

SURESH V. GARIMELLA

EDUCATION

Ph.D., Mechanical Engineering, University of California at Berkeley, 1989

M.S., Mechanical Engineering, The Ohio State University, Columbus, 1986

Bachelor of Technology, Mechanical Engineering, Indian Institute of Technology, Madras, 1985

PROFESSIONAL EXPERIENCE

Jul 19 - Present President, University of Vermont

Jul 19 - Present Professor, Department of Mechanical Engineering, UVM

Jul 19 - Present Distinguished Professor Emeritus of Mechanical Engineering, Purdue University

Jul 19 - Present Executive Vice President for Research and Partnerships Emeritus, Purdue University

May 19 - Present Member, Sandia National Laboratories Chief Research Officer External Advisory Board

Nov 18 - Present Member, National Science Board

Jun 14 - Jun 19 Executive Vice President for Research and Partnerships, Purdue University

May 13 - Jun 14 Chief Global Affairs Officer, Purdue University

Aug 11 - May 13 Associate Vice President for Engagement, Purdue University

Aug 11 - Jul 15 Senior Fellow, Energy & Climate Partnership of the Americas (ECPA), US State Department

Aug 10 - Jul 19 Jefferson Science Fellow, US Department of State

Dec 09 - Jun 19 R. Eugene and Susie E. Goodson Distinguished Professor, Purdue University

Jun 06 - Jun 19 R. Eugene and Susie E. Goodson Chair Professor, Purdue University

Jul 08 - Jun 13 Fellow, Center of Smart Interfaces, Technical University of Darmstadt, Germany

Jun 06 - May 09 Honorary Guest Professor, Xi'an JiaoTong University, Xi'an, China

Aug 02 - Jun 19 Professor, School of Mechanical Engineering, Purdue University

Jun 02 - Jul 04 Chair, Heat Transfer Area, School of Mechanical Engineering, Purdue University

Aug 99 - Jun 19 Director, Cooling Technologies Research Center, a National Science Foundation Industry/University Cooperative Research Center

Aug 99 - Jul 02 Associate Professor, School of Mechanical Engineering, Purdue University

Aug 94 - Jul 99 Cray-Research Associate Professor of Mechanical Engineering, UW-Milwaukee

Jun 95 - Jan 96 Honorary Visiting Fellow, The University of New South Wales, Sydney, Australia

Aug 92 - Jul 94 Cray-Research Assistant Professor of Mechanical Engineering, UW-Milwaukee

Aug 90 - Jul 92 Assistant Professor of Mechanical Engineering, UW-Milwaukee

Jan 90 - Jul 90 Instructor in Mechanical Engineering, University of California at Berkeley

HONORS & AWARDS

Member, National Science Board (NSB), appointed by the President of the United States for a six-year term to advise the President and Congress on science policy and oversee the National Science Foundation, 2018; Chair, Committee on Strategy; Member, Committee on Science and Engineering Policy, Science and Security Working Group, and Committee on Nominations; NSB liaison to President's Council of Advisors on Science and Technology. Seminal reports: [Vision 2030](#); [The Skilled Technical Workforce](#); and [The State of U.S. Science & Engineering](#)

Member, Vermont Academy of Science and Engineering, elected 2019

Member, Sandia National Laboratories Chief Research Officer External Advisory Board (CEAB), since 2019

Fellow, National Academy of Inventors, elected 2017, for having "demonstrated a highly prolific spirit of innovation in creating or facilitating outstanding inventions that have made a tangible impact on quality of life, economic development, and the welfare of society"

2016 IThERM Achievement Award, IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm), presented biennially in recognition of significant contributions made in thermal and thermomechanical management of electronics, June 2016

Charles Russ Richards Memorial Award, Pi Tau Sigma and American Society of Mechanical Engineers, 2014

75th Anniversary Medal, Heat Transfer Division, American Society of Mechanical Engineers, June 2013

Dick Ramey Above and Beyond Award, 2012, Indiana Association of School Principals, presented annually to an individual or institution for contributions to the success of academic competitions through their passion for extra-curricular activities benefiting Indiana's students

Fellow, American Association for the Advancement of Science (AAAS), 2011

Invited Plenary Session Panelist, Foundations for Sustainable Partnerships in Teaching and Research, *U.S.-India Higher Education Summit* hosted by U.S. Secretary of State Hillary Clinton and Indian Minister of Human Resource Development Kapil Sibal, Washington, D.C., October 13, 2011

Senior Fellow, Energy and Climate Partnership of the Americas (ECPA), U.S. Department of State, 2011-2015. Senior Fellows help to advance regional cooperation in sustainable energy generation, access, and resilience, bringing their academic, finance, technology, policy, and government experience.

Alexander Schwarzkopf Prize for Technology Innovation, National Science Foundation Industry University Cooperative Research Center (IUCRC) Association, 2011

Heat Transfer Memorial Award, American Society of Mechanical Engineers, 2010

Jefferson Science Fellow, U.S. Department of State, August 2010 to July 2016

Distinguished Alumnus Award of IIT Madras, Indian Institute of Technology, Madras, 2010

Allan Kraus Thermal Management Medal, American Society of Mechanical Engineers, 2009

The Harvey Rosten Award for Excellence, presented at SemiTHERM 2010, Santa Clara, California

Gustus L. Larson Memorial Award, Pi Tau Sigma and American Society of Mechanical Engineers, 2004

Fellow, American Society of Mechanical Engineers, 2002

K16 Clock Award, ASME Heat Transfer Division K-16 Committee, 2006

Fellow, Center of Smart Interfaces, Technical University of Darmstadt, Germany, since July 2008

Honorary Guest Professor, Xi'an JiaoTong University, Xi'an, China, 2006 to 2009

Member, Scientific Council, International Centre for Heat and Mass Transfer (ICHMT), 2009 to present

Invited Participant, 2006 U.S. Frontiers of Engineering Symposium of the National Academy of Engineering, September 21-23, Ford Research and Innovation Center, Dearborn, Michigan

Invited Speaker at the National Academy of Engineering Mechanical Engineering Section, October 4, 2004

Indiana 21st Century Research & Technology Fund Award, 2008

National Collegiate Inventors and Innovators Alliance (NCIIA) award, Lemelson Foundation, 2003

Research Initiation Award, National Science Foundation, 1992

Society of Automotive Engineers' Outstanding Faculty Advisor Award, 1994

Society of Automotive Engineers' Ralph R. Teetor Educational Award, 1992

Listed in Who's Who in Science and Engineering (1992); Who's Who in the World (1994)

Member, Sigma Xi

Major Internal Awards

2017 Leadership in Open Access Award, Purdue University, for leadership by example in the open access movement (Garimella's works posted on Purdue e-Pubs have been downloaded well over 250,000 times)

2012 Provost's Award for Outstanding Graduate Mentor, Purdue University

Faculty Award of Excellence for Mentoring, Purdue University College of Engineering, 2011

R. Eugene and Susie E. Goodson Distinguished Professorship, Purdue University, December 2009

Distance Teaching Award, Division of Engineering Professional Education, Purdue University, 2009

Ruth and Joel Spira Award, School of Mechanical Engineering, 2009

R. Eugene and Susie E. Goodson Chair Professorship of Mechanical Engineering, Purdue University, June 2006

Cray-Research Professorship, University of Wisconsin-Milwaukee, 1992 - 1999

Outstanding Teaching Award (university-wide), University of Wisconsin-Milwaukee, 1997

Graduate School/UWM Foundation Research Award (university-wide), UW-Milwaukee, 1995

Outstanding Teaching Award, College of Engineering and Applied Science, UW-Milwaukee, 1992

HONORARY & PROFESSIONAL MEMBERSHIPS, EDITORSHIPS

Member, National Science Board (2018-present)

Member, Sandia National Laboratories Chief Research Officer External Advisory Board (2019-present)

Member, Executive Committee, Council on Competitiveness (2021-present)

Member, National Academies' Study Committee on International Talent Programs in the Changing Global Environment (2023-present)

Board Member, Vermont Business Roundtable (2020-present)

Honorary Board Member, Vermont Council on World Affairs (2021-present)

Member, US-Colombia Business Council (2017-2019)

Member, Indiana-India Business Council (2018-2019)

Board Member, BioCrossroads (2017-2019)

Member, Scientific Advisory Board, Indiana Biosciences Research Institute (2016-2019)

Board Member, Regenstrief Foundation, (2015-2019)

Board Member, Purdue Research Foundation (2014-2019)

Board of Directors, Modine Manufacturing Inc. (2011-present)

Executive Committee Member, CONEXUS Indiana (2011-2013)

Member, Indiana Automotive Council (2011-2013)

Member, Indiana Aerospace and Defense Council (2011-2013)

Board Member, Energy Systems Network (2011-2013)

Task Force Member, "Immigration and US Economic Competitiveness: A View from the Midwest," Chicago Council on Global Affairs ([Call to Action report](#))

Board Member, Greater Lafayette Commerce (2011-2015)

Member, Economic and Community Development Council, Greater Lafayette Commerce (2011-2015)

Member, Board of Directors, Engagement Scholarship Consortium (2011-2013)

Editorial Board, *Advances in Applied Energy* (2020-present)

Editorial Board, *Applied Energy* (2008-present)

Editorial Advisory Board, *Energy Conversion and Management* (2013-present)

Editorial Advisory Board, *Nanoscale and Microscale Thermophysical Engineering* (2014-present)

Editorial Board, *International Journal of Micro-Nano Scale Transport* (2009-present)

Editor, *Experimental Heat Transfer* (2005-present)

Associate Editor, *ASME Thermal Science and Engineering Applications* (2008-2011)

Associate Editor, *ASME Journal of Heat Transfer* (2004-07)

Editor, *Heat Transfer-Recent Contents* (1995-98)

Editor, *Experimental Thermal and Fluid Science* (1993-2002)

Member, *U.S.-Russia Bilateral Presidential Commission Science & Technology Working Group* (2011)

Member, International Electronics Manufacturing Initiative (iNEMI) Thermal Management Technical Working Group (2002-2005)

Chair, ASME Heat Transfer Division *Membership Development and Recognition Committee* (2005-07)

Chair, *NASA Multiphase Flow and Heat Transfer Peer Review Panel*, February 2004

Chair, *NASA Multiphase Flow and Heat Transfer Peer Review Panel*, March 2003

Member, Institute-wide Evaluation Committee, Indian Institute of Technology, Hyderabad, 2014

Member, Evaluation Committee, Department of Mechanical and Process Engineering, Swiss Federal Institute of Technology (ETH) Zurich, 2013

Member, Review Committee, Department of Mechanical Engineering, IIT Madras, 2013

Member, Visiting Committee, Mechanical Engineering Department, National University of Singapore, 2013

SELECTED UNIVERSITY SERVICE

Co-Chair, Purdue University Hazards Management Oversight Committee (2014-19)

Chair, Purdue University Contract Review Board (2014-19)

Chair, Purdue University Global Council Committee on Global Engagement (2011-2013)

Member, College of Engineering Pre-eminent Team Selection Committee (2013-14)

Team Co-Captain, Faculty of 2020 professional development, College of Engineering Strategic Plan (2009)

Member, Dean's Faculty Advisory Committee (2006-09)

Member, Engineering Named Professorship Committee (2006-09)

Member, Academic Personnel Grievance Committee, Schools of Engineering, Purdue University (2005-07)

Member/Chair, multiple search committees including Multi-Physics Transport (Chair), Herrick Chair Professorship, Computational Heat Transfer/Fluids, Heat Transfer, and others

Member, Mechanical Engineering Advisory Committee (2002-04)

Member, Academic Planning and Space Committee, School of Mechanical Engineering, Purdue University (2001-2007)

Member, Graduate Committee, School of Mechanical Engineering, Purdue University (1999-02)

Chair, Curriculum Committee, UWM College of Engineering and Applied Science (1996-98); Member (1995-99)

Faculty Advisor, Society of Automotive Engineers' Student Chapter, UW-Milwaukee (1990-97)

Faculty Mentor, National Institutes of Health Minority High School Research Apprenticeship Program

SELECTED TECHNICAL SERVICE

Guest Editor, *Microelectronics Journal* Special Issue on Thermal Challenges in Next Generation Electronic Systems (**39**, 2008, with A. Fleischer); *Heat Transfer Engineering* Special Issue (**28**, 2008, with S. Revankar); *IEEE Transactions on Components and Packaging Technologies* Special Issue on Thermal Challenges in Next Generation Electronic Systems (**25**, 2002, with Y. Joshi); *Microelectronics Journal* Special Issue on Thermal Challenges in Next Generation Electronic Systems (**34**, 2003, with Y. Joshi)

Workshop Organizer and Chair, *Thermal Management in Telecommunication Systems and Data Centers*, Santa Clara, CA, November 2015; Santa Clara, CA, April 2012; Dallas, TX, October 2010

Coordinator, *Washington Energy Seminar*, U.S. Department of Energy, March 2011

Conference Organizer and Chair (with A. Fleischer), *Thermal Challenges in Next Generation Electronic Systems: Thermes 2007*, Engineering Conferences International, Santa Fe, NM, January 2007; Thermes 2002 (with Y. Joshi), January 2002

Conference Co-Chair, *ASME/ISHMT Heat and Mass Transfer Conference*, Guwahati, India, January 2006

Conference Co-Chair, *Next-Generation Thermal Management Materials and Systems Conference*, Dallas, TX, October 2002

Workshop Co-Organizer and Co-Chair, *Thermal Management in Electronic Equipment*, Bangalore, India, January 2004

Reviewer for

ACS Nano, various AIAA, ASME and IEEE Journals, Applied Energy, Applied Mechanics Reviews, Applied Physics Letters, Chemical Engineering Science, Colloids and Surfaces, Computational Mechanics, Desalination and Water Treatment, Energy and Fuels, Experiments in Fluids, Experimental Heat Transfer, Experimental Thermal and Fluid Science, Industrial & Engineering Chemistry Research, International Journal of Heat and Mass Transfer, International Journal of Numerical Methods in Engineering, International Journal of Refrigeration, Journal of Applied Physics, Journal of Colloid and Interface Science, Journal of Computational Physics, Journal of Fluids and Structures, Journal of Micromechanics and Microengineering, Journal of Physical Chemistry, Langmuir, Microfluidics and Nanofluidics, Nanoletters, Nanoscale, Nanoscale and Microscale Thermophysical Engineering, Numerical Heat Transfer, Procs National Academy of Sciences, Physics of Fluids, Progress in Energy and Combustion Science, Renewable Energy, Review of Scientific Instruments, Science, Scientific Reports, Sensors and Actuators, Solar Energy, and others

Grant proposals reviewer for the National Science Foundation, NASA, Department of Energy, National Research Council, Israel Science Foundation, Science Foundation Ireland, Australian Research Council, Institute for the Promotion of Innovation by Science and Technology in Flanders (Belgium), CONICYT (Chile), and many others

CLASSROOM TEACHING*At Purdue:*

Heat and Mass Transfer (ME 315)

Heat and Mass Transfer Laboratory (ME315L)

Intermediate Heat Transfer (ME 505); taught online through Continuing Engineering Education

Convection of Heat and Mass (ME 605)

Heat Transfer in Electronic Systems[§] (ME 597G); taught online via videostreaming through Continuing Engineering Education and through National Technological University (ME535-M)

Seminar in Global Policy Issues (cross-listed in nine departments, ECON, AGECE, NUCL, IT, ME, POL, CNIT, ...)

