Professional Vita (updated March 2025)

ISSAM MUDAWAR
(Formerly Issam Mudawwar)

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PERSONAL: American Citizen
Wife: Jane Ausman-Mudawar, daughter: Alexine

EDUCATION:

1980-1984	Massachusetts Institute of Technology - Cambridge, Massachusetts: Ph.D. in Mechanical Engineering, with a minor in Management, received February 1984; thesis entitled "Boiling Heat Transfer in Rotating channels with Reference to Gas Turbine Blade Cooling"
1978-1980	Massachusetts Institute of Technology - Cambridge, Massachusetts: M.S. in Mechanical Engineering, received May 1980; thesis entitled "Transverse Waves in MHD Slag Flows"
1974-1978	American University of Beirut, Lebanon: B.E. in Mechanical Engineering received June 1978

EXPERIENCE:

2015-present	Betty Ruth and Milton B. Hollander Family Professor of Mechanical Engineering, Purdue University
2014-2016	Chairman, Heat Transfer Area, Purdue University
2000-2001	Chairman, Heat Transfer Area, Purdue University
1993-2015	Professor of Mechanical Engineering, Purdue University
1992-present	President, Mudawar Thermal Systems Inc., West Lafayette, Indiana
1989-1993	Associate Professor of Mechanical Engineering, Purdue University
1984-1989	Assistant Professor Mechanical Engineering, Purdue University
1984-present	Founder and Director of the Purdue University International Electronic Cooling Alliance (PU-IECA)
1984-present	Founder and Director of the Purdue University Boiling and Two-Phase Flow Laboratory (PU-BTPFL)

CITATIONS RECORD & WORLD RANKINGS:

Clarivate (ISI):	Clarivate (formerly Thomson Reuters) Highly Cited Researcher, 2015
ScholarGPS:	Highly Ranked Scholar-Lifetime, 2022
Google Scholar:	37,016 citations, h-index: 110

World Rankings, Google Scholar (2025):
Flow Boiling: #1
Spray Cooling: #1
Microchannels: #1

Microgravity Boiling: #1
Electronics Cooling: #3

World Rankings, ScholarGPS (2025):
Heat Sink: #1
Boiling: #2
Heat Transfer: #3

World's most cited author in the International Journal of Heat and Mass Transfer, Exaly.com (2025)

RESEARCH BACKGROUND:

Since joining Purdue University in 1984, Prof. Issam Mudawar founded both the Purdue University Boiling and Two-Phase Flow Laboratory (PU-BTPFL) and the Purdue University International Electronic Cooling Alliance (PU-IECA). He also served as principal investigator for NASA's Flow Boiling and Condensation Experiment (FBCE) for the International Space Station (ISS) and co-principal investigator for both the Rolls Royce Purdue University Center in High Mach Propulsion and the Hydrogen Storage Laboratory. He has supervised over 70 Ph.D. and M.S. students and 7 Visiting Scholars, and written 4 handbooks, 9 book chapters, 288 archival journal papers, and numerous conference papers and technical reports. He is also a Thomson Reuters Highly Cited Researcher and has made signification contributions to ASME, AIAA, ASGSR and other engineering societies in the capacity of keynote speaker, author, reviewer and conference session chair.

Prof. Mudawar is internationally recognized for his theoretical and experimental research on phase change mechanisms and applications in space, energy, electronics thermal management, defense systems thermal management, electric and hybrid vehicles, and intelligent materials processing. Following are brief descriptions of his contributions in each of these areas.

Theoretical and Experimental Two-Phase Fluid Physics Research: His theoretical research encompasses virtually every aspect of phase change. Examples include theory of initiation of nucleate boiling, critical heat flux (CHF), minimum film boiling point, contact angle, turbulence in the vicinity of moving interfaces, pool boiling, wavy falling films, thin film condensation, heating, evaporation and boiling, channel flow boiling, flow boiling on curved surfaces, boiling in rotating systems, droplet impact dynamics, sprays, jets, and enhanced surfaces. He is also credited for authoring the first comprehensive methodology for analysis of boiling in micro-channels. He has developed customized experimental methods for these studies including simultaneous use of laser Doppler velocimetry (LDV) and parallel-wire conductance probes, micro-particle image velocimetry (micro-PIV), photomicrography, high speed video imaging, and specialized microfabrication techniques and carbon nanotube surface coating.

