic cooling system using multi-objective optimization and novel designs, Int. J. of Refrigeration, V. 57, pp. 62-76, 09/2015.
80. Qian, S., Ling, J., Hwang, Y., Radermacher, R., Takeuchi, I., Thermodynamics cycle analysis and numerical modeling of thermoelastic cooling systems, Int. J. of Refrigeration, V. 56, pp. 65-80, August 2015.
81. Alabdulkarem, A, Y. Hwang*, R. Radermacher, Multi-functional Heat Pumps Integration In Power Plants For CO_2 Capture and Sequestration, Applied Energy, V147, pp. 258-268, June 2015.
82. Qian, S., J. Ling, J. Muehlbauer, Y. Hwang*, R. Radermacher, Study on high-efficient heat recovery cycle for solid-state cooling, Int. J. of Refrigeration, V. 55, pp. 102-119, July 2015.
83. Al-Alili, A., Y. Hwang*, R. Radermacher, Performance of a desiccant wheel cycle utilizing new zeolite material: Experimental investigation, Energy, V. 81, pp. 137-145, March 2015.
84. Lee, H., Y. Hwang*, R. Radermacher, H. Chun, Performance investigation of multi-stage saturation cycle with natural working fluids and low GWP working fluids, Int. J. of Refrigeration, V. 51, pp. 103-111, 03/2015.
85. Popli, S., Y. Hwang*, R. Radermacher, Deluge Evaporative Cooling Performance of Wavy Fin and Tube Inclined Heat Exchangers, ASHRAE Transactions, V.120 P2, SE-14-020, 07/2014.

86. Li, G., M. Eisele, H. Lee*, Y. Hwang, R. Radermacher, Experimental Investigation of Energy and Exergy Performance of Secondary Loop Automotive Air-conditioning Systems Using Low-GWP (global warming potential) Refrigerants, Energy, V. 68, pp. 819-831, 04/2014.
87. Yun, Rin, Y. Hwang*, Inflow Condensation Heat Transfer Characteristics of CO_2 in Microchannel, Int. Journal of Air-Conditioning and Refrigeration, V.22, N.2, 03/2014.
88. Mortazavi, Amir, Alabdulkarem, A., Y. Hwang*, R. Radermacher, Novel Combined Cycle Configurations for Propane Pre-Cooled Mixed Refrigerant (APCI) natural gas liquefaction cycle, Applied Energy, V.117, pp.76-86, 03/2014.
89. Horvath, C., Y. Hwang*, R. Radermacher, W. Gerstler, C. Tang, Waste Heat and Electrically Driven Hybrid Cooling Systems for a High Ambient Temperature, Off-grid Application, Energy, V. 66, pp. 711-721, 03/2014.
90. Li, G., S. Qian, H. Lee*, Y. Hwang, R. Radermacher, Experimental investigation of energy and exergy performance of short-term adsorption heat storage for residential application, Energy, V. 65, 1, pp. 675-691, 02/2014.
91. Cao, T., H. Lee, Y. Hwang*, R. Radermacher, Experimental Investigation on Thin Polymer Desiccant Wheel Performance, Int. J. of Refrigeration, V. 44, pp. 1-11, 08/2014.
92. Kwon, L., H. Lee, Y. Hwang*, R. Radermacher, Experimental investigation of multifunctional VRF system in heating and shoulder seasons, Applied Thermal Engineering, V. 66, pp. 355-364,05/2014.
93. Al-Alili, A., Y. Hwang*, R. Radermacher, A hybrid solar air conditioner: experimental investigation, Int. J. of Refrigeration, V. 39, pp. 117-124, 03/2014.
94. Li, G., Y. Hwang*, R. Radermacher, Experimental investigation of energy and exergy performance of adsorption cold storage for space cooling application, investigation, Int. J. of Refrigeration, V. 44, pp. 23-35, 03/2014.
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3.3 Reports.

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3.4 Articles in Magazines and Newsletters

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3.5 Talks, Abstracts and Other Professional Papers Presented.

i. Keynote paper presentation (20).