At University of Wisconsin-Milwaukee:

Introduction to Heat Transfer (ME 311, for non-majors)

Introduction to Fluid Mechanics (ME 320)

Basic Heat Transfer (ME 321)

Mechanical Engineering Experimentation (ME 337)

Senior Design Project (ME 390)

Thermal Concerns in Computer Design[§] (ME 490)

Conduction Heat Transfer (ME 711)

Convective Heat and Mass Transfer (ME 712)

Radiation Heat Transfer (ME 713)

Solidification Heat Transfer[§] (ME 890)

Heat Transfer in Materials Processing[§] (ME 890)

[§] New course developed

RESEARCH PROGRAM & CONTRIBUTIONS

Research Interests: *Micro- and nano-scale transport phenomena, thermal management and energy efficiency in electronics systems, renewable/sustainable energy systems technology and policy, and materials processing*

Awards for Research Publications

Most Cited Articles (since 2010), Int J Heat Mass Transfer for “Characterization of Evaporation and Boiling from Sintered Powder Wicks fed by Capillary Action,” by JA Weibel, MT North, and SV Garimella (**53**:4204-4215, 2010)

Top 10 Most Cited Articles, Heat Transfer Engineering (2003-2008) for “Experimental Investigation of the Thermal Performance of Piezoelectric Fans,” by T Açıkalın, SM Wait, SV Garimella and A Raman (**25**:4-14, 2004)

Top 10 Most Cited Articles, Heat Transfer Engineering (2003-2008) for “Single-Phase Flow and Heat Transport and Pumping Considerations in Microchannel Heat Sinks,” by SV Garimella and V Singhal (**25**:15-25, 2004)

Most Cited Articles, Int J Heat Mass Transfer (2005-2008) for “Investigation of Heat Transfer in Rectangular Microchannels,” by PS Lee, SV Garimella and D Liu (**48**:1688-1704, 2005)

Highlights of 2008 selection by editorial board of *J Micromechanics Microengineering* for “Electrical Actuation of Dielectric Droplets,” N Kumari, V Bahadur, and SV Garimella (**18**:085018, 2008)

2019 Best Paper Award (Components: Characterization & Modeling Category) for “Evaluation of Additively Manufactured Microchannel Heat Sinks,” by IL Collins, JA Weibel, L Pan, and SV Garimella, *IEEE Transactions on Components, Packaging and Manufacturing Technology* (**9**:446-457, 2019)

Nasser Grayeli Best Poster Award for “Impact of Flow Boiling Instabilities on Heat Transfer Coefficient and Critical Heat Flux in a Microchannel,” by MD Clark, JA Weibel, and SV Garimella, at the *ASME International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems (InterPACK)*, Oct 27-29, 2020

Nasser Grayeli Best Poster Award for “The Critical Role of Dynamic Surface Wettability on Bubble Dynamics and Boiling Performance,” by TP Allred, JA Weibel, SV Garimella, at the *ASME International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems (InterPACK)*, Anaheim, CA, Oct 7-9, 2019

Best Poster Award in Component-Level Thermal Management Track for “Identification of the Dominant Heat Transfer Mechanisms during Confined Two-Phase Jet Impingement,” by MD Clark, JA Weibel, and SV Garimella, at the *IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm)*, San Diego, CA, May 29-Jun 1, 2018

Best Poster Award in Emerging Technologies Track for “Experimental Characterization of a Microchannel Heat Sink made by Additive Manufacturing,” by IL Collins, JA Weibel, L Pan, and SV Garimella, at *ITherm*, San Diego, CA, May 29-Jun 1, 2018

Best Poster Award for “Calibration and Sensitivity of a Fixed-Bed Adsorption Model for Atmosphere Revitalization in Space,” by KN Son, JA Weibel, and SV Garimella, at *ICES*, Charleston, SC, July 16-21, 2017

Best Poster Award in Thermal Management 1: Component Level Track for “An Area-Scalable Two-Layer Evaporator Wick Concept for High-Heat-Flux Vapor Chambers,” by S Sudhakar, JA Weibel, and SV Garimella, at *ITherm*, Orlando, FL, May 30-Jun 2, 2017

Best Poster Award in Thermal Management 2: System Level Track for “A Time-Stepping Analytical Model for 3D Transient Vapor Chamber Transport,” by G Patankar, JA Weibel, and SV Garimella, at *ITherm*, Orlando, FL, May 30-Jun 2, 2017

- Outstanding Poster Award* in Emerging Technologies & Fundamentals Track for “Rapid-Bubble-Growth Instability at the Onset of Microchannel Flow Boiling,” by TA Kingston, AE Moskalenko, JA Weibel, and SV Garimella, at *ITherm*, Orlando, FL, May 30-Jun 2, 2017
- Best Paper Award Runner-Up, Best Student Paper* (PK Mulay Memorial Scholarship), *and Best Student Paper in the area of Two-Phase Thermal Management Technology and/or Application* for “Experimental study on flow boiling in a compact hierarchical manifold microchannel heat sink array,” by KP Drummond, JA Weibel, and SV Garimella, at the *SEMI-THERM 33rd Annual Symposium*, San Jose, CA, March 13-17, 2017
- Best Paper Award* in Emerging Technologies Track for “Evaporative Intrachip Hotspot Cooling with a Hierarchical Manifold Microchannel Heat Sink Array,” by KP Drummond, JA Weibel, SV Garimella, D Back, D B. Janes, MD Sinanis, and D Peroulis, at *ITherm*, Las Vegas, NV, May 31-Jun 3, 2016
- Outstanding Paper Award* for “A Method for Thermal Performance Characterization of Ultra-Thin Vapor Chambers Cooled by Natural Convection,” by G Patankar, S Mancin, JA Weibel, MA MacDonald, and SV Garimella, at the *International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems (InterPACK) and ICNMM*, San Francisco, CA, July 6-9, 2015
- Best Poster Award* for “Quantitative Visualization of Vapor Bubble Growth in Diabatic Vapor-Liquid Microchannel Slug Flow,” by TA Kingston, JA Weibel, and SV Garimella, at *InterPACK* and *ICNMM*, San Francisco, CA, July 6-9, 2015
- Outstanding Paper Award in Thermal* for “Effects of Non-Uniform Heating on Two-Phase Flow through Microchannels,” by SN Ritchey, JA Weibel, and SV Garimella, at *InterPACK*, Burlingame, CA, July 16-18, 2013
- First Prize for Best Poster* in Advanced Packaging and Materials track for “Single-Step Fabrication and Characterization of Ultrahydrophobic Surfaces with Hierarchical Roughness,” by S Dash, N Kumari, M Dicuango, and SV Garimella, at *InterPACK*, Portland, OR, July 6-8, 2011
- First Prize for Best Poster* in Thermal Management track for “An Experimentally Validated Model for Transport in Thin, High Thermal Conductivity, Low CTE Heat Spreaders,” by R Ranjan, JY Murthy, SV Garimella and D Altman, at *InterPACK*, Portland, OR, July 6-8, 2011
- Best Poster Prize* for “Numerical Study of Evaporation Heat Transfer from the Liquid-Vapor Interface in Wick Microstructures,” by R Ranjan, JY Murthy and SV Garimella, *ASME International Mechanical Engineering Congress and Exposition*, Lake Buena Vista, FL, November 13-19, 2009
- Best Poster Prize* for “Numerical Analysis of Mist-Cooled High Power Components in Cabinets,” by N Kumari, V Bahadur, M Hodes, T Salamon, A Lyons, P Kolodner and SV Garimella, at *InterPACK*, San Francisco, July 19-23, 2009
- Best Poster Prize* for “Forces acting on Sessile Droplet on Inclined Surfaces,” by SR Annapragada, JY Murthy and SV Garimella, at *InterPACK*, San Francisco, July 19-23, 2009
- Best Paper Award in Heat Transfer*, for “Permeability and Thermal Transport in Compressed Open-Celled Foams,” by SR Annapragada, JY Murthy and SV Garimella, at the *2008 ASME Summer Heat Transfer Conference*, Jacksonville, FL, August 10-14, 2008
- Best Poster Prize* for “Infrared Micro-Particle Image Velocimetry in a Silicon Microchannel Heat Sink,” by BJ Jones and SV Garimella, *International Heat Transfer Conference*, Sydney, Australia, August 13-18, 2006
- Best Paper Award* for “Piezoelectric Fans for the Thermal Management of Electronics,” by SM Wait, T Açıklın, SV Garimella and A Raman, at the *Sixth ISHMT/ASME Heat and Mass Transfer Conference*, Kalpakkam, India, January 5-7, 2004

Patents

1. *Absorbance-Based Colorimetric Device System* (with A Chandramohan, JA Weibel), US Patent No. 11,536,665, issued 12/27/2022.
2. *Boiling Processes and Systems therefor having Hydrophobic Boiling Surfaces* (with TP Allred, JA Weibel), US Patent No. 11,137,220, issued 10/5/2021.
3. *Apparatus and Method for Increasing Boiling Heat Transfer Therein* (with TY Kim), US Patent No. 10,309,733 B2, issued 6/4/2019.
4. *Methods and Apparatuses for Impedance-Based Gas Detection for Microfluidic Systems* (with P Valiorgue, JA Weibel), US Patent No. 9,925,319 B2, issued 3/27/2018.
5. *Modular Jet Impingement Cooling Apparatuses with Exchangeable Jet Plates* (with MJ Rau, EM Dede, SN Joshi, MP Gaikwad), US Patent No. 9,484,283, issued 11/1/2016.
6. *Vehicles, Power Electronics Modules and Cooling Apparatuses with Single-Phase and Two-Phase Surface Enhancement Features* (with MJ Rau, EM Dede, SN Joshi), US Patent No. 8,786,078 B1, issued 7/22/2014.
7. *Cooling Apparatuses and Power Electronics Modules with Single-Phase and Two-Phase Surface Enhancement Features* (with MJ Rau, EM Dede, SN Joshi), US Patent No. 8,643,173 B1, issued 2/4/2014.
8. *Controlled Flow of a Thin Liquid Film by Electrowetting* (with HK Dhavaleswarapu, N Kumari), US Patent No. 8,632,670, issued 1/21/2014.
9. *Microfluidic Pumping Based on Dielectrophoresis* (with D Liu), US Patent No. 8,470,151, issued 6/25/2013.
10. *Method of Bonding Carbon Nanotubes* (with TS Fisher, S Aradhya), US Patent No. 8,419,885, issued 4/16/2013.
11. *Microfluidic Pumping Based on Dielectrophoresis* (with D Liu), US Patent No. 8,308,926, issued 11/13/2012.
12. *Method of Bonding Carbon Nanotubes* (with TS Fisher, S Aradhya), US Patent No. 8,262,835, issued 9/11/2012.
13. *Micropump for Electronics Cooling* (with V Singhal), US Patent No. 7,802,970, issued 9/28/2010.
14. *Various Methods, Apparatuses, and Systems that use Ionic Wind to Affect Heat Transfer* (with TS Fisher, DB Go, RK Mongia), US Patent No. 7,545,640, issued 6/9/2009.
15. *Microchannel Heat Sink* (with P-S Lee), US Patent No. 7,277,284, issued 10/2/2007.
16. *Piezoelectric Device with Feedback Sensor* (with A Raman), US Patent No. 6,713,942, issued 3/30/2004.

Research Grants

Dr. Garimella has secured extramural research funding of over **\$US 32M** for his research programs. This funding has come from the US National Science Foundation, NASA, US Army, DARPA, ONR, Members of the NSF Cooling Technologies Research Center, Semiconductor Research Corporation, State of Indiana 21st Century Research and Technology Fund, Hoosier Energy, Electric Power Research Institute (EPRI), Australian Research Council, State of Wisconsin Department of Development, Cray Research, John Fluke Manufacturing Co., Pycon Inc., and TSI Systems.

The Cooling Technologies Research Center that he directed is a graduated NSF Industry/University Cooperative Research Center, which he founded as an industry consortium in 1999. Annual membership funds support longer-term, pre-competitive research programs in cutting-edge technologies of interest to industry. Over 20 faculty members from different disciplines and schools and many graduate students and post-docs participate in Center efforts. From 2002 to 2017, the NSF IUCRC program supported this effort, for a total direct funding for the Center to date of over \$10M. Member companies include 3M, Aavid Thermalloy, Air Force Research Labs (WPAFB), Alcatel-Lucent (Bell Labs), Alcoa, Apple, Aptiv, Boeing, Cisco Systems, Delphi Electronics & Safety, Denso, Dow Silicones Corp., DuPont, Eaton, Ford Motor Co., General Electric, General Motors, Google, Graftech, HTRI, Honeywell, Huawei Technologies, IBM, Intel, John Deere, Johnson Matthey Electronics, LG Electronics, Laird Technologies, Malico, Midea Holding Group, Modine Manufacturing, MuRata, Nanoconduction, Nokia, Northrop Grumman, Parker Hannifin, Philips, Qualcomm, Raytheon, RedBull Advanced Technologies, Rockwell Automation, Rockwell Collins, Rogers Corp, Saint Gobain, Samsung Electronics, Sandia National Labs, Schlumberger, Seagate, Sharp Laboratories, Sony Computer Entertainment, Sony Corp, Saint Gobain, Sterling PCU, Sun Microsystems, Tenneco, Texas Instruments, Toyota Motor Company, and Wolverine Tube.

Long-term research in active and passive microscale liquid cooling of automotive and military electronics was supported with grants from DARPA (\$1.6M, *ICECool Fundamentals* 2013-16, co-PIs Janes, Peroulis and Weibel); \$2.5M, *Thermal Ground Plane* 2008-11, co-PIs Fisher and Murthy, Partners – Raytheon, Thermacore) and the Indiana 21st Century Research & Technology Fund (\$4M, 2004-2009, partners – Delphi Electronics & Safety, NAVSEA Crane, Thorrn Microtechnologies, CTS Microelectronics, Dupont Photomasks, Tristate).

Dr. Garimella's research thrusts in renewable and sustainable energy systems, including waste heat recovery from fossil fuel power plants and large IT installations, have been supported by Hoosier Energy, EPRI, and Sandia National Labs. Dr. Garimella was a co-investigator in the *Solar Energy Research Institute for India and the United States (SERIIUS)*, co-led by the Indian Institute of Science, Bangalore, and the National Renewable Energy Laboratory, and jointly supported by DOE and the Indian Ministry of Science and Technology with \$50M in funding.

DISSERTATION & THESIS SUPERVISION

Ph.D. Students

1. Lei Z. Schlitz, "Simulation of Gas Dynamics and Electromagnetic Processes in High-Current Arc Plasmas," Spring 1998.
2. Bechir Moussa, "Heat and Mass Transport in the Solidification of Metal Matrix Composites," August 2000.
3. James E. Simpson (**UWM Graduate Fellow**), "Front Tracking in the Numerical Simulation of Binary Alloy Solidification," August 2000.
4. Chin-Yuan Li (**PRF Fellow**), "A New Approach to Front Tracking on a Fixed Grid in Solidification Problems," May 2002.
5. Daniel J. Schlitz (**PRF Fellow**), "Microscale Ion Driven Air Flow" (co-advisor T Fisher), February 2004.
6. Unnikrishnan Vadakkan, "Transient Three-Dimensional Modeling of Flat Heat Pipes with Discrete Heat Sources" (co-advisor J Murthy), May 2004.
7. Vishal Singhal (**PRF Fellow**), "A Novel Micropump for Integrated Microchannel Cooling Systems," January 2005.