Space Research: Prof. Mudawar has played a leading role in NASA's shift from present mostly single-phase liquid-cooled thermal management and control systems for space missions to two-phase thermal management. These efforts are aimed at capitalizing upon the orders-of-magnitude enhancement that is possible with boiling and condensing flows compared to their single-phase counterparts. Prof. Mudawar has performed extensive microgravity flow boiling experiments in parabolic flight and developed the first theoretical model for flow boiling CHF in microgravity. He is the principal investigator for the Flow Boiling and Condensation Experiment (FBCE), NASA's largest and most complex heat transfer payload on International Space Station (ISS). Data from this facility are expected to have important long-term impact on phase change processes in space nuclear propulsion, cabin temperature control, waste management, cryogenic fluid transfer, and regenerative fuel cells. In related studies, he developed a theoretical model for successful startup of capillary pumped loops used for thermal management in many types of satellites and space systems. Recently, he has led NASA's efforts to measure heat transfer data for cryogenic fluids, using parabolic flight experiments, and to develop universal correlations and computational models for these unique fluids. Findings from these studies are expected to play a paramount role in the design and performance assessment of numerous NASA systems, including in-space cryogenic propellant transfer vehicles such as the nuclear thermal propulsion (NTP) system, the nuclear electric propulsion/chemical propulsion system (NEP/Chem), and the cryogenic fuel depot, all which rely on transferring cryogenic propellants from a supply tank to the engine or receiver tank (for the fuel depot).

Energy Research: Prof. Mudawar's energy research encompasses numerous energy systems and applications, including magnetohydrodynamic energy conversion, liquid-cooled industrial gas turbine

engines, high efficiency gas turbine power cycles, vertical evaporators, rotating evaporators, vertical condensers, desalination, particle accelerators, metal hydride hydrogen fuel cell storage systems, energy efficiency improvement and reduced water utilization in metal processing, and nuclear power generation. Published in 1999, his theoretical models and consolidated databases in the three-volume handbook "Critical Heat Flux (CHF) for Water in Tubes" is used by many nuclear reactor manufacturers to predict upper safely limits for reactor operation.

Electronics Thermal Management: launched in 1984, Prof. Mudawar's PU-IECA quickly became the nation's first laboratory dedicated exclusively to the study of very-high-flux and phase change thermal management of electronics using such schemes as thermosyphons, semi-passive falling film cooling, channel-flow boiling, micro-channel boiling, micro-channel condensation, jet impingement, spray cooling, and vapor compression loops. He has played a pioneering national and international role in the development of thermal solutions for supercomputers, servers, laptops, chip testing, data centers, hybrid vehicle power electronics, and x-ray medical devices.

Defense Systems Thermal Management: Prof. Mudawar has been engaged in numerous investigations related to thermal management of very-high-power-density defense systems through efforts both at Purdue and his firm, Mudawar Thermal Systems, at the Purdue Research Park. In work he performed for Rolls Royce, he developed a new compact heat exchanger for high Mach aircraft turbine engines, wherein the air used to cool turbine blades and afterburner is pre-cooled by the aircraft's fuel. Through 7 Phase I and 5 Phase II SBIR/STTR grants from the Navy, Air Force, Missile Defense Agency (MDA), Office of the Secretary of Defense (OSD), and NASA, he developed thermal management and temperature control technologies for several DoD applications. They include a new type of Navy/Air Force avionics module for fighter aircraft capable or removing nearly two-orders of magnitude more heat compared to today's most advanced avionics. An MDA SBIR grant yielded new cooling methods for laser weapon systems (both ground and airborne), as well as microwave systems and advanced radar. He also developed a new high performance temperature control method for DoD's Joint Tactical Radio System (JTRS) Ground Mobile Radio (GMR). And through Navy SBIR funding, he developed **MTS**2PhHiFlux, software that enables users to design complete two-phase thermal management systems.