1. Hwang, Y., Electrochemical Mass Transfer for Dehumidification and Gas Compression, 26th International Congress of Refrigeration, August 2023, Paris, France.
2. Hwang, Y., A Review of Recent Residential Heat Pump Systems and Applications in Cold Climates, 14th IEA Heat Pump Conference, May 2023, Chicago, USA.
3. Hwang, Y., Development of a Near-isothermal Compressor for Transcritical Carbon Dioxide Cycle, 14th IEA Heat Pump Conference, May 2023, Chicago, USA.
4. Hwang, Y.*, Innovations In Heat Pump Technology Hwang, Y.*, 2021 China Heat Pump Annual Conference, China, 10/31/2021.
5. Hwang, Y.*, Recent Advances in Elastocaloric Cooling Technologies: Where They Stand and What Prospects Are, The 25th IIR International Congress of Refrigeration, Montreal, Canada, 08/27/2019.
6. Hwang, Y.*, What are new cooling technologies?, The 5th International Conference on Refrigeration Technology, Zhuhai, China, 12/6/2018.
7. Hwang, Y.*, Advances in Caloric Cooling Technologies, The 8th Int. Conference on Compressors and Refrigeration, Xi'an, China, 07/21/2017.
8. Hwang, Y.*, New Cooling Technologies, International Symposium on Refrigeration Technology, Zhuhai, China, 10/31/2014.
9. Y. Hwang, Plenary Presentation: New Heat Exchanger Design Approach for Low Temperature Lift Heat Pump, 2nd International Workshop on Heat Transfer Advances for Energy Conservation and Pollution Control (IWHT2013), Xi'an, China, 10/19/13.
10. Ling, J., O. Kuwabara, Y. Hwang*, R. Radermacher, Enhancement Options for Separate Sensible and Latent Cooling Air-Conditioning Systems, 23rd International Congress of Refrigeration, Prague, Czech Republic, 08/25/2011.
11. Gluesenkamp, K.*, R. Radermacher, Y. Hwang, Trends in Absorption Machines, International Sorption Conference (ISHPC11): Sources/Sinks Alternative to the Outside Air for Heat Pump and Air-Conditioning Techniques, Padua, Italy, pp. 13-22, 04/08/2011.
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18. Hwang, Y.*, R. Radermacher, Integration of Air-conditioning and Refrigeration with Distributed System, The 21st Int. Congress of Refrigeration, Washington D.C., 08/22/2003.
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ii. Invited talks.

