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PATRICK E. PHELAN

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EDUCATION AND TRAINING

Tulane University, New Orleans, Louisiana, Mechanical Engineering, B.S., 1985
Massachusetts Institute of Technology, Cambridge, Mechanical Engineering, M.S., 1987
University of California, Berkeley, Mechanical Engineering, Ph.D., 1990
Tokyo Institute of Technology, Tokyo, Japan, Post-Doctoral Fellow, 1990 - 1992

PROFESSIONAL EXPERIENCE

Years	Title	Description
1996 – present	ASU faculty member	Assistant, Associate, and now Professor of Mechanical & Aerospace Engineering
2016 - present	Assistant & now Associate Dean of Graduate Programs, ASU Ira A. Fulton Schools of Engineering	Lead recruiting efforts for masters students, Dean's Fellowship program for PhD students, and new graduate engineering programs
2016 - present	Assistant & now Director, ASU Industrial Training & Assessment Center	Lead this re-established DOE-sponsored Center, which provides energy, productivity, and waste assessments of local manufacturing firms
2022 - present	Field Chief Editor, *Frontiers in Energy Efficiency*	Provide leadership for this new journal
2020 - 2022	Section Editor-in-Chief, *Energies*, Energy and Buildings	Provided editorial leadership for articles related to energy and buildings
2020 – 2022	Chief Technical Officer, VBeck LLC	Provided technical input for this sustainable energy start-up company
2012 – 2016	Manager, Emerging Technologies Program, Building Technologies Office, US Department of Energy	Managed and provided direction for the ~$50M buildings R&D portfolio for the US Department of Energy
2015 – 2016	Co-Chair, International Expert Panel for the High-Ambient Testing Program	Co-chair of advisory panel of experts overseeing testing of HFC refrigerant replacements that informed a proposed amendment to the Montreal Protocol
2008 – 2014	Associate Editor, *ASME Journal of Heat Transfer*	Organized reviews of submitted papers
2006 – 2012	Associate Director, *ASU National Center of Excellence on SMART Innovations* (SMART =	Helped to provide direction for this EPA-designated Center, especially in the areas

	Sustainable Materials & Renewable Technologies)	of sustainable energy technologies and urban heat island mitigation
2010 – 2012	Director, *ASU Professional Science Master's in Solar Energy Engineering & Commercialization*	Founding Director of this master's level program that provides focused education in solar energy
2008 – 2012	Graduate Program Chair, *ASU Mechanical & Aerospace Engineering*	Provided direction for master's and PhD students in mechanical and aerospace engineering; number of students grew from 151 to 266 during this time
2006 – 2008	Program Director, Thermal Transport Processes, National Science Foundation (NSF)	Led this ~ $6 million/year program at NSF, including organizing reviews and making funding recommendations
1997 – 2006	Director, ASU Industrial Assessment Center	Led this DOE-sponsored Center, which provided energy, productivity, and waste assessments of local manufacturing firms
Summer 2000	Motorola-ASU Faculty Fellow	Worked onsite at Motorola's Semiconductor Products Sector (now Freescale) on heat transfer in microelectronics
1992 – 1995	University of Hawaii Asst. Prof.	Asst. Prof. of Mechanical Engineering
Summer 1994	Argonne National Laboratory (ANL) Summer Faculty Research Participant	Supported by DOE at ANL's Energy Technology Division

HONORS AND AWARDS

2022 ASME Fellow

2015 Best Student Research Paper Award at the American Society of Mechanical Engineers *Power & Energy Conference* (student authors: Andrey Gunawan and Nicholas Fette)

2011 ASU Professor of the Year Nominee (one of 26)

2010 Top 5% of best teachers in the ASU Ira A. Fulton Schools of Engineering

2007 Best Paper Award for the Heating and Cooling Applications and Analysis Track at the *Energy Sustainability Conference*, ASME Solar Energy Division

1995 NSF CAREER Award

1995 *Teacher Recognition Award*, University of Hawaii, ASME Student Chapter

1993 *ASME Outstanding Faculty Award*, University of Hawaii, Dept. of Mechanical Engineering