Electric and Hybrid Vehicles Research: Prof. Mudawar has been engaged in several projects aimed at tackling the removal of large amounts of heat in automobiles. He has maintained a close relation with the National Renewable Energy Laboratory (NREL), designing and building their thermal management research laboratory as well as developing new strategies for dissipating heat from high-power-density hybrid vehicle electronics. In his work at Purdue's Hydrogen Storage Laboratory, he developed for General Motors two separate patented heat exchangers for removing heat from hydrogen storage systems utilizing metal hydrides. And in a recent Ford supported study, he developed a new patented cooling system for electric vehicle (EV) charging cables which enables ultra-fast charging the EV is less than 5 minutes compared to more that 20 minutes for the world's most advanced chargers.

Intelligent Materials Processing: Since the late 1980s, Prof. Mudawar has pursued several studies aimed at developing an intelligent heat-treating technology for complex-shaped metal alloy parts that would eliminate altogether the trial-and-error approach prevalent in the industry today. Using cooling and metallurgical transformation models, he developed a CAD-based pilot facility where the most critical phase of heat treating, the quench, is optimized by configuring water cooling sprays in response to the part's shape. This technology has been shown to greatly increase part strength and hardness, enhance corrosion resistance, reduce residual stresses, warping, and cracking, greatly increased productivity, and virtual eliminate scrap. Another important aspect of this technology is the development of new non-contact temperature measurement techniques and algorithms.

Prof. Mudawar's research contributions and innovations are highly acknowledged worldwide. His research contributions earned him the title of Fellow of ASME in 1997. He is also a Senior Member of AIAA and Member of ASGSR. One of his key research accomplishments is attainment of the world's highest phase-change cooling heat flux, over 27,000 W/cm^2, using innovative micro-heat-exchanger technology. In 1995 and 1996, "Business Week" featured his breakthroughs under "Developments to Watch" in three separate issues during a single 10-month period. He has received numerous awards, including best paper awards at the 1988 National Heat Transfer Conference, 1992 ASME/JSME Joint

Conference on Electronic Packaging, and ITherm 2008. He also received the ASME Journal of Electronic Packaging Outstanding Paper Award for 1995, in addition to numerous awards and recognitions from ASME, AIAA, IEEE, JSME, ASM, US Navy, US Missile Defense Agency, and Rolls Royce. In 2013, he received the American Society for Gravitational and Space Research (ASGSR) Founder's Award, the ASME Heat Transfer Memorial Award in Science Category, and 75th Anniversary Medal of the ASME Heat Transfer Division. In 2019, he received the AIAA Space Processing Award and, in 2021, he received the Alan Kraus Thermal Management Medal. Many of his publications have been recognized for top international citation rankings.

Prof. Mudawar is also highly committed to education, evidenced by the many awards he has received at Purdue for teaching and both curriculum and instructional heat transfer laboratory development, as well as dedicated service to minority students and organizations.

HONORS AND AWARDS:

- World's most cited author in the International Journal of Heat and Mass Transfer (Exaly.com, 2024).
- Most cited author in Purdue's School of Mechanical Engineering (AD Scientific Index, 2024).
- Co-author and Lead for Physical Sciences writeup, "Thriving in Space: Ensuring the Future of Biological and Physical Sciences Research Decadal Survey for 2023-2032," Congressionally mandated National Academies report, Washington, D.C., 2023.
- ScholarGPS Highly Ranked Scholar, 2022.
- 2021 ASME Allan Kraus Thermal Management Medal
- Most Accessed Article in 2020, ASME Journal of Thermal Science and Engineering Applications: "Recent Advances in High-Flux, Two-Phase Thermal Management," Vol. 5, 021012 (2013).
- Life Fellow of the American Society of Mechanical Engineers (ASME), 2020.
- Certificate of recognition and celebration of 35 years of service and contributions to Purdue University, 2019.
- American Institute of Aeronautics and Astronautics (AIAA) Space Processing Award, presented biennially, "recognizing decades of research and advances in fluid-based heat transfer in aerospace applications, including the Flow Boiling and Condensation Experiment for the ISS," 2019.
- Thomson Reuters list of "The World's Most Influential Scientific Minds 2015."
- The Betty Ruth and Milton B. Hollander Family Professor of Mechanical Engineering, 2015.
- Thomson Reuters Highly Cited Researcher, 2015.
- "Professor Issam Mudawar on his 60th Birthday," article co-authored by leading heat transfer researchers and former students, International Journal of Heat and Mass Transfer, Vol. 89, pp. A1-A3, 2015.
- Keynote Speaker, "Criteria for Negating Influence of Gravity on Flow Boiling Critical Heat Flux in Space Systems," 9th International Conference on Two-Phase Systems for Space and Ground Applications, Baltimore, MD, September 22-26, 2014.
- 2013 American Society for Gravitational and Space Research (ASGSR) Founder's Award. This award is "the highest honor given by ASGSR to a member of the Society for distinguished scientific contributions to and leadership in the field of gravitational research."
- 2013 Heat Transfer Memorial Award in Science Category for pioneering theoretical and experimental research on phase change mechanisms and applications in energy, materials processing, aerospace propulsion and thermal management, and electronics cooling, American Society of Mechanical Engineers (ASME) Heat Transfer Division (HTD).
- 75th Anniversary Medal of the American Society of Mechanical Engineers (ASME) Heat Transfer Division (HTD), 2013.
- Faculty Entrepreneurs Innovators Hall of Fame Award, Purdue Office of Technology Commercialization, 2012-2013.