1. Hwang, Y. A Control Strategy for Adsorption Heat Pump Systems and Adsorption Energy Storage, Korea Institute of Science and Technology, October 2014.
2. Hwang, Y. New Heat Exchanger Design Approach for Low Temperature Lift Heat Pump Systems, Korea Institute of Energy Research, December 2013.
3. Hwang, Y., Separate Sensible and Latent Cooling, Korea University, May 2013.
4. Hwang, Y., New Heat Exchanger Design Approach for Low Temperature Lift Heat Pump Systems, KAIST, May 2013.
5. Hwang, Y., Refrigerant Mixtures and Transcritical CO_2 Cycles, Emerson, Suzhou, China, August 2012.
6. Hwang, Y., Refrigeration Technologies, Xi'an Jiao Tong University, August 2012.
7. Hwang, Y., Energy Efficiency Enhancement Through Separate Sensible and Latent Cooling, Seoul National University, June 2012.
8. Hwang, Y., Energy Efficiency Enhancement for Sustainable Future Marine Energy Management, Pusan National University, June 2012.
9. Hwang, Y., Net Zero Energy Buildings, Busan Technology Park, June 2012.
10. Hwang, Y., Net Zero Energy Residence, UAE ASHRAE Chapter, April 2012.
11. Hwang, Y., Next Generation Heat Exchanger Design, Korea University, June 2011.
12. Hwang, Y., Advanced Technologies for Air-Conditioning and Refrigeration, Busan Technology Park MP Technology Institute, June 2011.
13. Hwang, Y., Marine Energy Management toward Sustainable Future, Samsung Heavy Industry, June 2011.
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15. Hwang, Y., Study on Application of R290 Technology, International Workshop on Alternatives to HCFC-22 in RAC Sector, CHEAA and UNEP, Hefei, China, November 2010.
16. Hwang, Y., Waste Heat Recovery Technologies, 1st SHI Eco Friendly Energy Forum, June 2010.
17. Hwang, Y., Modeling of the LNG Process, Samsung Heavy Industry, December 2009.
18. Hwang, Y., High Efficient Air-Conditioning and Refrigeration System Design, Pusan National University, September 2008.
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2. Hwang, Y., Update on IEA-HPT Annex 54: Heat Pump Systems with Low GWP Refrigerants, The European Heat Pump Summit 2021, October 26, 2021.
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8. Hwang, Y., Regenerative Elastocaloric Cooling, Seminar 31, ASHRAE Winter Conference, Atlanta, GA, 2019.
9. Hwang, Y., Overview of Elastocaloric Cooling, Seminar 71, ASHRAE Annual Conference, Houston, TX., 2018.
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11. Hwang, Y., Demonstration of Elastocaloric Cooling Technology, Seminar 48, ASHRAE Winter Conference, Orlando, FL, 2016.
12. Hwang, Y., CEEE's Alternative Refrigerant Research, 2016 Energy Efficiency & Demand Response Symposium, EPRI's Technology Innovation Program, Long Beach, 2016.
13. Hwang, Y., R. Radermacher, Experimental Cooling and Energy Performance of Motor Vehicle AC using HFC-152a, SAE 2015 Thermal Management Systems Symposium, Troy, MI, 2015.
14. Lee, Hoseong, X. Lin, Y. Hwang, R. Radermacher, Performance Investigation of Multi-Functional Variable Refrigerant Flow System, ASME 2015 9th International Conference on Energy Sustainability, San Diego, ESFuelCell2015-49745, June 28-July 2, 2015.
15. Hwang, Y., Cold Climate Heat Pump Technologies, Symposium II on Advanced Heat Pump Applications for Energy Efficiency & Demand Response, EPRI, Capital Hilton, Washington, DC 20036 November 4th & 5th, 2014.
16. Hwang, Y., High Efficient Residential Air-Conditioning System Design Training Camp, China Household Electric Appliance Research Institute, Technical Training Workshop on High Efficiency Room Air Conditioner Design and Manufacturing, December 2-7, 2013, Beijing, China.
17. Hwang, Y., Plenary Presentation: New Heat Exchanger Design Approach for Low Temperature Lift Heat Pump, the 2nd International Workshop on Heat Transfer Advances for Energy Conservation and Pollution Control (IWHT2013), October 18-21, 2013, Xi'an, China.
18. Hwang, Y., Energy Efficiency Improvement of RACs, China Household Electric Appliance Research Institute, Technical Training Workshop on High Efficiency Room Air Conditioner Design and Manufacturing, August 2013.
19. Hwang, Y., Review of Life Cycle Climate Performance (LCCP) Analysis and IIR's LCCP Working Party, Advancing Ozone and Climate Protection Technologies – Next Steps, Second International Conference, Bangkok, Thailand, June 29-30, 2013.
20. Hwang, Y.*, Solar Powered Hybrid Air Conditioner, ASME Integrated/Sustainable Building Equipment & Systems Open Research Forum, Washington D.C., 04/2013.
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22. Alabdulkarem, A., Y. Hwang*, R. Radermacher, Drop-In Performance Evaluation of Three Alternative Refrigerant Candidates for R-410A, ASHRAE Annual Meeting, Denver, CO, 2013.
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24. Hwang, Y., Application of Thermoelectric Modules for Vapor Injection Heat Pump System Under Cold Climate Operation, ASHRAE Winter Meeting, Dallas, TX, 2013.
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26. Al-Alili, A., Y. Hwang*, R. Radermacher, Experimental Investigation of a Hybrid Air Conditioner for Hot and Humid Climates, The ASME 2012 6th International Conference on Energy Sustainability & 10th Fuel Cell Science, Engineering and Technology Conference, July 23-26, 2012, San Diego, CA, USA.