INTELLECTUAL PROPERTY

2023 "Systems, methods, and apparatuses for implementing aggregable, environment-controlled mini-containers for the efficient logistics of perishable products," US20230267404A1, JR Villalobos, PE Phelan, L Siwek, K Bandara, & D Riley

2022 "Systems and methods for a power-generating thermogalvanic brick," US11346103B2, PE Phelan, L Aldous, R Taylor, & B Obeng

2021 "Solar adsorption heat pump and evacuated tube adsorption heat pump and desalination system," US11029064B2, S Alelyani, PE Phelan, & S Sinha

2018 "Systems and methods for sustainable self-cooling of central processing unit thermal hot spots using thermoelectric materials," US10162394B2, C-J Wu, PE Phelan, & S Lee

SUMMARY OF EXTRAMURAL FUNDING

The table below summarizes the extramural research and educational awards for which I have served as a PI or Co-PI. The total funding refers to that received for the entire award, not just the portion attributable to my participation.

Agency/Company	No. of Awards	Total Funding	Representative Awards
Federal			
National Science Foundation	17	$12,207,334	• FMRG: Eco: Reimagining Cement Manufacturing for Carbon Neutrality (NeutraCEM) • STTR Phase I: Innovative Two-Phase Cooling with Micro Closed Loop Pulsating Heat Pipes for High Power Density Electronics • Ultrasonic Enhancement of Heat and Mass Transfer in Sorption Processes • CAREER: Thermal Contact Resistance for Nonmetallic Materials at Cryogenic Temperatures • GOALI: Transport in Nanoscale Colloidal Systems • Science Master's Program: Solar Energy Engineering & Commercialization
US Department of Energy	8	$8,587,713	• Arizona State University Industrial Training & Assessment Center • Field Studies for an Advanced Water Treatment Technology for Control of Scale and Bio-Fouling in Various Water and Wastewater Systems
Office of Naval Research	1	$499,999	• MURI: System-Level Approach for Multi-Phase, Nanotechnology-Enhanced Cooling of High-Power Microelectronic Systems
DARPA	1	$95,000	• Direct to Phase II SBIR: GCTG New Cooling Pulsating Heat Pipe Technology (CLPHP)
US Department of	1	$601,224	• Graduate Education in Environmental Technology

Education			
US Centers for Disease Control	2	$349,335	• Climate Change and the Built Environment: A Vulnerability Analysis and Prevention Planning Project • Developing a Modular Web-Based Preparedness Modeling Tool for Heat Waves
Southwest Center for Environmental Research and Policy (EPA)	2	$140,243	• Accelerating the Development of a Mexican Energy Service Industry Through Education and Training • A Comparison of Industrial Energy Consumption Among U.S. and Mexican Manufacturers in the Southwest Border Region
US Department of Agriculture	2	$200,000	• Energy Efficiency for Agricultural Producers & Rural Small Businesses
US Department of the Interior	1	$47,189	• Collecting the Intermountain Region's GHG Emission Data
Utilities & Municipalities			
City of Phoenix	1	$46,604	• Analysis of Biogas Composition of a Waste Water Treatment Facility
Southwest Gas Corporation	2	$67,460	• Monitoring and Analysis of the SWG-Deluge-ASU Heat Pump
Arizona Public Service	3	$77,949	• Solar-Powered Absorption Cooling System
Salt River Project	1	$31,059	• A Performance Model of a Proton Exchange Membrane Fuel Cell
National Associations			
National Asphalt Pavement Association	1	$60,000	• Asphalt Pavements Temperature Effects on Overall Urban Heat Island and CO2 Impact
American Concrete Pavement Assoc.	1	$139,885	• The Thermal and Radiative Characteristics of Concrete Pavements in Mitigating Urban Heat Island Effects
Industrial			
Various Industrial Sponsors	10	$386,844	• Manufacturing and demonstration of integrated novel cooling solutions for portable commercial electronics • Combined Energy Savings and Greenhouse Gas Emissions Analysis • Application of Nanofluids in Microchannel Heat Sinks
International			
Australian Solar Institute	1	$109,778	• ASU Contribution to the Micro Urban Solar Integrated Concentrators