- Certificate of Recognition in testimony of distinguished achievement of research in thermal engineering and service to engineering profession, The Japanese Society of Mechanical Engineers (JSME) and the American Society of Mechanical Engineers (ASME), 2011.
- Keynote Speaker, "Two-Phase Micro-Channel Heat Sinks: Theory, Applications and Limitations," ASME/JSME 2011 8th Thermal Engineering Joint Conference, Honolulu, Hawaii, March 2011.
- Certificate of Recognition for 25 years of sustained contributions to the advancement of the arts, sciences and technology of aeronautics and astronautics, American Institute of Aeronautics and Astronautics (AIAA).
- Certificate of Recognition for 25 years of Service, American Society of Mechanical Engineers (ASME).
- Certificate of Recognition, Department of the Navy, Office of Naval Research, Small Business Innovation Program, June 7, 2010.
- The most cited article for the years 2005-2008, International Journal of Heat and Mass Transfer, for the paper "Two-Phase Flow in High-Heat-Flux Micro-Channel Heat Sink for Refrigeration Cooling Applications: Part I – Pressure Drop Characteristics," Vol. 48, pp. 928-940, 2005.
- The second most cited article for the years 2005-2008, International Journal of Heat and Mass Transfer, for the paper "Two-Phase Flow in High-Heat-Flux Micro-Channel Heat Sink for Refrigeration Cooling Applications: Part I – Heat Transfer Characteristics," Vol. 48, pp. 941-955, 2005.
- Rolls-Royce Milestone Award for design of air-to-fuel heat exchanger for high Mach aircraft turbine engines, LibertyWorks, North American Technologies operations of Rolls-Royce, February 2009.
- Best Paper Award in Thermal Management, for the paper "Single-Phase and Two-Phase Hybrid Cooling Schemes for High-Heat-Flux Thermal Management of Defense Electronics," 11th Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm 2008), FL, May 28-31, 2008.
- One of most cited articles for the years 2002-2005, International Journal of Heat and Mass Transfer, for the paper "Experimental and Numerical Study of Pressure Drop and Heat Transfer in a Single-phase Micro-channel heat Sink," Vol. 45, pp. 2549-2565, 2002.
- Top 1% citation in research field, for the paper "Experimental and Numerical Study of Pressure Drop and Heat Transfer in a Single-Phase Micro-Channel Heat Sink," International Journal of Heat and Mass Transfer, Vol. 46, pp. 2737-2753, 2003. Compiled by Essential Science Indicators, Thomson Publishing, 2005.
- Top 1% citation in research field, for the paper "Flow Boiling Heat Transfer in Two-Phase Micro-Channel Heat Sinks – I. Experimental Investigation and Assessment of Correlation Methods," International Journal of Heat and Mass Transfer, Vol. 46, pp. 2755-2771, 2003. Compiled by Essential Science Indicators, Thomson Publishing, 2005.
- The Solberg Award for Best Teacher in the School of Mechanical Engineering, 2003-2004.
- Recognition plaque, Space and Missile Defense Conference and Expo, Huntsville, Alabama, August 2003
- Recognition plaque, SBIR Pavilion 5th Space and Missile Defense Conference, Huntsville, Alabama, August 2002.
- Citation of Appreciation for Contribution to ITherm 2002: International Conference on Thermal, Mechanics and Thermomechanical Phenomena in Electronic Systems, IEEE CPMT Society, 2002.
- Keynote Speaker, "Assessment of High-Heat-Flux Thermal Management Schemes," I-Therm 2000: International Conference on Thermal, Mechanics and Thermomechanical Phenomena in Electronic Systems, Joint IEEE, ASME, CPMT, IMAPS, NIST conference, Las Vegas, Nevada, May 2000.
- Invited Speaker, "High-Heat-Flux Liquid Cooling Schemes," Manufacturing Test Research Symposium 2000, Intel Corp., Hillsboro, Oregon, August 24, 2000.
- The Ruth and Joel Spira Award for "outstanding contributions to the School of Mechanical Engineering and its students," 1999.