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39. Schoenfeld, J., Y. Hwang*, R. Radermacher, Experimental Results: Thermoelectric “Subcooler for CO2 Transcritical Vapor Compression System”, VDA Winter Meeting, Saalfelden, Austria, 2009.
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1. Hwang, Y.*, L. Cao, J. Baker, C. Wang and R. Radermacher, Electrochemical Mass Transfer for Dehumidification and Gas Compression, 26th International Congress of Refrigeration, Paper ID: 1150, August 2023, Paris, France.
2. Cao, L, J. Baker, Y. Hwang*, C. Wang and R. Radermacher, Development of An Electrochemical Membrane Dehumidifier, 26th International Congress of Refrigeration, Paper ID: 862, August 2023, Paris, France.
3. Wan, H., Y. Hwang*, S. Andersen, On-site Room Air Conditioners Replacement Test with Limited Data during COVID-19 Regulation Periods, 26th International Congress of Refrigeration, Paper ID: 305, August 2023, Paris, France.
4. Wan, H., B. Shen, Z. Li, Y. Hwang*, A hybrid method to evaluate the life cycle climate performance of heat pumps, 26th International Congress of Refrigeration, Paper ID: 711, August 2023, Paris, France.
5. Wan, H. and Y. Hwang*, A Review of Recent Residential Heat Pump Systems and Applications in Cold Climates, 14th IEA Heat Pump Conference, Paper 331, May 2023, Chicago, USA.
6. Cheng-Yi Lee, Timothy Kim, Yunho Hwang and Reinhard Radermacher, Development of a Near-isothermal Compressor for Transcritical Carbon Dioxide Cycle, 14th IEA Heat Pump Conference, Paper 217, May 2023, Chicago, USA.
7. Jangho Yang, Jan Muehlbauer, Daniel Bacellar, Vikrant Aute, Yunho Hwang, Experimental Investigation of a Phase Change Material Charged Serpentine Heat Exchanger with Louvered Fins, 14th IEA Heat Pump Conference, Paper 327, May 2023, Chicago, USA.
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Experimental Heat Transfer, Fluid Mechanics and Thermodynamics, 22-26 August 2022, Rhodes Island, Greece.

9. Lee, C., Y. Hwang*, S. Shaffer, An Improved Mass Flow Rate Prediction Method for Rolling Piston Compressors, 26th International Compressor Engineering Conference at Purdue, 1463, July 11-14, 2022.
10. Yang, J, J. Muehlbauer, D. Bacellar, J. Ling, V. Aute, Y. Hwang*, Experimental Investigation of A Phase Change Material Charged Finned-Tube Heat Exchanger. 19th International Refrigeration and Air Conditioning Conference at Purdue, 2421, July 11-14, 2022.
11. Lin, L., L. Gao, Y. Hwang, and M. Kedzierski, A Neural-network Approach to Develop Algebraic Correlations for Heat Transfer and Fluid Flow. 19th International Refrigeration and Air Conditioning Conference at Purdue, 2120, July 11-14, 2022.
12. Gao, L., Y. Hwang, R. Radermacher, A review of configuration optimization for energy conversion systems, 24th Conference on Process Integration for Energy Saving and Pollution Reduction, PRES21, Paper ID: 0362, Hybrid, Brono, Czech Republic, October 31- November 3, 2021.
13. Yang, J, J. Muehlbauer, D. Bacellar, J. Ling, V. Aute, Y. Hwang*, Experimental Investigation of Melting and Solidification Processes of Phase Change Material Heat Exchanger. Phase Change Materials and Slurries for Refrigeration and Air Conditioning Conference, Italy, Sep 1– 3, 2021.
14. Lee, C., T. Cao., Y. Hwang, S. Shaffer, Development of Accurate and Widely Applicable Compressor Performance Map, 12th International Conference on Compressors and their Systems, Paper ID: 156, Virtual, September 6-8, 2021.
15. Tancabel, J., Aute, V., Klein, E., Hwang, Y., Ling, J., Muehlbauer, J., Radermacher, R., Design Optimization and Experimental Validation of Heat Exchangers Utilizing High Performance, Non-round Tubes, Heat Transfer Fluid Mechanics and Thermodynamics Conference (ATE HEFAT 2021), pp. 614-619, Virtual, July 22-28, 2021.
16. Tao Cao, Lei Gao, Vikrant Aute, Yunho Hwang. A Data-driven Model Development for Generalized Building Energy Predictions. 6th International High-Performance Buildings Conference at Purdue, 3499, May 23-27, 2021.
17. Yiyuan QIAO, Tao CAO, Yunho HWANG, Vikrant AUTE. Investigation on Phase Change Material (PCM)-to-refrigerant Heat Exchanger in Air-conditioning Systems. 18th International Refrigeration and Air Conditioning Conference at Purdue, 2500, May 23-27, 2021.
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3.6 Patents (20).