8. Suwat Trutassanawin, "A Miniature-Scale Refrigeration System for Electronics Cooling" (co-advisor with E Groll), May 2006.
9. Wei Zhang, "Sub-Continuum Ion Transport in Air and Phonon Transport in Nanostructures" (co-advisor with T Fisher), June 2006.
10. Dong Liu, "Thermal Transport in Microchannels," August 2006.
11. Shankar Krishnan, "Transport Phenomena Associated with Phase Change In Homogeneous and Inhomogeneous Systems" (co-advisor J Murthy), August 2006.
12. Poh-Seng Lee (**Bilsland Dissertation Fellow**), "Heat Transport in Silicon Microchannel Arrays," May 2007.
13. Tolga Acikalin, "Thermal and Fluidic Characterization of Piezoelectric Fans," August 2007.
14. Pramod Chamарthy, "Non-Intrusive Temperature Measurement Using Microscale Visualization Techniques" (co-advisor with S Wereley), December 2007.
15. Abhijit Sathe, "Miniature-Scale Diaphragm Compressor for Electronics Cooling" (co-advisor with E Groll), August 2008.
16. Mark Kimber (**Winkelman Fellow**), "Thermal and Fluidic Characterization of Piezoelectrically Driven Cantilevers," August 2008.
17. Vaibhav Bahadur (**Andrews Fellow, Adelberg Fellow**), "Electrical Actuation of Liquid Droplets on Smooth and Artificially Microstructured Surfaces," August 2008.
18. Stefan S. Bertsch, "Refrigerant Flow Boiling in Microchannel Evaporators" (co-advisor with E Groll), August 2008.
19. David B. Go, "Ion Generation and Ionic Wind Heat Transfer at Millimeter and Micrometer Scales" (co-advisor with T Fisher), August 2008.
20. Brian D. Iverson (**Ingersoll Rand Fellow, Winkelman Fellow**), "Traveling-Wave Electrohydrodynamic Micropumping Induced in a Temperature Gradient," December 2008.
21. Hemanth K. Dhavaleswarapu, "Microscale Transport in Evaporating Thin Liquid Films" (co-advisor J Murthy), May 2010.
22. Tannaz Harirchian, "Two-Phase Flow and Heat Transfer in Microchannels," May 2010.
23. Niru Kumari, "Liquid Droplet Actuation and Control on Smooth and Superhydrophobic Surfaces using Electric Fields," May 2010.
24. Benjamin J. Jones (**National Defense Science and Engineering Graduate Fellow, Bilsland Fellow**), "Fundamental Studies of Thermal Transport and Liquid-Vapor Phase Change using Microscale Diagnostic Techniques," August 2010.
25. Ravi S. Annapragada, "Investigation of Actuated Droplet Motion on Smooth and Superhydrophobic Surfaces" (co-advisor J Murthy), August 2011.
26. John P. McHale, "Characterization of Nucleate Pool Boiling from Smooth and Rough Surfaces," August 2011.
27. Ram Ranjan (**Andrews Fellow**), "Two-Phase Heat and Mass Transfer in Capillary Porous Media" (co-advisor J Murthy), December 2011.
28. Christopher P. Migliaccio (**ASEE SMART Fellow, Ross Fellow**), "Evaporative Transport in Thin Liquid Films and Electrically Actuated Droplets," May 2012.

29. Justin A. Weibel (**Lozar Fellow, Ingersoll Rand Fellow**), "Characterization of Fluid-Thermal Transport and Boiling in Micro/Nano-Engineered Porous Structures," May 2012.
30. Craig Bradshaw (**ASHRAE Fellow, Lambert Teaching Fellow**), "A Miniature-Scale Linear Compressor for Electronics Cooling" (co-advisor with E. Groll), May 2012.
31. Scott M. Flueckiger, "Multiscale Simulation of Thermocline Energy Storage for Concentrating Solar Power," August 2013.
32. Karthik K. Bodla (**Ross Fellow**), "Direct Simulation of Transport Through Stochastic Porous Media" (co-advisor J Murthy), December 2013.
33. Susan N. Ritchey (**Ingersoll Rand Fellow, Lambert Fellow**), "Non-Intrusive Two-Phase Flow Regime Identification and Transport Characterization in Microchannels Subject to Uniform and Non-Uniform Heat Input," December 2014.
34. Susmita Dash (**Ross Fellow, Bilisland Fellow**), "Droplet Behavior on Superhydrophobic Surfaces: Interfaces, Interactions, and Transport," December 2014.
35. Stephen H. Taylor (**Winkelman Fellow**), "Capacitance-Based Characterization of Inhomogeneities in Thin Layers" August 2015.
36. Richard A. Simmons, "A Techno-Economic Investigation of Advanced Vehicle Technologies and their Impacts on Fuel Economy, Emissions and the Future Fleet," (co-advisor W Tyner) December 2015.
37. Matthew J. Rau (**Winkelman Fellow, Arrasmith Fellow**), "Turbulent Liquid-Vapor Flow Interactions and Heat Transfer in Confined Jet Impingement Boiling," May 2016.
38. Suchismita Sarangi, "Characterization of Pool Boiling Heat Transfer from Porous-Coating-Enhanced Surfaces," May 2016.
39. Ravi Patel (**Winkelman Fellow, Arrasmith Fellow, Adelberg Fellow**), "Characterization of the Liquid Film in Slug- and Annular-Regime Microchannel Flows," May 2017.
40. Kevin P. Drummond (**Cordier Fellow**), "Characterization of Manifold Microchannel Heat Sinks during Two-Phase Operation," (co-advisor J Weibel) May 2018.
41. Harshad Inamdar (**Lambert Fellow**), "Performance of Finned Heat Exchangers after Air-Side Fouling and Cleaning," (co-advisor with E Groll) August 2018.
42. Karen Nielson Son (**NASA Space Technology Research Fellow, Purdue Doctoral Fellow**), "Improved Prediction of Adsorption-Based Life Support for Deep Space Exploration," December 2018.
43. Gaurav Patankar, "Characterization, Modeling and Design of Ultra-Thin Vapor Chamber Heat Spreaders under Steady-State and Transient Conditions," (co-advisor J Weibel) May 2019.
44. Carolina Mira Hernández (**Colciencias Jose de Caldas/Fulbright Fellow**), "Characterization of Two-Phase Flow Morphology Evolution during Boiling via High-Speed Visualization," (co-advisor J Weibel) May 2019.
45. Aditya Chandramohan (**Cordier Fellow**), "Thermofluidic Transport in Evaporating Droplets: Measurement and Application," (co-advisor J Weibel) May 2019.
46. Todd A. Kingston (**Winkelman Fellow**), "Time-Resolved Characterization of Thermal and Flow Dynamics during Microchannel Flow Boiling," (co-advisor J Weibel), May 2019.
47. Aakriti Jain (**Andrews Fellow**), "Characterization of Flow Freezing in Small Channels for Ice Valve Applications" (co-advisor J Weibel), December 2019.

48. Taylor P. Allred (**National Defense Science and Engineering Graduate Fellow, Perry Fellow**), "Effects of Dynamic Surface Wettability on Pool Boiling Behavior," (co-advisor with J Weibel), December 2019.
49. Srivathsan Sudhakar (**Bilsland Fellow**), "Boiling in Capillary-Fed Porous Evaporators Subject to High Heat Fluxes" (co-advisor J Weibel), August 2021.
50. Matthew Clark "The Impact of Flow Boiling Instabilities on Heat Transfer in Microchannel Heat Sinks" (**Kohr Fellow**, co-advisor with J Weibel), August 2022.
51. Rishav Roy, "Evaporation-induced Salt Precipitation in Porous Media and the Governing Solute Transport" (**Ross Fellow**, co-advisor with J Weibel), August 2022.
52. Kalind Baraya, "Characterization and Mechanistic Prediction of Heat Pipe Performance under Transient Operation and Dryout Conditions" (**Ross Fellow**, co-advisor with J Weibel), August 2023.
53. Manohar Bongarala, "Determination of the Mechanism for the Boiling Crisis using Through-Substrate Visual and Infrared Measurements" (**Ross Fellow**, co-advisor with J Weibel), December 2023.

M.S. Students

1. D. J. Schlitz, "Localized Enhancement of Heat Transfer from an Array of Heat Sources in Forced Convection," Fall 1992.
2. S. Gudapati, "Influence of Geometry on Convective Heat Transfer from Discrete Heat Sources," Spring 1993.
3. L. Zhang, "Morphological Interface Stability in Alloy Systems during Unidirectional Solidification," Spring 1993.
4. J. P. McNulty, "Interface Tracking and the Formation and Suppression of Channels in Alloy Solidification," Spring 1994.
5. R. A. Rice, "Submerged and Confined Axisymmetric Liquid Jet Impingement Heat Transfer," Spring 1995.
6. G. K. Morris, "Prediction of Heat Transfer and Flow Fields in Submerged and Confined Axisymmetric Impinging Jets," Spring 1996.
7. J. A. Fitzgerald (**NSF Graduate Research Fellow**), "An Experimental Investigation of the Flow Field in a Confined and Submerged Impinging Jet," Summer 1997.
8. V. P. Schroeder, "Heat Transfer from a Discrete Heat Source in Confined Air Jet Impingement with Single and Multiple Orifices," Fall 1997.
9. H. A. El-Sheikh, "Enhancement of Air Jet Impingement Heat Transfer using Pin Fin Heat Sinks," Spring 1999.
10. L. A. Brignoni, "Heat Transfer from Enhanced Surfaces in Air Jet Impingement and Suction," Spring 1999.
11. C-Y. Li, "Fluid Property Effects in Confined and Submerged Jet Impingement," Summer 1999.
12. J. E. Simpson (**UWM Graduate Fellow**), "Interface Propagation in the Solidification of Metal Matrix Composites," Summer 1999.
13. W. F. Mohs, "Investigation of Thermal Contact Conductance in Electronics Cooling Applications," Summer 1999.

14. V. Singhal, "Prediction of Thermal Contact Conductance by Integrated Thermal and Surface Deformation Analysis," Fall 2001.
15. P. J. Litke, "Experimental Determination of Thermal Contact Conductance," Spring 2002.
16. S. Krishnan, "Analysis of Phase Change Energy Storage Systems for Pulsed Power Dissipation," Summer 2002.
17. R. E. Fields (**Ingersoll Rand Fellow/Arrasmith Fellow**), "An Experimental Characterization of Heat and Mass Transport in Flat Heat Pipes," Summer 2002.
18. T. Acikalin, "Miniature Piezoelectric Fans for Thermal Management of Electronics" (co-advisor A Raman), Spring 2003.
19. S. Basak, "Dynamic Response Optimization of Piezoelectrically Excited Thin Resonant Beams" (co-advisor with A Raman), Summer 2003.
20. A. F. Black, "Surface Characterization and Thermal Constriction Resistance Modeling for Predicting Thermal Contact Conductance," Fall 2003.
21. S. M. Wait (**SRC Fellow/Arrasmith Fellow**), "Ultrasonic Piezoelectric Fans for Microelectronics Cooling" (co-advisor A Raman), Summer 2004.
22. M. S. Peterson, "Experimental Investigation of Enhanced Ion Generation in Atmospheric Air" (co-advisor with T Fisher), Summer 2004.
23. B. D. Iverson (**Ingersoll Rand Fellow**), "Heat and Mass Transport in Heat Pipe Wick Structures," Fall 2004.
24. C. T. Merrill (**NSF Graduate Research Fellow**), "Prediction of Thermal Contact Resistance across Joints with Metallic Coatings," Fall 2005.
25. R. S. Annapragada, "Thermo-Mechanical Modeling and Property Prediction in the Casting of Particulate Materials," Summer 2006.
26. T. W. Davis, "Experimental Characterization of the Transport Properties of Heat Pipe Wicks," Summer 2006.
27. J. P. McHale, "Laminar Flow and Forced Convective Heat Transfer in a Trapezoidal Microchannel," Fall 2006.
28. S. V. Aradhya, "Electrothermally Bonded Carbon Nanotube Arrays For Enhanced Interfacial Conductance" (co-advisor with T Fisher), Summer 2008.
29. B. T. Holcomb, "Measurement and Prediction of Flow Boiling of Water in Silicon Microchannels," Summer 2009.
30. G. Powell, "Controlled Synthesis of CNT-based Nanostructures for Enhanced Boiling and Wicking" (co-advisor with T Fisher), Summer 2009.
31. N. Bajaj, "Topological Design Optimization of Nested Channels for Squeeze Flow of Thermal Interface Materials" (co-advisor with G Subbarayan), December 2010.
32. R. Leffler, "Power Plant Waste Heat Rejection and Utilization Options" (co-advisor with E Groll), May 2011.
33. D. A. West (**NSF Graduate Research Fellow, Winkelman Fellow**), "Single-Phase and Two-Phase Heat Transfer During Confined Impingement of Single Jets and Jet Arrays," May 2012.
34. A. Krishna, "Organic Rankine Cycle with Solution Circuit for Low-Grade Heat Recovery" (co-advisor with E Groll), August 2012.

35. M. Dicuangco (**Arrasmith Fellow**), “Particle Deposition on Superhydrophobic Surfaces by Sessile Droplet Evaporation” (co-advisor J Weibel), May 2014.
36. Y. Yadavalli, “Transport in Ultra-thin Heat Pipes for Low Power Applications” (co-advisor J Weibel), December 2014.
37. J. Castillo Chacon (**Fulbright/Colciencias Jose de Caldas Fellow**), “Dropwise Condensation Dynamics in Humid Air” (co-advisor J Weibel), December 2014.
38. I. L. Collins (**Lozar Fellow**), “Evaluation of Additive Manufacturing Technology for Microchannel Heat Sinks” (co-advisor with J Weibel), May 2018.
39. H. Lai, “Characterization of Thin Liquid Films on Surfaces with Small Scale Roughness by Optical Interferometry” (co-advisor with J Weibel), Aug 2019.
40. Sara Lyons, “Characterization of the Effects of Internal Channel Roughness on Fluid Flow and Heat Transfer in Additively Manufactured Microchannel Heat Sinks” (**Andrews Fellow**, co-advisor with J Weibel), August 2022.

Undergraduate Students

Over 65 undergraduate students including those listed below have worked as part of Dr. Garimella’s research group, some through the NSF REU program and an undergraduate research experience component in his NSF Center offering *CTRC Undergraduate Research Fellowships* to encourage students in discovery-based learning. Many of these students have subsequently enrolled in graduate programs.

Andrey Moskalenko (2016), Dayana Stefany Vega (2016), Rajakumar Ganne (2016), Soumya Bandyopadhyay (2016), Yu Han (2016), Ashish Daga (2015), Ruixuan Ren (2014), Taylor Allred (2014), Srivathsan Sudhakar (2014), Nitesh Bajaj (2013), Letian Wang (2013), Ankita Deshmukh (2013), S G Krishnan (2013), Abilasha Nandakumar (2012-13), Gaurav Patankar (2012), Nico Weigand (2012), Michael Frank (2011-12), Mercy Dicuangco (2011), Marie Alt (2011), Abhijeet Patel (2010), Sonal Vaid (2008), Ravi Patel (2008), Sai Chodavarapu (2008), Bryson Sullivan (2008), Raul Maturana (2008), Ronan Lonergan (2008), Jon Shelton (2008), Adithya Bhat (2008), Josh Christian (2008), Ben Ali (2007), Lizmar Principe (2007), Brad Holcomb (2007), Carlos Kemeny (2006), Sujaatha Dwadasi (2006), Himani Shah (2006), Michael Keen (2006), Nikhil Bajaj (2004), Vishnu Dwadasi (2004), Maria Burnett (2003-2004), Indra Tjahjono (2002-2003), Girum Berhane (2003), Renee Wenstrup (2003), Ben Jones (2003), Ken Leer (2002), Patrick Wong (2001), Kiran Vedula (2001), Michael Meyer (2001), K. M. Wong (2001), Gbenga Showole (2000), Dan Taylor (2000), Erik Olsen (2000), Paul Litke (2000), Greg Glidden (1999), Danielle Wade (1999), Brian Storniolo (1998), Nate Kohnle (1998), M. M. Tegelman (1998), Mike Guslick (1997-1998), Jim Briggs (1998), Scott Nelson (1997), Vitaliy Rayz (1997), Katie Schuchardt (1996), Todd Brunner (1996), Jim Oehmcke (1995), Boris Nenaydykh (1994), Garron Morris (1993), Dave Hlavac (1993), Ken Cascio (1993), Kevin Adams (1992), Roy Rice (1992), and Kirk Blomdahl (1991)

Post-doctoral Researchers / Visiting Professors & Scholars

1. Prof. C. V. Madhusudana, School of Mechanical and Manufacturing Engineering, University of New South Wales, Sydney, Australia; Visiting Professor, July to December 2000.
2. Prof. C. B. Sobhan, Regional Engineering College, Calicut, India; Visiting Professor, March 1999 to May 2000.
3. Dr. James E. Simpson, Post-doctoral Research Associate, August to November 2000.