- Inaugural member of the Purdue University Book of Great Teachers for lasting tribute to those 200 teachers "who have defined Purdue teaching excellence since the institution's birth," 1999.
- Founding Fellow of The Purdue University Teaching Academy, 1997.
- Fellow of the American Society of Mechanical Engineers (ASME), 1997.
- The Purdue University Charles Murphy Award for Outstanding Teaching, 1996-1997.
- Certificate of Appreciation, Heat Treating Society, ASM International, for the presentation "Investigation of Droplet Heat Transfer and Spray Quenching," 2nd International Conference on Quenching and the Control of Distortion, Cleveland, 1996.
- The Solberg Award for Best Teacher in the School of Mechanical Engineering, 1995-1996.
- Keynote Speaker, "High-Flux Thermal Management of Avionics," 31st AIChE-ASME-ANS-AIAA National Heat Transfer Conference, Houston, Texas, August 1996.
- Outstanding Paper Award for 1995, The ASME Journal of Electronic Packaging, for the paper "Two-Phase Electronic Cooling using Mini-Channel and Micro-Channel Heat Sinks: Parts 1 and 2," Vol. 116, 1994.
- Nominee for State of Indiana Award for SBIR Innovation, 1995.
- Certificate of Appreciation, International Society for Hybrid Microelectronics, 1994.
- Best Paper in Thermal Management, 1992 ASME/JSME Joint Conference on Electronic Packaging, Milpitas, California, for the paper "Enhancement of Single-Phase Heat Transfer and Critical Heat Flux from an Ultra-High-Flux Simulated Microelectronic Heat Source to a Rectangular Impinging Jet of Dielectric Liquid".
- Keynote Speaker, "Direct-Immersion Cooling for High Power Electronic Chips," I-Therm II: Intersociety Conference on Thermal Phenomena in Electronic Systems, Austin, Texas, February 1992.
- The Solberg Award for Best Teacher in the School of Mechanical Engineering, 1991-1992.
- Best Paper in Electronic Cooling, 1988 ASME/AIChE/ANS National Heat Transfer Conference, Houston, Texas, for the paper "Microelectronic Cooling by Enhanced Pool Boiling of a Dielectric Fluorocarbon Liquid".
- Certificate of appreciation in recognition of support to minority engineering students and programs at Purdue University awarded by the Purdue Chapter of the National Society of Black Engineers, 1987-1988.
- Professor of the Year Award, Purdue Chapter of the National Society of Black Engineers, 1986-1987.
- The Solberg Award for Best Teacher in the School of Mechanical Engineering, 1986-1987.
- Professor of the Year Award, Purdue Chapter of the National Society of Black Engineers, 1984-1985.

PATENTS:

- “Finned Heat Exchanger for Metal Hydride Hydrogen Storage,” inventors: Issam Mudawar, Milan Visaria, Hui Zhang, and Timothee Pourpoint, US Patent No. 8,636,836, issued Jan. 28, 2014.
- “Coiled and Microchannel Heat Exchangers for Metal Hydride Storage Systems,” inventors: Issam Mudawar, Milan Visaria, US Patent No. 8,778,063 B2, issued Jul. 15, 2014.
- “Accelerated Electric Charging with Subcooled Coolant Boiling,” inventors: Issam Mudawar, Seunghyun Lee, Devahdhanush Vijayaraju Swathibanu, Myung Sung, and Mike Denger. Joint Purdue Research Foundation US/EU/China Patent: US 2022/0203857 A1; DE 10 2021 006 489 A1; CN 114683893 A, 30 June 2022.