1. Wang, Chunsheng, Tao, Ye, Radermacher, Reinhard, Hwang, Yunho, Baker, Josheph, Mei, Zhenyuan, Systems, Devices, and Methods Employing Electrochemical Process with Oxygen as Carrier Gas, US Patent, US 11710845, July 25, 2023.
2. Wang, Chunsheng, Tao, Ye, Radermacher, Reinhard, Hwang, Yunho, Systems, Devices, and Methods Employing Electrochemical Processing of Hydrofluoroolefins, US Patent, US 11131029, September 28, 2021.
3. Cole, B., L. Shapiro, B. Noel, H. Lee, Y. Hwang, D. Wilkins, Heat Exchanger including Manifold, Korean Patent, 25667-0015KR2, 2021.
4. Radermacher, R.*, V. Aute, Y. Hwang, et al., Comfort units and systems, methods, and devices for use thereof, U.S. Patent, US10801750B2, 2020.
5. Cole, B., L. Shapiro, B. Noel, H. Lee, Y. Hwang, D. Wilkins, Heat Exchanger including Manifold, U.S. Patent, US 10619944B2, 2020.
6. Kim, J., Y. Hwang, Heat Pump System for Vehicle, U.S. Patent, US10625563B2, 2020.
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8. Kim, J., Y. Hwang, Heat Pump System for Vehicle with Battery and Electronic Component Cooling, U.S. Patent, US10252599B2, 2019.
9. Cui, J., I. Takeuchi, M. Wuttig, Y. Wu, R. Radermacher, Y. Hwang, J. Muehlbauer, Thermoelastic Cooling, U.S. Patent, US10119059B2, 2018.
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11. Cole, B., L. Shapiro, D. Wilkins, B. Noel, H. Lee, Y. Hwang, Evaporator Heat Exchanger Plate, U.S. Design Patent, US D736,361S, 2015.
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14. Kuwabara, O., R. Radermacher, Y. Hwang, J. Ling, Air conditioner having a desiccant rotor with moisture adsorbing area, U.S. Patent, US8584479, 2013.
15. Hwang, Y.*, H. Lee, J. Muehlbauer, L. Shapiro, B. Cole, Heat Exchanger Plate, U.S. Design Patent, US D658,748, 2012
16. Hwang, Y.*, H. Lee, J. Muehlbauer, L. Shapiro, B. Cole, Heat Exchanger Plate, U.S. Design Patent, US D657,856, 2012
17. Hwang, Y.*, H. Lee, J. Muehlbauer, L. Shapiro, B. Cole, Heat Exchanger Plate, U.S. Design Patent, US D657,855, 2012
18. Hwang, Y.*, H. Lee, J. Muehlbauer, L. Shapiro, B. Cole, Heat Exchanger Plate, U.S. Design Patent, US D657,854, 2012
19. Sim, J.*, Y. Ko, J., Shin, B. Choi, J. Hwang, Y. Jeong, S. Ha, Y. Hwang, Refrigerator and Method for Controlling Operation of the Same, U.S. Patent, US7726141B2, 2010.
20. Radermacher, R.*, T. Ishihara, H. Huffs, Y. Hwang, M. Otake, O., Kuwabara, I., Kamimura, Multi-stage refrigeration system including sub-cycle control characteristics, U.S. Patent, US7631510B2, 2009.

3.7 Extension Activities.

a. Student design competition participation
   - 2017 Solar Decathlon, Hosted by the U.S. DOE, Lead Faculty for HVAC Team; ***Won Second Place*** among 13 University Teams selected.
   - Graduate and undergraduate students: **MaxTech and Beyond**, Ultra-low Energy Use Appliance Design, Hosted by Lawrence Berkeley National Laboratory, Fall 2012 - Spring 2013; ***Won First Place*** among Eight Project Teams selected.
   - Graduate and undergraduate students: **MaxTech and Beyond**, Ultra-low Energy Use Appliance Design, Hosted by Lawrence Berkeley National Laboratory, Fall 2011 - Spring 2012; ***Won First Place*** among Nine Project Teams selected.
   - Undergraduate student: Modeling and Design of Highly Efficient Graphite Foam Heat Exchangers, Hosted by Lockheed Martin, Fall 2009.