4. Prof. Moogeun Kim, School of Mechanical and Automotive Engineering, Inje University, South Korea; Visiting Professor, February 2001 to February 2002.
5. Philipp Buermann, Research Scientist, Technical University of Dresden, August to September 2001 (co-supervised with A Raman).
6. Dr. Madhusudan Iyengar, Post-doctoral Research Associate, April to October 2003.
7. Prof. Sung Jin Kim, Korean Advanced Institute of Science and Technology (KAIST), South Korea; Visiting Professor, August 2003 to August 2004.
8. Kyu Hyung Do, Korean Advanced Institute of Science and Technology (KAIST), South Korea; Visiting Scholar, August 2003 to August 2004.
9. Dr. Dawei Sun, Post-doctoral Research Associate, September 2003 to September 2006.
10. Dr. Tailian Chen, Post-doctoral Research Associate, May 2004 to June 2006.
11. Dr. Lorenzo Cremaschi, Post-doctoral Research Associate, August 2004 to July 2006 (co-supervised with E Groll).
12. Dr. Hao Wang, Post-doctoral Research Associate, September 2004 to May 2007 (co-supervised with J Murthy).
13. Tine Stevens, Katholieke Universiteit Leuven; Visiting Scholar, September to October 2005.
14. Dr. Dong Liu, Post-doctoral Research Associate, August 2006 to July 2007.
15. Dr. Moeketsi Mpholo, Senior Lecturer, University of Lesotho; Visiting Scholar, August to December 2007.
16. Dr. Placidus Amama, Post-Doctoral Research Associate, September to December 2007 (co-supervised with T Fisher).
17. Dr. Fabien Volle, Post-doctoral Research Associate, October 2007 to August 2009.
18. Dr. Anuradha Bulusu, Post-doctoral Research Associate, January 2008 to March 2009 (co-supervised with T Fisher).
19. Dr. Zhen Yang, Post-doctoral Research Associate, January 2008 to February 2010.
20. Enrico Da Riva, University of Padova, Italy; Visiting Scholar, July to December 2008.
21. Dr. Amaresh Dalal, Post-doctoral Research Associate, September 2008 to December 2009 (co-supervised with J Murthy).
22. Dr. Brian Iverson, Post-doctoral Research Associate, January to August 2009.
23. Dr. Sidharth Paranjape, Post-doctoral Research Associate, July 2009 to May 2012.
24. Dr. Tim Persoons, Katholieke Universiteit Leuven; Visiting Scholar, August 2009.
25. Tom Saenen, Katholieke Universiteit Leuven; Visiting Scholar, August 2009.
26. Xuelei Nie, Chinese Academy of Sciences; Visiting Scholar, September 2009 to August 2010.
27. Dr. Tae Young Kim, Post-doctoral Research Associate, March 2010 to February 2012.
28. Joan Lopez Mas, Universitat Politecnica de Catalunya, Spain; Visiting Scholar, May to July 2010.
29. Dr. Tannaz Harirchian, Post-doctoral Research Associate, May to December 2010.
30. Dr. Berhane Hagos Gebreslassie, Post-doctoral Research Associate, July 2010 to November 2011.

31. Dr. Tim Persoons (**Marie Curie/IRCSET Fellow**), Visiting Scholar, September 2010 to December 2011.
32. Oisín Fergal Lyons (**Fulbright Fellow**), Visiting Scholar, September 2011 to July 2012.
33. Prof. Fangjun Hong, Shanghai Jiao Tong University, China; Visiting Professor, September 2011 to August 2012.
34. Peng Guan, Tsinghua University, Visiting Scholar, September 2011 to September 2012.
35. Dr. Orkan Kurtulus, Post-doctoral Research Associate, January 2012 to December 2013 (co-supervised with E Groll).
36. Jochen Dietl, Technical University of Darmstadt, Visiting Scholar, July to September 2012.
37. Andrea Diani, University of Padua, Visiting Scholar, July to October 2012.
38. Dr. Pierre Valiorgue, Post-doctoral Research Associate, October 2012 to August 2013.
39. Dr. Zhenhai Pan, Post-doctoral Research Associate, October 2012 to July 2016.
40. Andres Heldstab, Institute for Energy System Buchs Switzerland, April to July 2013.
41. Dr. Simoné Mancin, University of Padua, Visiting Scholar, May to August 2013.
42. Dr. Hsien-Chin Su, National Taiwan University, Visiting Scholar, July 2013 to June 2014.
43. Prof. Martine Baelmans, Catholic University of Leuven, Belgium; Visiting Professor, November 2013, April 2014.
44. Dr. Xuemei Chen, Post-doctoral Research Associate, December 2013 to July 2018.
45. Dr. Dongseob Kim, Post-doctoral Research Associate, January 2014 to January 2015.
46. Prof. Yonghua Huang, Shanghai Jiao Tong University, China; Visiting Professor, July 2014 to June 2015.
47. Prof. V. Kumaresan, Anna University, India; Visiting Professor, August 2014 to January 2015.
48. Dr. Tijs Van Oevelen, Post-doctoral Research Associate, March 2015 to February 2017.
49. Dr. Han Hu, Post-doctoral Research Associate, September 2016 to July 2019.
50. Dr. Monojit Chakraborty, Post-doctoral Research Associate, October 2016 to October 2018.
51. Dr. Ankur Miglani, Post-doctoral Research Associate, January 2017 to November 2019.

Group Alumni in Faculty Positions

1. Dr. Todd Kingston, Department of Mechanical Engineering, *Iowa State University*, Ames, IA.
2. Dr. Ankur Miglani, Department of Mechanical Engineering, *Indian Institute of Technology Indore*, India.
3. Dr. Han Hu, Department of Mechanical Engineering, *University of Arkansas*, Fayetteville, AR.
4. Dr. Monojit Chakraborty, Department of Chemical Engineering, *Indian Institute of Technology Kharagpur*, India.
5. Dr. Susmita Dash, Department of Mechanical Engineering, *Indian Institute of Science*, Bangalore, India.
6. Dr. Niki Ritchey, Department of Mechanical Engineering, *Texas A&M University*, College Station, TX.
7. Dr. Tae Young Kim, Department of Mechanical System Engineering, *Chonbuk National University*, Korea.

8. Dr. Xuemei Chen, Department of Energy and Power Engineering, *Nanjing University of Science and Technology*, Nanjing, China.
9. Dr. Matthew Rau, Department of Mechanical Engineering, *Pennsylvania State University*, University Park, PA.
10. Dr. Zhenhai Pan, School of Mechanical Engineering, *Shanghai Jiao Tong University*, Shanghai, China.
11. Dr. Craig Bradshaw, Department of Mechanical and Aerospace Engineering, *Oklahoma State University*, Stillwater, OK.
12. Dr. Shankar Krishnan, Department of Mechanical Engineering, *Indian Institute of Technology, Bombay*, India.
13. Dr. Vaibhav Bahadur, Department of Mechanical Engineering, *University of Texas at Austin*, Austin, TX.
14. Dr. Pierre Valiorgue, Département de Mécanique, Laboratoire de Mécanique des Fluides et d'Acoustique, *Université Claude Bernard Lyon 1*, Lyons, France.
15. Dr. Brian Iverson, Department of Mechanical Engineering, *Brigham Young University*, Provo, UT.
16. Dr. Justin Weibel, School of Mechanical Engineering, *Purdue University*, West Lafayette, IN.
17. Dr. Tim Persoons, Department of Mechanical Engineering, *University of Dublin, Trinity College*, Dublin, Ireland.
18. Dr. Zhen Yang, Department of Mechanical Engineering, *Tsinghua University*, Beijing, China.
19. Dr. Amaresh Dalal, Department of Mechanical Engineering, *Indian Institute of Technology, Guwahati*, India.
20. Dr. Fabien Volle, Laboratoire d'Ingénierie des Matériaux et des Hautes Pressions, *University of Paris*, Paris, France.
21. Dr. David Go, Department of Aerospace and Mechanical Engineering, *University of Notre Dame*, South Bend, IN.
22. Dr. Mark Kimber, Department of Nuclear Engineering, *Texas A&M University*, College Station, TX.
23. Dr. Stefan Bertsch, NTB Interstaatliche Hochschule für Technik Buchs (*Technical University of Buchs*), Switzerland.
24. Dr. Dong Liu, Department of Mechanical Engineering, *University of Houston*, Houston, TX.
25. Dr. Hao Wang, Department of Energy and Resources Engineering, *Peking University*, Beijing, China.
26. Dr. Poh-Seng Lee, Department of Mechanical Engineering, *National University of Singapore*, Singapore.
27. Dr. Tailian Chen, Department of Mechanical Engineering, *Gonzaga University*, Spokane, WA.
28. Dr. Lorenzo Cremaschi, Department of Mechanical Engineering, *Auburn University*, Stillwater, OK.
29. Dr. Suwat Trutassanawin, Mechanical Engineering Department, *Mahidol University*, Bangkok, Thailand.

LIST OF PUBLICATIONS

[Google Scholar citations](#) 35,597, h-index 105, i10-index 393 (July 21, 2024)

Books / Book Chapters

1. T.A. Kingston, J.A. Weibel, and S.V. Garimella, "Recent Experimental and Modeling Advances in Two-Phase Embedded Microfluidic Cooling, *Embedded Cooling of Electronic Devices, WSPC Series in Advanced Integration and Packaging: Volume 8*, ISBN: 978-198-12-7793-1, 2024.
2. D. Ginley, R. Aswathi, S. R. Atchuta, B. Basu, S. Basu, J. M. Christian, A. Dan, N. Dani, R. N. Das, P. Dutta, S. M. Flueckiger, S. V. Garimella, Y. Goswami, C. K. Ho, S. Kedare, S. D. Khivsara, P. Kumar, C. D. Madhusoodana, B. Mallikarjun, C. Mira-Hernández, M. Orosz, J.D. Ortega, D. R. Parida, M. S. Prasad, K. Ramesh, S. Advaith, S. K. Saha, S. Sakthivel, S. Sharma, P. Singh, S. Singh, O. Srikanth, V. Srinivasan, J. A. Weibel, T. Wendelin, [Multiscale concentrated solar power](#), *Solar Energy Research Institute for India and the United States (SERIUS): Lessons and Results from a Binational Consortium*, Springer International Publishing, Chapter 3, pp. 87-132, 2020.
3. M. J. Rau and S. V. Garimella, "Two-Phase Jet Impingement: Liquid-Vapor Interactions and Heat Transfer Mapping for Multiscale Surface Enhancement Design," in *Encyclopedia of Two-Phase Heat Transfer and Flow III*, World Scientific Publishers, [Chapter 6](#), pp. 221-278, 2018.
4. R. A. Simmons, P. F. Secor and S. V. Garimella, "Adapting Policies for a New Energy Future," *Handbook of Clean Energy Systems* (J. Yan ed.), Vol. 6, John Wiley and Sons, pp. 3139-3164, 2015.
5. R. A. Simmons and S. V. Garimella, "Electric, Hybrid and Advanced Vehicles: Finding a Lane on the Road Ahead," *Handbook of Clean Energy Systems* (J. Yan, ed.), Vol. 4, John Wiley and Sons, pp. 2279-2300, 2015.
6. S. V. Garimella and T. Harirchian, *Microchannel Heat Sinks for Electronics Cooling*, Vol. 1 in the *Encyclopedia of Thermal Packaging*, World Scientific, Singapore, 2013 (248 pp., ISBN 978-981-4313-80-3).
7. K. K. Bodla, J. Y. Murthy and S. V. Garimella, "Optimization under Uncertainty for Electronics Cooling Designs" *WSPC Series in Advanced Integration and Packaging, Vol. 3: Cooling of Microelectronic and Nanoelectronic Equipment: Advances and Emerging Research*, Chapter 11, 2014.
8. G. A. Powell, A. Bulusu, J. A. Weibel, S. S. Kim, S. V. Garimella and T. S. Fisher, "Hydrophilic CNT-Sintered Copper Composite Wick for Enhanced Cooling" *WSPC Series in Advanced Integration and Packaging, Vol. 3: Cooling of Microelectronic and Nanoelectronic Equipment: Advances and Emerging Research*, Chapter 12, 2014.
9. D. Liu and S. V. Garimella, "Cooling Techniques for Electronic Devices," Chapter in *Heat and Mass Transfer (6.170)*, *Encyclopedia of Life Support Systems*, UNESCO-EOLSS Joint Committee.
10. D. Liu and S. V. Garimella, "Electromechanical Actuation of Nanofluids," in *Nanoparticles: Synthesis, Characterization and Applications*, R. S. Chughule (ed.), American Scientific Publishers, 2009.
11. S. Krishnan, S. V. Garimella and J. Y. Murthy, "Thermal Characterization of Open-Celled Metal Foams by Direct Simulation," in *Cellular and Porous Materials: Thermal Properties Simulation and Prediction*, Ochsner, Murch and de Lemos (Eds), Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, 2009.
12. S. Krishnan, S. V. Garimella and J. Y. Murthy, "Metal Foams as Passive Control of Thermal Systems," in *Emerging Topics in Heat and Mass Transfer in Porous Media - from Bioengineering and Microelectronics to Nanotechnology*, P. Vadasz (Ed.), Springer, 2008.
13. P. Chamrathy, S. T. Wereley, and S. V. Garimella, "μPIV based Diffusometry," in *Encyclopedia of Micro and Nano-Fluidics*, 2007.

14. S. V. Garimella and J. E. Simpson, "Numerical Treatment of Moving Interfaces in Phase-Change Processes," in *Fluid Dynamics at Interfaces*, W. Shyy and R. Narayanan (eds.), Cambridge University Press, pp. 278-293, 1999.
15. S. V. Garimella, Flow Visualization Methods and Their Application in Electronic Systems, Chapter 10, *Thermal Measurements in Electronics Cooling* (K. Azar, ed.) CRC Press, 1997, ISBN 0-8493-3279-6.
16. S. V. Garimella, Enhanced Air Cooling of Electronic Equipment, Chapter 6, *Air Cooling Technology for Electronic Equipment* (S. J. Kim and S. W. Lee eds.) CRC Press, 1996, ISBN 0-8493-9447-3.