SCIENTIFIC AND HONOR SOCIETIES:

- Life Fellow, ASME

- Senior Member, AIAA
- Member, American Society for Gravitational and Space Research (ASGSR)

PUBLICATIONS:

I. Handbooks

1. Hall, D.D. and Mudawar, I., 1999, "Critical Heat Flux (CHF) for Water Flow in Tubes. Volume I. Compilation and Assessment of the World CHF Data," Published by the Boiling and Two-Phase Flow Laboratory, Purdue University, West Lafayette, IN, 151 pages plus CD-ROM of the entire world database for CHF.
2. Hall, D.D. and Mudawar, I., 1999, "Critical Heat Flux (CHF) for Water Flow in Tubes. Volume II. PU-BTPFL CHF Database," Published by the Boiling and Two-Phase Flow Laboratory, Purdue University, West Lafayette, IN, 1375 pages.
3. Hall, D.D. and Mudawar, I., 1999, "Critical Heat Flux (CHF) for Water Flow in Tubes. Volume III. Subcooled CHF Correlations," Published by the Boiling and Two-Phase Flow Laboratory, Purdue University, West Lafayette, IN, 300 pages.
4. Mudawar, I. and Qu, W., 2004, “Mini/Micro-Channel Thermal/Fluid Transport Phenomena,” Published by Purdue University International Electronic Cooling Alliance, West Lafayette, IN, 434 pages.

II. Book Chapters

1. Mudawwar, I. and El-Masri, M.A., 1987, "Experimental Investigation of Boiling Water Films in Radial Rotating Channels," in ***Heat Transfer and Fluid Flow in Rotating Machinery***, W.J. Yang, ed., Hemisphere Publishing Corporation, New York, pp. 255-269.
2. Lee, C., and Mudawwar, I., 1987, "A New Critical Heat Flux Model for Subcooled Two-Phase Flow Through a Vertical Tube," in ***Particulate Phenomena and Multiphase Transport***, Vol. 1, T.N. Veziroglu, ed., Hemisphere Publishing Corporation, New York, pp. 425-442.
3. Koskie, J., Mudawwar, I., and Tiederman, W., 1987, "Characteristics of Interfacial Waves on Freely-Falling Liquid Films," in ***Particulate Phenomena and Multiphase Transport***, Vol. 2, T.N. Veziroglu, ed., Hemisphere Publishing Corporation, New York, pp. 319-330.
4. Mudawwar, I., Incropera, T.A., and Incropera, F.P., 1987, "Critical Heat Flux (CHF) in Falling Liquid Films," in ***Particulate Phenomena and Multiphase Transport***, Vol. 2, T.N. Veziroglu, ed., Hemisphere Publishing Corporation, New York, pp. 345-360.
5. Shmerler, J. and Mudawwar, I., 1987, "Effects of Interfacial Waves on Heat Transfer to Free-Falling Turbulent Liquid Films," in ***Particulate Phenomena and Multiphase Transport***, Vol. 2, T.N. Veziroglu, ed., Hemisphere Publishing Corporation, New York, pp. 361-376.
6. Mudawar, I., Incropera, T.A., and Incropera, F.P., 1988, "Microelectronic Cooling by Fluorocarbon Liquid Films," in ***Cooling Technology for Electronic Equipment***, W. Aung, ed., Hemisphere Publishing Corporation, New York, pp. 417-434.
7. Mudawar, I. and Bowers, M.B., 1996, "Parametric Study of Ultra-High CHF in Highly Subcooled Water Flow Inside Small Diameter Tubes," in ***Convective Flow Boiling***, J.C. Chen, Y. Fujita, F. Mayinger, and R.A. Nelson, eds., Taylor and Francis, Washington, DC, pp. 117-122.
8. Mudawar, I., Galloway, J.E., Gersey, C.O., and Reed, S.J., 1996, "Theoretical Modeling of CHF for Near-Saturated Pool Boiling and Flow Boiling from Short Heaters using the Interfacial Lift-off Criterion," in ***Convective Flow Boiling***, J.C. Chen, Y. Fujita, F. Mayinger, and R.A. Nelson, eds., Taylor and Francis, Washington, DC, pp. 219-224.
9. Mudawar, I. and Estes, K.A., 1996, "Modeling of Hydrodynamic Parameters and Critical Heat Flux in Spray Cooling," in ***Convective Flow Boiling***, J.C. Chen, Y. Fujita, F. Mayinger, and R.A. Nelson, eds., Taylor and Francis, Washington, DC, pp. 345-350.