3.8 Awards.

1. The Wilbur T. Pentzer award from USNC/IIR, July 2022.
2. A. James Clark School of Engineering Dean's "**A. James Clark Student Competition Advisors Award"**, University of Maryland, December 2021.
3. A. James Clark School of Engineering Dean's "**Outstanding Performance Award for Professional Track Faculty for Research**", University of Maryland, September 25, 2020.
4. **Best Paper Award,** Rang Tu and Yunho Hwang, "Performances of Heat Pump Driven Two-stage Desiccant Plates Dehumidifier for Residential Application in Humid Climate" in the Energy Track, ASME 2018 International Mechanical Engineering Conference and Exhibition.
5. **Best Student Paper Award,** Tao Cao, Yunho Hwang and Reinhard Radermacher, "Evaluation of an extended-duct air delivery system in tall spaces conditioned by rooftop units" in the Energy Track, ASME 2017 International Mechanical Engineering Conference and Exhibition.
6. **1st Place Student Paper Award**, Ye Tao, Hoseong Lee, Yunho Hwang, Reinhard Radermacher, Performance Investigation on Electrochemical Compressor with Ammonia, 23rd International Compressor Engineering Conference at Purdue, Paper No. 11380, 07/14/2016.
7. **Best Paper Award**, Magnus Eisele, Yunho Hwang*, Reinhard Radermacher, Small-Scale Dynamic Test Facility for Automotive Thermal Management Systems", in Vehicle Thermal Management Systems (VTMS) 10 Conference, 2011.
8. **Honorable Mention Award**, Abdul Alabdulkarem, Yunho Hwang, Reinhard Radermacher "New Energy Efficient CO_2 Pressurization Strategies for Enhanced Oil Recovery Applications" in 2011 ASME Int. Mechanical Engineering Congress and Exposition.
9. **Best Paper Presentation Award** at Sixth World Conference on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics (ExHFT-6), 2005.

3.9 Editorships, Editorial Boards and Reviewing Activities for Journals.

1. Editor:
   - Energy, Elsevier (Netherlands), Subject Editor (2015-present)
   - Int. Journal of AC&R, World Scientific (US), Editor (2013-present)
   - ASME J. of Engineering of Sustainable Buildings and Cities, Editor (2020-present)
2. Guest Editor
   - 2014 International Sorption Heat Pump Conference, S&T for the Built Environment, Vol. 21, Issue 3, 2015.
   - Special Edition: Expander, Int. Journal of HVAC&R, V15, N4, 2009.
3. Editorial Board
   - International Journal of Low-Carbon Technologies, Oxford Academic (UK) (2017-present)
   - Open Journal of Energy Efficiency, Scientific Research Publishing (US) (2012-present)
   - Engineering, Scientific Research Publishing (US) (2010-present)
   - Journal of Petroleum Engineering, Hindawi (UK) (2012-2017)
4. Reviewing Activities for Journals:
   - Applied Energy
   - Applied Thermal Engineering
   - Energy
   - International Journal of Heat and Mass Transfer
   - International Journal of Refrigeration
   - International Journal of Thermal Sciences
   - Science and Technology for the Built Environment (Former: Int. Journal of HVAC&R)

4. Service.

a. Professional

i. Offices and committee memberships held in professional organizations.

Date	Committee membership	Professional organization
2019 to present	Operating Agent	IEA, HPT, Annex 54
2020 to present	President, Commission B1	Int. Institute of Refrigeration

2011 to 2019	Vice President, Commission B1	Int. Institute of Refrigeration
1999 to 2011	Secretary, Commission B2	Int. Institute of Refrigeration
2011 to 2016	Chair, LCCP Working Group	Int. Institute of Refrigeration
2020 to 2021	Chair, Refrigeration Committee	ASHRAE
2019 to 2020	Vice Chair, Refrigeration Committee	ASHRAE
2002 to 2019	Member, TC 3.4, 8.4, 8.7, 8.11, SPC118, CEC	ASHRAE
2008 to 2011	Chair, TC10.10	ASHRAE
2018 to 2019	Chair of Executive Committee, Advanced Energy System Division (AESD)	ASME
2014 to 2019	Executive Committee Member in AESD	ASME
2013 to 2014	Chair, Technical Committee of Renewable Energy and Energy Conversion in AESD	ASME
2011 to 2013	Vice Chair, Technical Committee of Renewable Energy and Energy Conversion in AESD	ASME

ii. Proposal reviewing activities
- 2010 to Present: Department of Energy's Grant Application
- 2010 to Present: Qatar National Research Fund
- 2003 to Present: California State's Energy Innovations Small Grant Program