Refereed Journal Publications

1. M. Bongarala, J. A. Weibel, S. V. Garimella, "A Method to Partition Boiling Heat Transfer Mechanisms using Synchronous Through-Substrate High-Speed Visual and Infrared Measurements," *International Journal of Heat and Mass Transfer* Vol. 226, p. 125516, 2024.
2. C Mira-Hernandez, J. A. Weibel, S. V. Garimella, "Critical Heat Flux Degradation due to Flow Disturbances and Pressure Oscillations under Confined and Submerged Two-Phase Water Jet Impingement," *International Journal of Heat and Mass Transfer* Vol. 228, p. 125577, 2024.
3. K. Baraya, J. A. Weibel, S. V. Garimella, "Transient Recovery from Heat Pipe Dryout by Power Throttling," *International Journal of Heat and Mass Transfer* Vol. 221, p. 125104, 2024.
4. H. V. Inamdar, E. A. Groll, J. A. Weibel, and S. V. Garimella, "Air-Side Fouling of Finned Heat Exchangers: Part 1, Review and Proposed Test Protocol," *International Journal of Refrigeration* Vol. 151, pp. 77-86, 2023.
5. H. V. Inamdar, E. A. Groll, J. A. Weibel, and S. V. Garimella, "Air-Side Fouling of Finned Heat Exchangers: Part 2, Experimental Demonstration and Assessment of Test Protocol," *International Journal of Refrigeration* Vol. 151, pp. 63-67, 2023.
6. M. D. Clark, Md E. Rahman, J. A. Weibel, and S. V. Garimella, "Effect of Thermal Capacitance on Microchannel Heat Sink Response to Pressure Drop Oscillations," *International Journal of Heat and Mass Transfer* Vol. 214, p. 124369, 2023.
7. R. Roy, J. A. Weibel, and S. V. Garimella, "An Exclusion Distance Controls the Efflorescence Pattern Distribution on Porous Media during Salt Solution Evaporation," *International Journal of Heat and Mass Transfer* Vol. 209, p. 124104, 2023.
8. K. Baraya, J. A. Weibel, and S. V. Garimella, "Wetting Hysteresis as the Mechanism of Heat Pipe Post-dryout Thermal Hysteresis and Recovery," *International Journal of Heat and Mass Transfer* Vol. 204, p. 123875, 2023.
9. M. D. Clark, J. A. Weibel, and S. V. Garimella, "Impact of Pressure Drop Oscillations and Parallel Channel Instabilities on Microchannel Flow Boiling and Critical Heat Flux," *International Journal of Multiphase Flow* Vol. 161, p. 104380, 2023.
10. M. Bongarala, H. Hu, J. A. Weibel, and S. V. Garimella, "Microlayer Evaporation Governs Heat Transfer Enhancement during Pool Boiling from Microstructured Surfaces," *Applied Physics Letters* Vol. 120, p. 221602, 2022.
11. S. K. Lyons, A. Chandramohan, J. A. Weibel, and S. V. Garimella, "Simultaneous Measurement of Temperature and Strain in Electronic Packages using Multi-Frame Super-Resolution Infrared Thermography and Digital Image Correlation," *Journal of Electronics Packaging* Vol. 144, p. 041019, 2022.
12. R. Roy, J. A. Weibel, and S. V. Garimella, "Predicting the Formation of Efflorescence and Subflorescence caused by Salt Solution Evaporation from Porous Media," *International Journal of Heat and Mass Transfer* Vol. 189, p. 122645, 2022.
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374. S. V. Garimella and R. N. Christensen, "Transient Condensation in the Presence of Noncondensables at a Flat, Vertical Wall," *Nuclear Technology* Vol. 89, pp. 388-398, 1990.

Refereed Conference Publications

(Based on Review of the Full Paper)

1. K. Baraya, J. A. Weibel, and S. V. Garimella, "Experimental Demonstration of Heat Pipe Operation Beyond the Capillary Limit during Brief Transient Heat Loads," *IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm)*, Las Vegas, NV, May 28-31, 2019.
2. T. P. Allred, J. A. Weibel, and S. V. Garimella, "Control of Pool Boiling Hydrodynamics Through Surface Wettability Patterning," *16th International Heat Transfer Conference*, Beijing, China, August 10-15, 2018.
3. M. D. Clark, J. A. Weibel, and S. V. Garimella, "Identification of the Dominant Heat Transfer Mechanisms During Confined Two-Phase Jet Impingement," *IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm)*, San Diego, CA, May 29- Jun 1, 2018 (**Best Student Poster, Component-Level**).
4. I. L. Collins, J. A. Weibel, L. Pan, and S. V. Garimella, "Experimental Characterization of Microchannel Heat Sinks made by Additive Manufacturing," *IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm)*, San Diego, CA, May 29- Jun 1, 2018 (**Best Student Poster, Emerging Technologies**).
5. K. N. Son, J. A. Weibel, S. V. Garimella, J. C. Knox, and R. F. Coker, "Calibration and Sensitivity of a Fixed-bed Adsorption Model for Atmosphere Revitalization in Space," *47th International Conference on Environmental Systems (ICES)*, Charleston, SC, July 16-20, 2017.
6. S. Sudhakar, J. A. Weibel, and S. V. Garimella, "An Area-Scalable Two-Layer Evaporator Wick Concept for High-Heat-Flux Vapor Chambers," *Procs. ITherm17*, Orlando, FL, May 30 - Jun 2, 2017 (**Best Student**

Poster, Component-Level).

7. G. Patankar, J. A. Weibel, and S. V. Garimella, "A Time-Stepping Analytical Model for 3D Transient Vapor Chamber Transport," *Procs. IThERM17*, Orlando, FL, May 30 - Jun 2, 2017 (**Best Student Poster, System-Level**).
8. C. Mira-Hernández, M. D. Clark, J. A. Weibel, and S. V. Garimella, "A Semi-Empirical Model for Two-Phase Heat Transfer from Arrays of Confined Impinging Jets," *Procs. IThERM17*, Orlando, FL, May 30 - Jun 2, 2017.
9. T. A. Kingston, J. A. Weibel, and S. V. Garimella, "Rapid-Bubble-Growth Instability at the Onset of Microchannel Flow Boiling," *Procs. IThERM17*, Orlando, FL, May 30 - Jun 2, 2017 (**Best Student Poster, Emerging Technologies and Fundamentals**).
10. K. P. Drummond, J. A. Weibel, and S. V. Garimella, "Experimental Study on Flow Boiling in a Compact Hierarchical Manifold Microchannel Heat Sink Array," *SEMI-THERM 33rd Annual Symposium and Exhibit*, San Jose, CA, March 13-17, 2017 (**Best Student Paper**).
11. A. Jain, Y. Huang, J. A. Weibel, and S. V. Garimella, "Visualization of Ice Formation Modes and Flow Blockage during Freezing of Water Flowing in a Microchannel," *ASME Summer Heat Transfer Conference*, HT2016-7243, Washington, DC, July 10-14, 2016.
12. A. Chandramohan, J. A. Weibel, and S. V. Garimella, "The Role of Condensation from Humid Air on Melting of Ice," *Procs. IThERM16*, Las Vegas, NV, May 31- June 3, 2016.
13. K. P. Drummond, J. A. Weibel, S. V. Garimella, D. Back, D. B. Janes, M. D. Sinanis, and D. Peroulis, "Evaporative Intrachip Hotspot Cooling with a Hierarchical Manifold Microchannel Heat Sink Array," *Procs. IThERM16*, Las Vegas, NV, May 31- June 3, 2016 (**Best Paper Award, Emerging Technologies**).
14. S. Sarangi, J. A. Weibel, and S. V. Garimella, "Effect of Particle Morphology on Pool Boiling from Surfaces Coated with Sintered Particles," *ASME International Mechanical Engineering Congress and Exposition*, Houston, TX, November 13-19, IMECE2012-50238, 2015.
15. R. A. Simmons, H. Wang, S. V. Garimella, and E. A. Groll, "Hybrid, Plug-in Hybrid, and Electric Vehicle Energy Consumption Sensitivity to the Combined Effects of Driving Cycle and Ambient Temperature-Induced Thermal Loads," *Procs. 3rd Sustainable Thermal Energy Management International Conference (SUSTEM 2015)*, Newcastle upon Tyne, UK, July 7-8, pp. 271-283, 2015.
16. Z. Pan, J. A. Weibel, and S. V. Garimella, "A Cost-Effective Modeling Approach for Simulating Phase Change and Flow Boiling in Microchannels," *International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems (InterPACK) and International Conference on Nanochannels, Microchannels and Minichannels (ICNMM)*, San Francisco, CA, July 6-9, 2015.
17. G. Patankar, S. Mancin, J. A. Weibel, M. A. MacDonald, and S. V. Garimella, "A Method for Thermal Performance Characterization of Ultra-Thin Vapor Chambers Cooled by Natural Convection," *InterPACK and ICNMM*, San Francisco, CA, July 6-9, 2015 (**Outstanding Paper Award**).
18. T. A. Kingston, J. A. Weibel, and S. V. Garimella, "Quantitative Visualization of Vapor Bubble Growth in Diabatic Vapor-Liquid Microchannel Slug Flow," *InterPACK and ICNMM*, San Francisco, CA, July 6-9, 2015 (**Best Poster Award**).
19. M. J. Rau, T. Guo, P. P. Vlachos, and S. V. Garimella, "Visualization of Confined Jet Impingement with Boiling using Time-Resolved Stereo-PIV," *InterPACK and ICNMM*, San Francisco, CA, July 6-9, 2015.
20. K. P. Drummond, J. A. Weibel, S. V. Garimella, D. Back, D. B. Janes, M. D. Sinanis, and D. Peroulis, "Fabrication and Characterization of a Hierarchical Manifold Microchannel Array for Evaporative Intrachip Cooling," *40th Annual Government Microcircuit Applications & Critical Technology (GOMACTech) Conference*, St. Louis, MO, March 23-26, 2015.

21. S. G. Krishnan, K. K. Bodla, J. A. Weibel and S. V. Garimella, "Numerical Investigation of Fluid Flow and Heat Transfer in Periodic Porous Lattice-Frame Materials," *Procs. 15th International Heat Transfer Conference (IHTC-15)*, Kyoto, Japan, August 10-15, 2014.
22. Y. Yadavalli, J. A. Weibel and S. V. Garimella, "Flat Heat Pipe Performance Thresholds at Ultra-Thin Form Factors," Paper No. 45, *Procs. ITherm14*, Orlando, FL, May 27-30, 2014.
23. M. Dicuangco, S. Dash, J. A. Weibel and S. V. Garimella, "Evaporative Particle Deposition on Superhydrophobic Surfaces," *ASME International Mechanical Engineering Congress & Exposition, IMECE2013-63928*, San Diego, CA, November 15-21, 2013.
24. C. Mira-Hernández, S. M. Flueckiger and S. V. Garimella, "Numerical Simulation of Single- and Dual-Media Thermocline Tanks for Energy Storage in Concentrating Solar Power Plants," *Solar Power and Chemical Energy Systems (SolarPACES)*, Las Vegas, NV, September 17-20, 2013; also published as *Energy Procedia* Vol. 49, pp. 916-926, 2014.
25. S. M. Flueckiger, B. D. Iverson and S. V. Garimella, "Simulation of a Concentrating Solar Power Plant with Molten-Salt Thermocline Storage for Optimized Annual Performance," *ASME International Conference on Energy Sustainability, ES2013-19297*, Minneapolis, MN, July 14-19, 2013.
26. K. K. Bodla and S. V. Garimella, "Microstructural Evolution and Transport Properties of Sintered Porous Media," *ASME Summer Heat Transfer Conference, HT2013-17241*, Minneapolis, MN, July 14-19, 2013.
27. Z. Pan, S. Dash, J. A. Weibel and S. V. Garimella, "Numerical Study of Water Droplet Evaporation on a Superhydrophobic Surface," *ASME Summer Heat Transfer Conference, HT2013-17697*, Minneapolis, MN, July 14-19, 2013.
28. S. N. Joshi, M. J. Rau, E. M. Dede and S. V. Garimella, "An Experimental Study of a Multi-Device Jet Impingement Cooler with Phase Change Using HFE-7100," *ASME Summer Heat Transfer Conference, HT2013-17241*, Minneapolis, MN, July 14-19, 2013.
29. R. S. Patel and S. V. Garimella, "Diagnostic Technique for Quantitative Resolution of Three-Dimensional Liquid-Gas Phase Boundaries in Microchannel Flows," *ASME International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems, InterPACK2013-73057*, Burlingame, CA, July 16-18, 2013.
30. S. H. Taylor and S. V. Garimella, "A Capacitance-Based Technique for Characterization of Dielectric Interfaces Using a Grid of Electrode Junctions," *ASME International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems, InterPACK2013-73283*, Burlingame, CA, July 16-18, 2013.
31. S. N. Ritchey, J. A. Weibel and S. V. Garimella, "Effects of Non-Uniform Heating on Two-Phase Flow through Microchannels," *ASME International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems, InterPACK2013-73058*, Burlingame, CA, July 16-18, 2013 (**Outstanding Paper Award, Thermal**).
32. S. Sarangi, K. K. Bodla, S. V. Garimella and J.Y. Murthy, "Optimization Under Uncertainty of Manifold Microchannel Heat Sinks," *ASME International Mechanical Engineering Congress and Exposition, Houston, TX, November 9-15, IMECE2012-89261*, 2012.
33. B. J. Woodland, A. Krishna, E. A. Groll, J. E. Braun, W. T. Horton and S. V. Garimella, "Thermodynamic Comparison of Organic Rankine Cycle with Liquid Flooded Expansion and with Solution Circuit," *Heat Powered Cycles Conference 2012*, Elkmaar, Netherlands, Sept 10-12, 2012.
34. S. M. Flueckiger, S. V. Garimella and E. A. Groll, "Numerical Study of Supercritical CO₂ Convective Heat Transfer in Advanced Brayton Cycles for Concentrated Solar Power," *ES2012-91396, Procs. 6th International Conference on Energy Sustainability*, ASME, San Diego, CA, July 23-26, 2012.