III. Journal Publications

1. Mudawwar, I., El-Masri, M.A., Wu, C.S., and Ausman-Mudawwar, J.R., 1985, "Boiling Heat Transfer and Critical Heat Flux in High-Speed Rotating Liquid Films", ***International Journal of Heat and Mass Transfer*****,** Vol. 28, pp. 795-806.
2. Mudawwar, I. and El-Masri, M.A., 1986, "Momentum and Heat Transfer Across Freely-Falling Turbulent Liquid Films," ***International Journal of Multiphase Flow***, Vol. 12, pp. 771-790.
3. Mudawwar, I., 1986, "Interfacial Instabilities of Air-Driven Liquid Films", ***International Communications in Heat and Mass Transfer***, Vol. 13, pp. 535-543.
4. Mudawwar, I., Incropera, T.A., and Incropera, F.P., 1987, "Boiling Heat Transfer and Critical Heat Flux in Liquid Films Falling on Vertically-Mounted Heat Sources," ***International Journal of Heat and Mass Transfer***, Vol. 30, pp. 2083-2095.
5. Grimley, T.G., Mudawwar, I., and Incropera, F.P., 1988, "CHF Enhancement in Flowing Fluorocarbon Liquid Films Using Structured Surfaces and Flow Deflectors," ***International Journal of Heat and Mass Transfer***, Vol. 31, pp. 55-65.
6. Shmerler, J.A. and Mudawwar, I., 1988, "Local Heat Transfer Coefficient in Wavy Free-Falling Turbulent Liquid Films Undergoing Uniform Sensible Heating," ***International Journal of Heat and Mass Transfer***, Vol. 31, pp. 67-77.
7. Shmerler, J.A. and Mudawwar, I., 1988, "Local Evaporative Heat Transfer Coefficient in Turbulent Free-Falling Liquid Films," ***International Journal of Heat and Mass Transfer***, Vol. 31, pp. 731-742.
8. Mudawwar, I. and El-Masri, M.A., 1988, "Boiling Incipience in Plane Rotating Water Films," ***Journal of Heat Transfer***, Vol. 110, pp. 532-535.
9. Grimley, T.G., Mudawwar, I., and Incropera, F.P., 1988, "Limits to Critical Heat Flux Enhancement in a Liquid Film Falling over a Structured Surface which Simulates a Microelectronic Chip," ***Journal of Heat Transfer***, Vol. 110, pp. 535-538.
10. Lee, C.H. and Mudawwar, I., 1989, "A Mechanistic Critical Heat Flux Model for Subcooled Flow Boiling Based on Local Bulk Flow Conditions," ***International Journal of Multiphase Flow***, Vol. 14, pp. 711-728.
11. Marsh, W.J. and Mudawar, I., 1989, "Predicting the Onset of Nucleate Boiling in Wavy Free-Falling Turbulent Liquid Films," ***International Journal of Heat and Mass Transfer***, Vol. 32, pp. 361-378.
12. Maddox, D.E. and Mudawar, I., 1989, "Critical Heat Flux in Subcooled Flow Boiling of Fluorocarbon Liquid on a Simulated Electronic Chip in a Rectangular Channel," ***International Journal of Heat and Mass Transfer***, Vol. 32, pp. 379-394.
13. Marsh, W.J. and Mudawar, I., 1989, "Effects of Surface Tension and Contact Angle on Sensible Heating and Boiling Incipience in Dielectric Falling Films," ***Journal of Electronic Packaging***, Vol. 111, pp. 46-53.
14. Anderson, T.M. and Mudawar, I., 1989, "Microelectronic Cooling by Enhanced Pool Boiling of a Dielectric Fluorocarbon Liquid," ***Journal of Heat Transfer***, Vol. 111, pp. 752-759.
15. Maddox, D.E. and Mudawar, I., 1989, "Single- and Two-Phase Convective Heat Transfer from Smooth and Enhanced Microelectronic Heat Sources in a Rectangular Channel," ***Journal of Heat Transfer***, Vol. 111, pp. 1045-1052.
16. Koskie, J.E., Mudawar, I., and Tiederman, W.G., 1989, "Parallel-Wire Probes for Measurement of Thick Liquid films," ***International Journal of Multiphase Flow***, Vol. 15, pp. 521-530.
17. Lin, W.S., Pei, B.S., Lee, C.H., and Mudawwar, I., 1989, "A Theoretical Critical Heat Flux Model for Rod Bundles under PWR Conditions," ***Nuclear Technology***, Vol. 85, pp. 213-226.
18. Deiters, T.A. and Mudawar, I., 1989, "Optimization of Spray Quenching for Aluminum Extrusion, Forging or Continuous Casting," ***Journal of Heat Treating***, Vol. 7, pp. 9-18.