iii. International activities not listed above.
- Scientific Committee, the 5th IIR Conference on Thermophysical Properties and Transfer Processes of Refrigerants, April 2017.
- Scientific Committee, the 3rd International Symposium on Refrigeration Technology, Zhuhai, China, October 2014.
- Scientific Committee, the 4th IIR Conference on Thermophysical Properties and Transfer Processes of Refrigerants, June 2013.
- Scientific Committee, the 8th International Conference on Multiphase Flow, June 2013.
- Scientific Committee, the 8th World Conf. on Experimental Heat Transfer, Fluid Mechanics and Thermodynamics will be held in Lisbon, June 24-27, 2013.
- Scientific Committee, the 6th World Conference on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics, 2005.

iv. Organizing Conferences
- General Chair of 9th IIR International Conference on Caloric Cooling and Applications of Caloric Materials, College Park, MD, June 7-11, 2021.
- General Chair of 9th ASME International Conference on Energy Sustainability, San Diego CA, June 28-July 2, 2015.
- Executive Advisory Committee of 9th ASME International Conference on Energy Sustainability, San Diego CA, June 28-July 2, 2015.
- Technical Program Chair of 8th ASME International Conference on Energy Sustainability, Boston, MA, June 30-July 2, 2014.
- General Chair of International Sorption Heat Pump Conference, College Park, MD, March 31-April 3, 2014.

b. Service Awards and Honors.
- **A. James Clark Student Competition Advisors Award,** December 2021
- **Peter Ritter von Rittinger International Heat Pump Award**, April 2021
- **University of Maryland, Dean's Award for Professional Track Faculty Research,** September 2020
- **ASHRAE Fellow**, January 2019
- **ASME Fellow,** December 2014

- **ASHRAE Exceptional Service Award**, June 2013.
- **ASHRAE Distinguished Service Award**, June 2010.
- **SAE Member Service Award**, November 2008.

c. Certifications.

- EPA Certified Universal Technician per Section 608 of Clean Air Act

5. Teaching, Mentoring and Advising.

a. **Courses taught**

Course Taught	Years Taught (S: Spring; F: Fall)
ENPM808C: Ocean Energy Harvesting	2020S, 2017S
ENME635: Energy Conversion Systems	2019S, 2013S, 2012S, 2010S, 2009S
ENME635: Energy Conversion Systems, International Joint Summer Course	2010, Shanghai Jia Tong University 2009, Hong Kong Poly Tech Univ. 2008, Pusan National University
ENME701: Sustainable Energy Production & Utilization	2018F
ENME701: Sustainable Energy Production & Utilization International Joint Summer Course	2019, Korea University 2015, Korea University 2013, University of Maryland
ENPM 651: Heat Transfer for Modern Applications	2022S, 2020F, 2019S, 2017F, 2016S, 2014F, 2013S
ENME423: Building Cooling, Heating & Power Integration	2010F, 2009F, 2008F
ENME489M: Special Topics in Mechanical Eng., Ultra-low Energy Use Appliance Design II	2015S, 2014S, 2013S, 2012S
ENME489M: Special Topics in Mechanical Engineering, Ultra-low Energy Use Appliance Design I	2017S, 2014F, 2013F, 2012F, 2011F
ENME808L: Ultra-low Energy Use Appliance Design II	2015S, 2014S, 2013S, 2012S
ENME808P: Ultra-low Energy Use Appliance Design I	2017S, 2014F, 2013F, 2012F, 2011F
ENME371: Product Engineering and Manufacturing	2011F

b. Course Development.

Course Developed	Years Started
ENPM808C: Ocean Energy Harvesting	2017S
ENME701: Sustainable Energy Production & Utilization	2018F
ENME701: Suitability, International Joint Summer Course	2013 Summer
ENPM 651: Heat Transfer for Modern Applications	2013S
ENME635: Energy Conversion Systems, International Joint Summer Course	2010, Shanghai Jia Tong University 2009, Hong Kong Poly Tech Univ. 2008, Pusan National University
ENME808L: Ultra-low Energy Use Appliance Design II	2012S
ENME808P: Ultra-low Energy Use Appliance Design I	2011F
ENME489M: Special Topics in Mechanical Engineering, Ultra-low Energy Use Appliance Design II	2012S
ENME489M: Special Topics in Mechanical Engineering, Ultra-low Energy Use Appliance Design I	2011F