35. K. K. Bodla, J. Y. Murthy and S. V. Garimella, "Analysis of Thin-Film Evaporation through Sintered Wick Microstructures", HT2012-58598, *Procs. Summer Heat Transfer Conference*, Rio Grande, Puerto Rico, July 8-12, 2012.
36. J. A. Weibel, A. S. Kousalya, T. S. Fisher and S. V. Garimella, "Characterization and Nanostructured Enhancement of Boiling Incipience in Capillary-Fed, Ultra-Thin Sintered Powder Wicks," *Procs. ITherm12*, San Diego, CA, May 30-June 1, 2012.
37. K. K. Bodla, J. Y. Murthy and S. V. Garimella, "Optimization Under Uncertainty for Electronics Cooling Design Applications," *Procs. ITherm12*, San Diego, CA, May 30-June 1, 2012.
38. R. Ranjan, J. Y. Murthy and S. V. Garimella, "Bubble Dynamics during Capillary-Fed Nucleate Boiling in Porous Media," *Procs. ITherm12*, San Diego, CA, May 30-June 1, 2012.
39. R. S. Patel and S. V. Garimella, "Development of a Particle Tracking-Based Measurement Technique to Map Three-Dimensional Interfaces Between Transparent, Immiscible Fluids," *Procs. ITherm12*, San Diego, CA, May 30-June 1, 2012.
40. S. Chavali, Y. Singh, G. Subbarayan, and S. V. Garimella, "Mechanical and Thermal Response of Compliant Thermal Interface Materials under Cyclic Loading," *Procs. ITherm12*, San Diego, CA, May 30-June 1, 2012.
41. S. R. Annapragada, J. Y. Murthy and S. V. Garimella, "Droplet Shapes on Superhydrophobic Surfaces under Electrowetting Actuation," IMECE2011-65370, *Proceedings of ASME 2011 International Mechanical Engineering Congress & Exposition*, Denver, CO, November 11-17, 2011.
42. B. Gebreslassie, E. A. Groll and S. V. Garimella, "Optimization of Solar-Assisted Single-Effect Water/Lithium Bromide Absorption Chiller," IMECE2011-63211, *Proceedings of ASME 2011 International Mechanical Engineering Congress & Exposition*, Denver, CO, November 11-17, 2011.
43. S. Flueckiger, Z. Yang and S. V. Garimella, "Thermocline Energy Storage in the Solar One Power Plant: An Experimentally Validated Thermomechanical Investigation," *ASME Energy Sustainability Conference*, Washington DC, August 7-10, 2011.
44. R. Ranjan, A. Patel, S. V. Garimella and J. Y. Murthy, "Wicking and Thermal Characteristics of Micropillared Structures for use in Passive Heat Spreaders," InterPACK2011-52041, *Procs. ASME 2011 Pacific Rim Technical Conference & Exposition on Packaging and Integration of Electronic and Photonic Systems*, Portland, OR, July 6-8, 2011.
45. S. Dash, N. Kumari, M. Dicuango and S. V. Garimella, "Single-Step Fabrication and Characterization of Ultrahydrophobic Surfaces with Hierarchical Roughness," InterPACK2011-52046, *Procs. ASME 2011 Pacific Rim Technical Conference & Exposition on Packaging and Integration of Electronic and Photonic Systems*, Portland, OR, July 6-8, 2011 (**First Prize for Best Poster** in Advanced Packaging and Materials).
46. R. Ranjan, J. Y. Murthy, S. V. Garimella and D. H. Altman, "An Experimentally Validated Model for Transport in Thin, High Thermal Conductivity, Low CTE Heat Spreaders," InterPACK2011-56039, *Procs. ASME 2011 Pacific Rim Technical Conference & Exposition on Packaging and Integration of Electronic and Photonic Systems*, Portland, OR, July 6-8, 2011 (**First Prize for Best Poster** in Thermal Management).
47. S. R. Annapragada, S. Dash, S. V. Garimella and J. Y. Murthy, "Dynamics of Droplet Motion under Electrowetting Actuation," InterPACK2011-52061, *Procs. ASME 2011 Pacific Rim Technical Conference & Exposition on Packaging and Integration of Electronic and Photonic System*, Portland, OR, July 6-8, 2011.
48. R. S. Patel, T. Harirchian and S. V. Garimella, "Dependence of Flow Boiling Heat Transfer Coefficient on Location and Vapor Quality in a Microchannel Heat Sink," InterPACK2011-52089, *Procs. ASME 2011 Pacific Rim Technical Conference & Exposition on Packaging and Integration of Electronic and Photonic System*, Portland, OR, July 6-8, 2011.
49. S. Paranjape, S. N. Ritchey and S. V. Garimella, "Impedance-Based Void Fraction Measurement and Flow Regime Identification in Microchannel Flows," InterPACK2011-52116, *Procs. ASME 2011 Pacific Rim*

Technical Conference & Exposition on Packaging and Integration of Electronic and Photonic System, Portland, OR, July 6-8, 2011.

50. A. Krishna, E. A. Groll and S. V. Garimella, "Organic Rankine Cycle with Solution Circuit for Ultra Low-Grade Waste Heat Recovery," *International Sorption Heat Pump Conference*, Padua, Italy, April 6-8, 2011.
51. T. Chen and S. V. Garimella, "A Study of Critical Heat Flux during Flow Boiling in Microchannel Heat Sinks," *ASME/JSME 2011 8th Thermal Engineering Joint Conference (AJTEC2011)*, Honolulu, Hawaii, March 13-17, 2011.
52. N. Bajaj, G. Subbarayan and S. V. Garimella, "Topological Design Optimization of Nested Channels for Squeeze Flow of Thermal Interface Materials," *International Mechanical Engineering Congress and Exposition*, ASME, Vancouver, British Columbia, Canada, November 12-18, 2010.
53. M. Hashimoto, H. Kasai, K. Usami, H. Ryoson, K. Yazawa, J. A. Weibel and S. V. Garimella, "Nano-Structured Two-Phase Heat Spreader for Cooling Ultra- High Heat Flux Sources," *14th International Heat Transfer Conference*, Washington, D.C., August 8-13, 2010.
54. S. Kim, J. A. Weibel, T. S. Fisher and S. V. Garimella, "Thermal Performance of Carbon Nanotube Enhanced Vapor Chamber Wicks," *14th International Heat Transfer Conference*, Washington, D.C., August 8-13, 2010.
55. X. Nie, X. Hu, S. V. Garimella and D. Tang, "Heat and Mass Transfer in the Corner Flow Region of Vertical Microgrooves," *Proceedings of ASME 2010 3rd Joint US-European Fluids Engineering Summer Meeting and 8th International Conference on Nanochannels, Microchannels, and Minichannels FEDSM2010*, Montreal, Canada, August 2-4, 2010.
56. J. A. Weibel, S. V. Garimella, J. Y. Murthy and D. H. Altman, "Optimization of Mass Transport in Integrated Nanostructured Wicking Surfaces for the Reduction of Evaporative Thermal Resistance," *Procs. ITherm10*, Reno, NV, June 2-5, 2010.
57. M. Hashimoto, H. Kasai, Y. Ishida, H. Ryoson, K. Yazawa, J. A. Weibel and S. V. Garimella, "A Two-Phase Heat Spreader for Cooling High Heat Flux Sources," *Procs. ITherm10*, Reno, NV, June 2-5, 2010.
58. K. K. Bodla, J. Y. Murthy and S. V. Garimella "XMT-Based Direct Simulation of Flow and Heat Transfer through Open-cell Aluminum Foams," *Procs. ITherm10*, Reno, NV, June 2-5, 2010.
59. R. Ranjan, J. Y. Murthy, S. V. Garimella and U. Vadakkan, "A Numerical Model for Transport in Heat Pipes Considering Wick Microstructure Effects," *Procs. ITherm10*, Reno, NV, June 2-5, 2010.
60. S. R. Annapragada, T. Salamon, P. Kolodner, M. Hodes and S. V. Garimella, "Prediction of Electrical Contact Resistivity in Thermoelectric Modules (TEMS) from Module-Level Measurements," *Procs. ITherm10*, Reno, NV, June 2-5, 2010.
61. N. Bajaj, G. Subbarayan and S. V. Garimella, "Squeeze Flow Characterization of Particle-Filled Polymeric Materials through Image Correlation," *Procs. ITherm10*, Reno, NV, June 2-5, 2010.
62. A. Dalal, R. Ranjan, J. Y. Murthy and S. V. Garimella, "Heat Transfer during Evaporation of Binary Liquids from Wick Microstructures," *ASME/ISHMT Heat and Mass Transfer Conference*, Mumbai, India, January 4-6, 2010.
63. S. R. Annapragada, S. V. Garimella, and J. Y. Murthy, "Experimental Characterization of Droplet Motion on Inclined Hydrophobic Surfaces," *ASME/ISHMT Heat and Mass Transfer Conference*, Mumbai, India, January 4-6, 2010.
64. R. Ranjan, J. Y. Murthy and S. V. Garimella, "Numerical Study of Evaporation Heat Transfer from the Liquid-Vapor Interface in Wick Microstructures," *IMECE2009-11326, ASME International Mechanical Engineering Congress and Exposition*, Lake Buena Vista, FL, November 13-19, 2009 (**Best Poster Award**).

65. S. R. Annapragada, J. Y. Murthy and S. V. Garimella, "Forces Acting on Sessile Droplets on Inclined Surfaces," HT2009-88365, *ASME Summer Heat Transfer Conference*, San Francisco, CA, July 19-23, 2009 (**Best Poster Award**).
66. T. Harirchian and S. V. Garimella, "A Systematic Investigation of the Effects of Microchannel Width, Depth, and Aspect Ratio on Convective Boiling Heat Transfer and Flow Regimes in Parallel Microchannels," HT2009-88331, *ASME Summer Heat Transfer Conference*, San Francisco, CA, July 19-23, 2009.
67. B. T. Holcomb, T. Harirchian and S. V. Garimella, "An Experimental Investigation of Microchannel Size Effects on Flow Boiling with De-Ionized Water," HT2009-88329, *ASME Summer Heat Transfer Conference*, San Francisco, CA, July 19-23, 2009.
68. N. Kumari, V. Bahadur, M. Hodes, T. Salamon, A. Lyons, P. Kolodner and S. V. Garimella, "Numerical Analysis of Mist-Cooled High Power Components in Cabinets," IPACK2009-89269, *The ASME/Pacific Rim Technical Conference and Exhibition on Integration and Packaging of Micro, Nano, and Electronic Systems (InterPACK '09)*, San Francisco, CA, July 19-23, 2009 (**Best Poster Award**).
69. C. P. Migliaccio, H. K. Dhavaleswarapu and S. V. Garimella, "Microscale Temperature Measurements near the Contact Line of an Evaporating Thin Film in a V-Groove," IPACK2009-89134, *The ASME/Pacific Rim Technical Conference and Exhibition on Integration and Packaging of Micro, Nano, and Electronic Systems (InterPACK '09)*, San Francisco, CA, July 19-23, 2009.
70. B. J. Jones and S. V. Garimella, "Surface Roughness Effects on Flow Boiling in Microchannels," IPACK2009-89168, *The ASME/Pacific Rim Technical Conference and Exhibition on Integration and Packaging of Micro, Nano, and Electronic Systems (InterPACK '09)*, San Francisco, CA, July 19-23, 2009.
71. R. Lonergan, M. L. Kimber and S. V. Garimella, "Vibration Coupling in Arrays of Oscillating Piezoelectric Fans," *Second International Conference on Thermal Issues in Emerging Technologies Theory and Applications (TheTA) Conference*, Cairo, Egypt, December 17-20, 2008.
72. D. B. Go, R. A. Maturana, R. K. Mongia, S. V. Garimella and T. S. Fisher, "Ionic Winds for Enhanced Cooling in Portable Platforms," *10th Electronics Packaging Technology Conference*, December 9-12, 2008, Singapore.
73. F. Volle, S. V. Garimella and M. A. Juds, "A Thermal Quadrupole-Based Model for Heat Diffusion in a Multilayered System: Application to Determination of Transient Performance of a Medium-Voltage Soft Starter," IMECE2008-67470, *ASME International Mechanical Engineering Congress and Exposition*, Boston, MA, October 31-November 6, 2008.
74. R. Ranjan, J. Y. Murthy and S. V. Garimella, "Characterization of Microstructures for Heat Transfer Performance in Passive Cooling Devices," HT2008-56170, *ASME Summer Heat Transfer Conference*, Jacksonville, FL, August 10-14, 2008.
75. S. R. Annapragada, J. Y. Murthy and S. V. Garimella, "Permeability and Thermal Transport in Compressed Open-Celled Foams," HT2008-56375, *ASME Summer Heat Transfer Conference*, Jacksonville, FL, August 10-14, 2008 (**Best Paper Award**).
76. J. P. McHale and S. V. Garimella, "Measurements of Bubble Nucleation Characteristics in Pool Boiling of a Wetting Liquid on Smooth and Roughened Surfaces," HT2008-56179, *ASME Summer Heat Transfer Conference*, Jacksonville, FL, August 10-14, 2008.
77. R. A. Bidkar, M. Kimber, A. Raman, A. K. Bajaj and S. V. Garimella, "Nonlinear Aerodynamic Damping of Beams at High Oscillatory Reynolds Numbers," *9th International Conference on Flow-Induced Vibrations – FIV2008*, Prague, Czech Republic, June 30-July 2, 2008.
78. S. Aradhyia, S. V. Garimella and T. S. Fisher, "Electrochemically Bonded Carbon Nanotube Interfaces," *Procs. ITherm08*, Orlando, FL, May 28-31, 2008.

79. M. Kimber, K. Suzuki, N. Kitsunai, K. Seki and S. V. Garimella, "Quantification of Piezoelectric Fan Flow Rate Performance and Experimental Identification of Installation Effects," *Procs. ITherm08*, Orlando, FL, May 28-31, 2008.
80. D. Liu and S. V. Garimella, "Microfluidic Pumping based on Dielectrophoresis for Thermal Management of Microelectronics," *Procs. ITherm08*, Orlando, FL, May 28-31, 2008.
81. V. Bahadur, M. Hodes, A. Lyons, S. Krishnan and S. V. Garimella, "Enhanced Cooling in a Sealed Cabinet using an Evaporating-Condensing Dielectric Mist," *Procs. ITherm08*, Orlando, FL, May 28-31, 2008.
82. T. Harirchian and S. V. Garimella, "An Investigation of Flow Boiling Regimes in Microchannels of Different Dimensions by Means of High-Speed Visualization," *Procs. ITherm08*, Orlando, FL, May 28-31, 2008.
83. H. Wang, S. V. Garimella and J. Y. Murthy, "Analysis of the Total Heat Transfer in an Evaporating Thin Film," MNHT2008-52386, *ASME Micro/Nanoscale Heat Transfer International Conference (MNHT08)*, Tainan, Taiwan, January 6-9, 2008.
84. S. V. Garimella and D. Liu, "Microscale Thermal Transport and Electromechanical Microfluidic Actuation," **Keynote Lecture** at *ASME/ISHMT Heat and Mass Transfer Conference*, Hyderabad, India, January 3-5, 2008.
85. T. Harirchian and S. V. Garimella, "Microchannel Size Effects on Two-Phase Local Heat Transfer and Pressure Drop in Silicon Microchannel Heat Sinks with a Dielectric Fluid," IMECE2007-42458, *ASME International Mechanical Engineering Congress and Exposition*, Seattle, WA, November 2007.
86. H. Dhavaleswarapu, S. V. Garimella and J. Y. Murthy, "Microscale Temperature Measurements at the Triple Line of an Evaporating Thin Film," IMECE2007-42398, *ASME International Mechanical Engineering Congress and Exposition*, Seattle, WA, November 2007.
87. S. Bertsch, E. A. Groll and S. V. Garimella, "Experimental Investigation of Local Heat Transfer Coefficient for Refrigerant Flow Boiling in Microchannel Cold Plate Evaporators," 22nd *International Congress on Refrigeration*, Beijing, August 21-26, 2007.
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Conference Publications

(Full Paper Based on Review of an Extended Abstract)

185. C. R. Bradshaw, E. A. Groll and S. V. Garimella, "A Sensitivity Analysis of a Miniature-Scale Linear Compressor for Electronics Cooling using a Comprehensive Model," *International Compressor Engineering Conference at Purdue*, West Lafayette, IN, Paper 1133, July 16-19, 2012.
186. C. R. Bradshaw, E. A. Groll and S. V. Garimella, "Linear Compressors for Electronics Cooling: Energy Recovery and Useful Benefits," *International Compressor Engineering Conference at Purdue*, West Lafayette, IN, Paper 1134, July 16-19, 2012.
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189. E. Da Riva, D. Del Col, A. Cavallini and S. V. Garimella, "Simulation of Condensation in a Circular Minichannel: Application of VOF Method and Turbulence Model," *International Refrigeration and Air Conditioning Conference*, West Lafayette, IN, July 12-15, 2010.
190. C. Bradshaw, E. A. Groll, and S. V. Garimella, "A Comprehensive Model of a Miniature-Scale Linear Compressor for Electronics Cooling," *International Refrigeration and Air Conditioning Conference*, West Lafayette, IN, July 12-15, 2010 (**Best Paper Award**).
191. S. V. Garimella and T. Harirchian, "Boiling Heat Transfer and Flow Regimes in Microchannels – a Comprehensive Understanding," **Keynote Lecture** at the *15th International Workshop on Thermal Investigations of ICs and Systems (THERMINIC)*, Leuven, Belgium, pp. 101-112, October 7-9, 2009.
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2. ["Expanding the Global Reach of the Twenty-First-Century Research University,"](#) *Science & Diplomacy* Vol. 7, No. 1 (March 2018).
3. D. H. Altman, J. A. Weibel, S. V. Garimella, T. S. Fisher, J. H. Nadler and M. North, "Thermal Ground Plane, Vapor Chamber Heat Spreaders for High Power Packaging Density Electronic Systems," *Electronics Cooling* Vol. 18, pp. 20-27, March 2012.
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5. C. Bradshaw, E. A. Groll and S. V. Garimella, "Miniature Refrigeration Systems: A Maturing Technology for Electronics Cooling," *Cooling India* Vol. 4(5), pp. 100-106, November-December 2008.
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Messages to the University of Vermont community are available [here](#)

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The State of American Science, Panelist, Association of American Universities and The Science Coalition Media Roundtable, National Press Club, Washington, DC, July 12, 2017.