			(MUSIC)
AORA Solar Ltd.	1	$1,550,000	• AORA Solar
Foundations			
Foundation for Food & Agriculture Research	1	$963,513	• Integration of Small Growers into Technology-enabled, Rapid-response Fresh Food Supply Chains

TEN RELATED PUBLICATIONS

To date (July, 2025) I have authored or co-authored 180 refereed journal papers, resulting in 22,616 citations, and an *h*-index of 64 (Google Scholar).

Alenezi, A., Muhammad Ali, H., & Phelan, P.E., 2025, "Experimental investigation of the effect of ultrasonic waves on heat transfer enhancement and pressure drop for propylene glycol/water mixtures in a rectangular minichannel heat sink," *Applied Thermal Eng* **267**, pp. 125717, https://doi.org/10.1016/j.applthermaleng.2025.125717.

Ali, A., Noshad, N., Kumar, A., Ilyas, S.U., Phelan, P.E., Alsaady, M., Nasir, R., & Yan, Y., 2024, "Application of machine learning algorithms in predicting rheological behavior of BN-diamond/thermal oil hybrid nanofluids," *Fluids* **9**, https://doi.org/10.3390/fluids9010020.

Alenezi, A., Chandrasekaran, G., Noe, C., & Phelan, P.E., 2023, "Experimental study of the effects of ultrasound on the heat transfer enhancement in a 3D-printed minichannel heat sink," *Int J of Heat and Mass Transfer* **209**, 124101, https://doi.org/10.1016/j.ijheatmasstransfer.2023.124101.

Al-Weqayyan, Y., Dasinor, E., Obeng, B., Abbas, A., & Phelan, P.E., 2023, "Experimental and simulated thermal resistance of thermogalvanic cells with triply periodic minimal surface structures," *Int J of Thermal Sciences* **192**, pp. 108430, https://doi.org/10.1016/j.ijthermalsci.2023.108430.

Yaple, J., Noe, C., Alenezi, A., Phelan, P.E., & Bhate, D., 2022, "Design and additive manufacturing of bio-inspired copper heat sinks for microelectronics cooling," *Int Solid Freeform Fabrication Symposium*, pp. 1826 – 1837.

Nazir, H., Batool, M., Bolivar Osorio, F.J., Isaza-Ruiz, M., Xu, X., Vignarooban, K, Phelan, P.E., & Kannan, A.M., 2019, "Recent developments in phase change materials for energy storage applications: A review," *Int J of Heat and Mass Transfer* **129**, pp. 491-523.

Otanicar, T.P., Smith, R., Dai, L., Phelan, P.E., & Swaminathan, R., 2015, "Applicability of Controllable Nanoparticle Radiative Properties for Spacecraft Heat Rejection," *J of Thermophysics and Heat Transfer* **29**, pp. 869-874.

Lee, S., Phelan, P.E., & Wu, C.-J., 2015, "Hot Spot Cooling and Harvesting Central Processing Unit Waste Heat Using Thermoelectric Modules," *ASME J of Electronic Packaging* **137**, pp. 031010.

Miner, M.J., Phelan, P.E., Odom, B.A., Ortiz, C.A., Prasher, R.S., & Sherbeck, J.A., 2013, "Optimized Expanding Microchannel Geometry for Flow Boiling," *ASME J of Heat Transfer* **135**, pp. 042901.

Phelan, P.E., Gupta, Y., Tyagi, H., Prasher, R.S., Cattano, J., Michna, G., Zhou, R., Wen, J., Jensen, M., & Peles, Y., 2010, "Optimization of Refrigeration Systems for High-Heat-Flux Microelectronics," *ASME J of Thermal Science & Engineering Applications* **2**, pp. 031004.