19. Mudawar, I. and Valentine, W.S., 1989, "Determination of the Local Quench Curve for Spray Cooled Metallic Surfaces," ***Journal of Heat Treating***, Vol. 7, pp. 107-121.

20. Mudawar, I. and Maddox, D.E., 1990, "Enhancement of Critical Heat Flux from High Power Microelectronic Heat Sources in a Flow Channel," ***Journal of Electronic Packaging***, Vol. 112, pp. 241-248.

21. Mudawar, I. and Anderson, T.M., 1990, "Parametric Investigation into the Effects of Pressure, Subcooling, Surface Augmentation and Choice of Coolant on Pool Boiling in the Design of Cooling Systems for High-Power Density Chips," ***Journal of Electronic Packaging***, Vol. 112, pp. 375-382.

22. Wadsworth, D. and Mudawar, I., 1990, "Cooling of a Multichip Electronic Module by Means of Confined Two-Dimensional Jets of Dielectric Liquid," ***Journal of Heat Transfer***, Vol. 112, pp. 891-898.

23. Deiters, T.A. and Mudawar, I., 1990, "Prediction of the Temperature-Time Cooling Curves for Three-Dimensional Aluminum Products During Spray-Quenching," ***Journal of Heat Treating***, Vol. 8, pp. 81-91.

24. Lyu, T.H. and Mudawar, I., 1991, "Statistical Investigation of the Relationship Between Interfacial Waviness and Sensible Heat Transfer to a Falling Liquid Film," ***International Journal of Heat and Mass Transfer***, Vol. 34, pp. 1451-1464.

25. Mudawar, I. and Wadsworth, D.C., 1991, "Critical Heat Flux from a Simulated Electronic Chip to a Confined Rectangular Impinging Jet of Dielectric Liquid," ***International Journal of Heat and Mass Transfer***, Vol. 34, pp. 1465-1480.

26. Lyu, T.H. and Mudawar, I., 1991, "Determination of Wave-Induced Fluctuations of Wall Temperature and Convective Heat Transfer Coefficient in the Heating of a Turbulent Falling Liquid Film," ***International Journal of Heat and Mass Transfer***, Vol. 34, pp. 2521-2534.

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V. Conference Presentations

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51. Mudawar, I., Devahdhanush, V.S, "High-Power Density Thermal Management of Electric Vehicles," Thermal Management Systems and Materials, ITB Group, Novi, MI, June 16, 2022.
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GRADUATE STUDENTS:

Degrees Awarded

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Visiting Scholars

1. Prof. C. Gu, Tsinghua University, China, 1988.
2. Prof. Andrew Hung, National Tsing Hua University, Taiwan, Republic of China, 1990-1991.
3. Dr. Seok-Mann Yoon, Korea Science and Engineering Foundation (KOSEF), Taejon, Korea, 2000-2003.
4. Prof. Yeung Chan Kim, Andong National University, Andong, Korea, 2005-2006.
5. Prof. Gangtao Liang, Dalian University of Technology, China, 2016-2018.
6. Dr. Chang Cai, Dalian University of Technology, China, 2019-2020.
7. Dr. Yuchuan Lei, Southeast University, China, 2019-2020.

Current Research Team

1. Devahdhanush, V.S. (Visiting Assistant Professor)
2. Ahmad, Faraz (Fulbright Ph.D. Scholar)
3. Damle, Nishad (Ph.D. candidate)
4. Foster, Dylan (Ph.D. candidate)
5. Hwang, Hyun (Ph.D. candidate)
6. Kim, Sunjae (Ph.D. candidate)
7. Mehdi, Sadaf (Ph.D. candidate)
8. Karra, Chanakya (M.S. candidate)