[Make Indiana a Magnet for Jobs](#), Op-ed discussing Indiana's talent gap and brain drain/gain, *IndyStar*, 28 April, 2017.

[Focus at Purdue always on #ScienceForYou](#), Op-ed on the occasion of the national March for Science, *Journal & Courier* and *IndyStar*, 20 April, 2017.

[Expanding Indiana's Agbiosciences Talent Pipeline](#), Panelist, *2016 Indiana Agbiosciences Innovation Summit*, Indianapolis, IN, November 2016.

The Future of Life Sciences Startups: The Intersection of Academia and Industry, Plenary remarks and Panel Moderator, National Centre for Biological Sciences, Bangalore, India, October 2016.

[Purdue's \\$250M Life Sciences Investment](#), TV interview, *Inside Indiana Business* with Gerry Dick, 14 July, 2016.

[Purdue Gains Global Patent Recognition](#), TV interview, *Inside Indiana Business* with Gerry Dick, 14 January,

2016.

Reimagining the Future, Panel Moderator, PHD Chamber, New Delhi, India, October 2015.

Strategic Partnerships to Forge Discovery with Delivery, Hong Kong S&T Park, October 2015.

The University as a Laboratory for Innovation and a Catalyst for Regional Development, Opening Keynote, *Cities for Life Global Meeting*, Medellin, Colombia, to an audience of 2000 from 116 cities around the world, August 2015.

Prosperity and Education: The Challenge of Cooperation in the Americas – The Role of Universities, Panelist, *Foro de Rectores de Las Americas* (First Forum of University Presidents) organized by the Government of Panama at the *VII Summit of the Americas*, Panama City, April 2015.

Building Strong Partnerships: Case Study of Colombia, *NAFSA Latin America Forum*, NAFSA 2014 Annual Conference & Expo, San Diego, CA, May 2014.

Creating the Best Student Experiences: The Purdue-EAFIT Partnership, *100,000 Strong in the Americas Capacity Building Workshop – Innovating and Scaling-Up U.S.-Western Hemisphere Exchange*, San Diego, CA, May 2014.

Moving Us Forward: Lafayette Roundtable for Immigration Reform, *Bibles, Badges and Business Project*, National Immigration Forum, Lafayette, IN, August 2013.

Building Careers for Global Markets, *Passage to India Executive Forum*, Caterpillar, Peoria, IL, April 2013.

Electricity, Development and Emissions – Competing Policy Choices & Public-Private Partnerships, *Seminar on Renewable Energy and Energy Efficiency*, Instituto Tecnológico de Costa Rica, San Carlos, September 2012.

Scientific and Technological Innovation Partnerships for Clean Energy Development, Plenary Lecture, *Workshop on Innovation, Science and Technology for Energy-Efficient Development of Central America*, Universidad Nacional de Costa Rica, Liberia, Costa Rica, September 2012 – to authorities from national research offices, universities, and research centers of Central America to discuss and identify potential joint action that promotes and facilitates energy-efficient development of the Region.

Electricity, Development and Emissions, *Intel Thermal Technologies Forum*, Portland, OR, November 2011.

Competing Policy Choices at the Intersection of Energy and Climate Change – An Engineer's Role, Purdue University, November 2011.

Energy Access Versus Emissions: Informing Complex Policy Choices, *Honeywell Advanced Technology Lecture Series*, Clearwater, FL, October 2011.

Foundations for Sustainable Partnerships in Teaching and Research, Plenary Session Panelist, *U.S.-India Higher Education Summit* hosted by U.S. Secretary of State Hillary Clinton and Indian Minister of Human Resource Development Kapil Sibal, Washington, D.C., October 2011.

Thermal and Energy Management Technologies for the Next Decade: Challenges and Opportunities, *International Business and Technology Summit on Thermal Management of Electronics*, Cambridge, MA, October 2011.

Electricity, Development, and the Role of Renewables in Africa, Africa Bureau, U.S. Department of State, Washington, D.C., May 2011.

Renewable and Sustainable Energy Strategies, U.S. Department of Energy, Washington D.C., March 2011.

Electricity, Development and Emissions, White House, Washington, D.C., March 2011.

Nanotechnology, Energy Efficiency, Waste Heat Recovery, Solar Power, *U.S.-Russia Bilateral Presidential Commission Science and Technology Working Group Meeting*, Moscow, Russia, March 2011.

[Electricity, Development and Emissions](#), *Jefferson Science Fellows Distinguished Lecture Series on Current Issues in Science and Technology*, U.S. Department of State, Washington, DC, February 2011.

KEYNOTE AND INVITED LECTURES, SHORT COURSES

- 2024** Yugaantar – Youth in Transition, keynote address to about 10,000 students at the 13th annual national conclave of *Bharatiya Chhatra Sansad* (Indian Students’ Parliament), Pune, India, January 2024.
- 2023** [The Role of Higher Education in Preserving American Values](#), panel discussion at the *Commonwealth Club of San Francisco*, November 2023.
- Accelerating Change: New Frontiers in College & Career Readiness, panel discussion at the *CFES Brilliant Pathways Conference*, Burlington, Vermont, November 2023.
- Our Commitment to Rural Partnerships, luncheon keynote at the *Vermont Economic Development Authority Annual Meeting*, October 2023.
- “Urban-Rural Development: Why and How,” [RISE Summit](#), University of Vermont, June 21, 2023.
- “[Expanding Place-Based Innovation and Opportunity](#),” National Commission on Innovation and Competitiveness, UC Davis, March 27, 2023.
- “Planning Workshop for Transforming Indian Higher Education: An Indo-US Partnership Initiative,” Workshop Chair, MIT-WPU, Pune, India, January 22-23, 2023.
- 2022** “National Science and Engineering Policy Directions and UVM Opportunities,” *College of Engineering and Mathematical Sciences Seminar*, University of Vermont, April 15, 2022.
- 2021** “The University as a Laboratory for Innovation... and a Catalyst for Regional Development,” *Science Society and Innovation Lecture Series*, University of Witwatersrand, South Africa, June 24, 2021 (<https://youtu.be/YrA4SLjZ1tk>).
- 2020** “Leading a University through a Most Unusual Time – an Engineer’s Perspective,” *Virtual Workshop on COVID-19: Challenges in Research and Education*, American Society of Thermal and Fluids Engineers, August 31, 2020.
- 2019** “Energy Use in Information and Communications Technologies,” *Mechanical Engineering Department Seminar*, University of Vermont, November 15, 2019.
- Driving Impact through Multidisciplinary Research, Keynote, *Pharmaceutical Industry Process Safety Conference*, West Lafayette, IN, May 2019.
- What IF we could actually listen to each other: Improving Impact Through Empathetic Communication, Keynote at *Purdue Ideas Festival – What IF we could Engineer Policy*, West Lafayette, IN, April 2019.
- 2018** “Energy Use in Information and Communications Technologies: The Role of Thermal Management,” *Swiss Federal Institute of Technology (ETH)*, Zürich, Switzerland, September 4, 2018.
- “Validation of Direct Numerical Simulations of Two-Phase Slug Flow Boiling,” *IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm)*, San Diego CA, May 29-June 1, 2018.
- 2017** “Energy Use in Information and Communications Technologies: The Role of Thermal Management,” Keynote Lecture at the *International Conference on Applied Energy*, Cardiff, England, August 22, 2017.
- 2016** “The Challenge of Thermal Management,” ITherm Achievement Award **Luncheon Presentation**, 15th *IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITherm)*, Las Vegas, NV, June 1, 2016.
- 2015** “Physics of Thermal Transport and Flow Dynamics during Phase Change at Small Length Scales,” **Plenary Talk**, *Japan-US Seminar on Two-Phase Flow Dynamics*, West Lafayette, IN, May 10-15, 2015.
- 2013** “Electrical Actuation and Engineered Superhydrophobic Surfaces for Droplet Transport,” **Keynote Lecture**, *ASME Summer Heat Transfer Conference*, Minneapolis, MN, July 14-19, 2013.
- “Scientific and Technological Innovation Partnerships for Clean Energy Development,” *Purdue-Mexico Workshop on Sustainability*, West Lafayette, IN, April 30, 2013.

- "Energy Storage Options and Opportunities," *Purdue Solar Seminar Series*, Purdue University, March 7, 2013.
- "Microscale Thermal Transport with Phase Change on Engineered Surfaces," *Mechanical Engineering Colloquium*, MIT, Boston, MA, February 22, 2013.
- "Carpe Orbem: Take the Reins of Global Leadership and Public Policy Engagement," *Global Engineering Professional Seminar*, Purdue University, West Lafayette, IN, January 31, 2013.
- 2012** "Energy Storage Options and Opportunities," *Purdue Energy Forum*, West Lafayette, IN, November 7, 2012.
- "Pushing the Limits of Passive Cooling with Engineered Surfaces – Strategies and Challenges," **Keynote Lecture**, *ASME Summer Heat Transfer Conference*, Rio Grande, Puerto Rico, July 8-12, 2012.
- "Recent Advances in Passive Two-Phase Cooling - Pushing the Limits with Engineered Surfaces," Short Course (with JA Weibel) at *ITHERM12*, San Diego, CA, May 31, 2012.
- "Microscale Thermal Transport with Phase Change – State of the Art and Research Needs," **Keynote Lecture**, *3rd Brazilian Meeting on Two-Phase Flow and Phase Change Heat Transfer (EBECEM2012)*, Curitiba, Brazil, May 7, 2012.
- "Public Policy Engagement Avenues and Opportunities for Engineers and Scientists," College of Engineering, Purdue University, West Lafayette, IN, April 30, 2012.
- "Key Drivers and System-Level Solutions for Future Thermal Management Technologies," **Keynote Lecture**, *2nd Workshop on Thermal Management in Telecommunication Systems and Data Centers*, Santa Clara, CA, April 25, 2012.
- "Automotive Thermal Management Technologies: Challenges and Opportunities," Delphi Electronics & Safety, Kokomo, IN, March 29, 2012.
- 2011** "Policy Engagement Avenues and Opportunities," *Discovery Park Leadership Meeting*, Purdue University, West Lafayette, IN, December 13, 2011.
- "Automotive Thermal Management Technologies: Challenges and Opportunities," Toyota Research Institute of North America, Ann Arbor, MI, December 9, 2011.
- "Carpe Orbem: Take the Reins of Global Leadership in Energy and Climate Change," *President's Leadership Class*, Purdue University, West Lafayette, IN, December 5, 2011.
- "Electricity, Development and Emissions," **Dinner Keynote Talk**, *Intel Thermal Technologies Forum*, Portland, OR, November 14, 2011.
- "Competing Policy Choices at the Intersection of Energy and Climate Change – An Engineer's Role," *Mechanical Engineering Graduate Seminar*, Purdue University, West Lafayette, IN, November 10, 2011 (<http://nanohub.org/resources/13050>).
- Foundations for Sustainable Partnerships in Teaching and Research*, **Invited Plenary Session Panelist**, *U.S.-India Higher Education Summit* hosted by U.S. Secretary of State Hillary Clinton and Indian Minister of Human Resource Development Kapil Sibal, Washington, D.C., October 13, 2011.
- "Stranger in a Strange Land: Science and Engineering Impacting Global Policy," Presentation to the *Engineering Advisory Council*, College of Engineering, Purdue University, West Lafayette, IN, April 8, 2011.
- "Nanotechnology, Energy Efficiency, Waste Heat Recovery, Solar Power," **Invited Lecture**, *U.S.-Russia Bilateral Presidential Commission Science and Technology Working Group Meeting*, Moscow, Russia, March 1, 2011.
- 2010** "Small-Scale Solutions to Grand Challenges in Thermal Management," **Invited Lecture**, *10th International Workshop on Micro and Nanotechnology for Power Generation and Energy Conversion Applications (PowerMEMS 2010)*, Leuven, Belgium, December 2, 2010.

“Electrically Induced Droplet Transport on Smooth and Superhydrophobic Surfaces,” *Distinguished Speaker Seminar Series*, Department of Mechanical Engineering, University of Maryland, College Park, November 19, 2010.

“Perspectives on Challenges and Opportunities in Advanced Thermal Management Technologies,” **Keynote Lecture**, *Workshop on Thermal Management in Telecommunication Systems and Data Centers*, Dallas, TX, October 25, 2010.

“Microchannel Heat Exchangers for Thermal Management of High-Performance Microelectronics Systems,” Short Course at *ITHERM10*, Las Vegas, NV, June 2, 2010.

“Micro/Nano-Scale Thermal Management of Electronics,” **Invited Talk**, *UGIM 2010*, West Lafayette, IN, July 1, 2010.

“Energy Considerations in Computing,” **Invited Lecture**, *Institute Day*, Indian Institute of Technology Madras, Madras, India, April 17, 2010.

“Microchannel Heat Exchangers,” **Invited Lecture**, *International Workshop on Thermal Design and Management in Electronics*, Bombay, India, January 7-8, 2010.

2009 “Advanced Thermal Management Technologies for Avionics Applications,” Raytheon, Indianapolis, IN, November 16, 2009.

“Small-Scale Heat Transfer,” **Invited Lecture** at the *Heat Exchangers Workshop*, United Technologies Research Corporation, Hartford, CT, October 14, 2009.

“Boiling Heat Transfer and Flow Regimes in Microchannels – a Comprehensive Understanding,” **Keynote Lecture**, *15th International Workshop on Thermal Investigations of ICs and Systems (THERMINIC 2009)*, Leuven, Belgium, October 8, 2009.

“Microsystems for Energy-Efficient Thermal Management,” **Keynote Lecture**, *InterPACK 09*, San Francisco, CA, July 22, 2009.

“Opportunities in Micro/Nano-Scale Interfacial Transport,” **Invited Lecture**, *Workshop on Near-Wall Multiphase Flows*, CSI Interaktionstag, Seeheim, Germany, July 3, 2009.

“Microscale Examination of Thermal Transport at Interfaces,” **Invited Lecture**, Center of Smart Interfaces, Technical University of Darmstadt, Germany, July 2, 2009.

2008 “Micro/Nano-scale Thermal Management,” **Keynote Lecture** at the *Second International Conference on Thermal Issues in Emerging Technologies Theory and Applications (TheTA) Conference*, Cairo, Egypt, December 18, 2008.

“Advances in Thermal Transport and Materials Research for Electronics Thermal Management,” Saint-Gobain Northboro Research and Development Center, Northboro, MA, November 3, 2008.

“Microscale Actuation, Transport and Control in Thermal Microsystems,” Department of Mechanical Engineering, Southern Methodist University, October 3, 2008.

“Microscale Actuation, Transport and Control in Thermal Microsystems,” Catholic University of Leuven, Belgium, September 11, 2008.

“Energy Considerations in Computing,” *Joint Indo-US Workshop on Scalable Nanomaterials for Enhanced Energy Transport and Conversion*, Jawaharlal Nehru Centre for Advanced Scientific Research and GE John F. Welch Technology Centre, Bangalore, India, August 21, 2008.

“Microscale Actuation, Transport and Control in Thermal Microsystems,” *MasterClass on Heat Transfer Enhancement*, Technical University of Darmstadt, Germany, July 30 - August 1, 2008.

“Advanced Cooling Technologies for Next-Generation Microelectronics Systems,” Short Course at *ITHERM08*, Orlando, FL, May 28, 2008.

“Advanced Cooling Technologies,” **Invited Lecture**, *International Workshop on Thermal Design and Management in Electronics*, Bangalore, India, January 7-8, 2008.

- "Microscale Thermal Transport and Electromechanical Microfluidic Actuation," **Keynote Lecture**, *ASME/ISHMT Heat and Mass Transfer Conference*, Hyderabad, India, January 4, 2008.
- 2007** "Microscale Actuation, Transport, and Control in Thermal Microsystems," Department of Mechanical Engineering, University of Iowa, Iowa City, IA, November 29, 2007.
- "Recent Advances in Thermal Management Approaches for Military Applications," Rockwell Collins, Cedar Rapids, IA, November 28, 2007.
- "Recent Advances in Electronics Thermal Management," Department of Mechanical Engineering, Nanyang Technological University, Singapore, October 31, 2007.
- "Thermal Microsystems for Electronics Thermal Management across Multiple Scales," *IEEE REL/CPMT/ED Singapore Chapter* and Department of Mechanical Engineering, National University of Singapore, Singapore, October 30, 2007.
- "Thermal Microsystems for Electronics Thermal Management across Multiple Scales," *Leaders in Mechanical Engineering Seminar Series*, Department of Mechanical Engineering, University of Maryland, College Park, October 19, 2007.
- "Electrically Actuated Microscale Flows for Microelectronics Cooling," **Keynote Lecture**, *The Eighteenth International Symposium on Transport Phenomena*, Daejeon, Korea, August 29, 2007.
- "Recent Advances in Thermal Management Technologies for Consumer Electronics," Samsung Electronics Co. Ltd., Suwon City, Korea, August 28, 2007.
- "Thermal Microsystems for Electronics Thermal Management across Multiple Scales," **Invited Lecture**, *Cooling Zone Summit*, Natick, MA, August 22, 2007.
- "Thermal Microsystems for Electronics Thermal Management across Multiple Scales," **Keynote Lecture**, *InterPACK 07*, Vancouver, Canada, July 10, 2007.
- "Advanced Thermal Management Technologies across Multiple Scales," Short Course at *InterPACK 07*, Vancouver, Canada, July 8, 2007.
- "Measurements of Flow Boiling Heat Transfer Coefficients in a Mini-Channel Evaporator for Electronics Cooling," (with S Bertsch and E Groll) in Seminar 50: Recent Developments in Microchannel Heat Transfer and Fluid Flow, *2007 ASHRAE Winter Meeting*, Dallas, TX, January 30, 2007.
- 2006** "Thermal Microsystems for Electronics Thermal Management across Multiple Scales," Department of Mechanical Engineering, University of Minnesota, MN, December 6, 2006.
- "Thermal Microsystems for On-Chip Thermal Engineering," **Plenary Lecture**, *International Conference on Micro and Nano Technologies (ICMNT06)* organized by the UNESCO/IAEA International Center for Theoretical Physics, Tizi-Ouzou, Algeria, November 19, 2006.
- "Fluid Mechanics at Micro- and Nano-Scales," Short Course, *International Conference on Micro and Nano Technologies (ICMNT06)* organized by the UNESCO/IAEA International Center for Theoretical Physics, Tizi-Ouzou, Algeria, November 20-22, 2006.
- "Advances in Electronics Cooling for Automotive Applications," Emerging Technologies Seminar, Delphi Electronics and Safety, Kokomo, IN, October 30, 2006.
- "Emerging Mesoscale Thermal Management Technologies," **Invited Lecture** at *International Electronics Packaging Symposium*, GE Global Research Center, Schenectady, October 24, 2006.
- "Thermal Microsystems for Electronics Thermal Management across Multiple Scales," Department of Mechanical Engineering, University of Illinois, Urbana-Champaign, September 25, 2006.
- "Thermal Microsystems for Thermal Management across Multiple Scales," *Symposium on Thermal Management of Electronics Components through Direct Fluid Cooling*, HP Labs, Palo Alto, CA, September 1, 2006.
- "Emerging Meso-Scale Thermal Management Technologies," RTI, Inc., Raleigh, NC, July 26, 2006.

- "Thermal Microsystems for On-Chip Thermal Engineering," School of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an, China, June 21, 2006.
- "Advanced Thermal Management Technologies for Next-Generation Microelectronics," Short Course at Xi'an Jiaotong University, Xi'an, China, June 21-25, 2006.
- "Advanced Thermal Management Technologies for Next-Generation Microelectronics Systems," Short Course at *ITHERM 06*, San Diego, CA, May 30, 2006.
- "Thermal Microsystems for On-Chip Thermal Engineering," Nanotutorial also posted on the nanoHUB as part of the Nanotechnology 501 Seminar Series (<http://www.nanohub.org/resources/?id=1182>), March 21, 2006.
- "Forced Convection and Microchannel Transport," **Invited Lecture**, *International Workshop on Thermal Design and Management in Electronics*, Bangalore, India, January 10-11, 2006.
- "Emerging Technologies in Thermal Microsystems," Purdue University, December 1, 2006.
- 2005** "Emerging Meso-Scale Thermal Management Technologies for Microelectronics," Department of Mechanical Engineering, University of Illinois, Urbana-Champaign, October 4, 2005.
- "On-Chip Integration of Novel Cooling Strategies through Electrothermal Co-Design," **Invited Lecture** in Phonon Engineering for Thermal Management of ICs, *6th International Workshop on Future Information Processing Technologies (IWFIPT)*, Asheville, NC, August 29, 2005.
- "Emerging Meso-Scale Technologies for High-Heat-Flux Electronics Thermal Management," **Invited Lecture**, *Cooling Zone Summit*, Natick, MA, August 17, 2005.
- "Integration of Novel Microelectronics Cooling Strategies through Electrothermal Co-Design," Purdue University *Silicon Valley Symposium*, Santa Clara, CA, July 26, 2005.
- "Microchannel Heat Sinks and Micropumps," Short Course at *InterPACK 05*, San Francisco, CA, July 17, 2005.
- "Advanced Thermal Management Technologies for Next Generation Microelectronics Systems," Short Course at *InterPACK 05*, San Francisco, CA, July 17, 2005.
- "Integration of Novel Localized Cooling Strategies Through Electro-Thermal Co-Design," DARPA MTO Workshop on *Site-Specific Thermal Management of ICs, MEMS, and Integrated Systems*, San Diego, CA, January 13-14, 2005.
- 2004** "Advances and Challenges in Mesoscale Thermal Management Technologies for Microelectronics," *Sematech Topical Research Conference*, Austin, TX, October 26, 2004.
- "Advances in Mesoscale Thermal Management Technologies for Microelectronics," **Keynote Lecture**, *THERMINIC*, 10th International Workshop on Thermal Investigations of ICs and Systems, Côte d'Azur, France, September 30, 2004.
- "Advances in Mesoscale Thermal Management Technologies for Microelectronics," **Keynote Lecture**, *International Symposium on Heat Transfer*, Beijing, China, June 16, 2004.
- "Microchannel Heat Sinks and Micropumps," Short Course at *ITHERM 04*, Las Vegas, NV, June 1, 2004.
- "Advanced Thermal Management Technologies for Next Generation Microelectronics Systems," Short Course at *ITHERM 04*, Las Vegas, NV, June 1, 2004.
- "Emerging Meso-Scale Thermal Management Technologies," Department of Mechanical Engineering, University of Notre Dame, South Bend, IN, April 13, 2004.
- "Microchannel Heat Sinks with Integrated Micropumps," Workshop on *Thermal Management of Electronic Equipment*, Bangalore, India, January 2, 2004.
- 2003** "Novel Meso-scale Cooling Technologies for Thermal Management in Space," Wright Patterson Air Force Base, OH, October 24, 2003.
- "Microchannel Heat Sinks with Integrated Micropumps," JSME Workshop Design and Manufacturing of

High-Performance Heat Sinks for Microelectronic Equipment, Tokyo, Japan, October 15, 2003.

“Enabling Meso-scale Thermal Management Technologies for Naval Cooling Applications,” ONR Thermal Management Workshop, Arlington, VA, October 7, 2003.

“Enabling Thermal Management Technologies for Next Generation Microelectronics Systems,” Intel Corporation, Chandler, AZ, September 26, 2003.

“Novel Mesoscale Thermal Management Technologies for Microelectronics,” Department of Mechanical Engineering, University of Arizona, Tucson, AZ, September 25, 2003.

“Enabling Thermal Management Technologies for Next Generation Microelectronic Systems,” Pohang Institute of Science and Technology, Pohang, Korea, August 26, 2003.

“Microchannel Heat Sinks with Integrated Micropumps,” *The 3rd Colloquium on Micro/Nano Thermal Engineering*, Micro Thermal System Research Center (MTSRC), Seoul National University, Seoul, Korea, August 25, 2003.

“Recent Advances in Thermal Management Technologies for Microelectronics,” Samsung Electronics, Suwon, Korea, August 23, 2003.

“Novel Mesoscale Thermal Management Technologies for Microelectronics,” Korea Advanced Institute of Science and Technology, Taejon, Korea, August 22, 2003.

“Microchannel Cooling Systems with Integrated Fluid Actuation for Micro Cryocoolers,” DARPA Microsystems Technology Office Cryocooler Workshop, Mystic, CT, July 14, 2003.

“Analysis, Experiments and Computer Modeling of Melt Casting Processes,” US Army ARDEC, Picatinny Arsenal, NJ, May 8, 2003.

“Novel Mesoscale Thermal Management Technologies for Microelectronics,” Department of Mechanical Engineering, Louisiana State University, Baton Rouge, LA, February 21, 2003.

“Enabling Thermal Management Technologies for Next Generation Microelectronic Systems,” Bell Labs, Lucent Technologies, Murray Hill, NJ, January 27, 2003.

2002 “Enabling Thermal Management Technologies for Microelectronic Systems,” BAE Systems, Nashua, NH, December 9, 2002.

“Microscale Fluid Transport and Pumping Developments for Microchannel Cooling Systems,” *Next-Generation Thermal Management Materials and Systems Conference*, Dallas, October 30, 2002.

“Overview of Compact High-Performance Cooling Technologies,” Eaton Corporation, Milwaukee, WI, July 23, 2002.

“Overview of Compact High-Performance Cooling Technologies,” Rockwell Automation, Milwaukee, WI, July 22, 2002.

“Single-Phase Flow and Heat Transfer in Microchannel Heat Sinks,” *Analysis and Design of Microchannel Heat Exchangers*, Short Course of the International Institute of Refrigeration held at Purdue University, West Lafayette, July 14, 2002.

“Advances in Thermal Management of Microelectronic Systems,” Honeywell, Los Angeles, CA, May 29, 2002.

“Miniature Piezoelectric Fans for Fuel-Cell Applications,” Motorola Solid State Research Center, Tempe, AZ, April 1, 2002.

“Tracking Phase Interfaces in Thermal Processing Applications,” PDE Seminar, School of Mathematics, Purdue University, West Lafayette, IN, February 28, 2002.

2001 and Prior

“Advances in Thermal Management of Microelectronic Systems,” Emerging Technology Symposium, Delphi Delco Electronic Systems, Kokomo, IN, January 29, 2001.

“Advances in Thermal Management of Microelectronic Systems,” Intel Corporation, Chandler, AZ,

January 19, 2001.

“Thermal Management in Microelectronic Systems,” Philips Research Center, Eindhoven, The Netherlands, August 18, 2000.

“Moving Interfaces in Phase-Change Processes,” RWTH, Aachen, Germany, August 22, 2000.

“Transport on Multiple Scales in Materials Processing,” School of Materials Science and Engineering, Purdue University, West Lafayette, IN, January 24, 2000.

“CFD in Electronics Packaging and Electronic Materials Processing,” *International Symposium on Challenges and New Directions in Computation of Internal Flows*, IIT Madras, India, January 8, 2000.

“The Effect of Thermosolutal Convection on Directional Solidification,” *International Workshop on Advances in Solidification Processing*, Pune, India, January 10, 2000.

“High-Performance Approaches to Thermal Management of Microelectronics,” Nokia Research Center, Helsinki, Finland, November 22, 1999.

“Numerical Treatment of Moving Interfaces in Phase-Change Processes,” National Aeronautics and Space Administration–Lewis Research Center, Cleveland, OH, July 24, 1998.

“Interface Tracking in Crystal Growth, Alloy Solidification and Composites Processing,” University of Maryland-College Park, MD, February 20, 1998.

“High-Performance Cooling Techniques for Computers and Microelectronics,” Bharat Heavy Electricals Ltd., Corporate Research and Development, Hyderabad, India, December 16, 1997.

“High-Performance Cooling Techniques for Computers and Microelectronics,” Osmania University, Hyderabad, India, December 19, 1997.

“Recent Developments in High-Performance Cooling Techniques for Electronic Systems,” **Keynote lecture** at the Eurotherm Seminar on Thermal Management of Electronic Systems, Nantes, France, September 24, 1997.

“High-Performance Techniques for Electronics Cooling,” Workshop Speaker, Yuan-Ze Institute of Technology, Taiwan, March 25, 1997.

“Interface Tracking in Crystal Growth, Alloy Solidification and Composites Processing,” Pennsylvania State University, State College, PA, January 20, 1997.

“Thermal Management of Microelectronics,” University of Western Sydney, Australia, October 24, 1995.

“Solidification Heat Transfer and Materials Processing,” *Lecture Series* delivered in the School of Mechanical and Manufacturing Engineering, The University of New South Wales, Sydney, Australia, September 13 to October 10, 1995.

“Jet Impingement Heat Transfer - Experiments and Computations,” The University of New South Wales, Sydney, Australia, September 18, 1995.

“Microelectronics Cooling with Impinging Jets,” Departmental Colloquium, University of Sydney, Australia, September 6, 1995.

“Solidification of Alloys: Interface Stability and Suppression of Segregation,” Departmental Colloquium, University of Sydney, Australia, August 30, 1995.

“Reducing Inter-Chip Temperature Differences in Computers Using Coolant Flow Modulation,” International Electronics Packaging Conference, Binghamton, NY, October 1, 1993.

“Thermal Management of High-Density Microelectronics,” University of Wisconsin-Madison, October 21, 1992.

“Fluid Dynamic Characteristics of the Flow over an Array of Large Roughness Elements,” InterSociety Conference on Thermal Phenomena in Electronic Systems (ITHERM III), Austin, TX, February 6, 1992 (invited talk).

“Heat Transfer in Electronic and Optical Systems,” Hewlett-Packard Company, Palo Alto, CA, October 25,

1991.

“Heat Transfer in Electronic and Optical Systems,” Lawrence Livermore National Laboratory, Livermore, CA, October 24, 1991.

“Thermal Management in Supercomputers,” Cray Research, Inc., Chippewa Falls, WI, August 14, 1991.

“Thermal and Hydrodynamic Characteristics of an Array of Protruding Elements in Forced Convection,” Stanford University, Stanford, CA, December 19, 1990.