

Ravi S. Prasher, Ph.D.
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Summary:

- Technologist, researcher and educator with demonstrated accomplishments in industrial (Intel Corp.), technology start-up (Sheetak Inc.), academic (ASU, UCB), government sectors (ARPA-E) and national lab (LBNL)
- **Area of Expertise:** Nano to macroscale thermal energy process and systems, thermal storage, thermal management
- **Research Experience:**
 - Co-Supervised the development of successful \$100 M DOE funded water desalination led by LBNL
 - 120 archival journal publications (24 solo author) in top science and engineering journals (e.g. Nature Nanotechnology, Physical Review Letters)
 - More than **30 patents** in the area of thermal energy based devices
 - **h-index:** 64 (based on Google Scholar)
 - **Citations:** more than 19,000 (based on Google Scholar)
 - Research funding received from: DOE, NSF and Office of Naval Research
 - Advised/served Ph.D. students/committees at UC Berkeley, Stanford, and ASU
- **Teaching Experience:** Taught undergraduate heat transfer at UC Berkeley, Developed and taught two graduate level courses on nanoscale thermal transport and thermal properties production and taught undergraduate thermodynamics at ASU
- **Other**
 - Reviewer for multiple top science and engineering journals such as Nature, Science, Nature Materials, Nature Energy, Physical Review Letters & J. of Heat Transfer
 - Fellow of ASME (elected 2009)
 - Sr. Member of IEEE (elected 2006)
 - Intel Achievement Award (highest award for technical achievement in Intel) for electronics thermal management (2009)
 - Outstanding Engineer Award from IEEE Components and Packaging Society (2006)
 - Invited and conducted a four hour learning session on Thermal Energy Science and Technology and its relevance to climate change for Bill Gates with Prof. Arun Majumdar of Stanford University and Prof. Asegun Henry of MIT
 - Associate Editor: J. Heat Transfer (2016 – 2019), Nanoscale and Microscale thermophysical Engineering (2008-present) Annual Reviews of Environment and Resources (2013 – 2018), IEEE Transactions on Components and Packaging Technology (2005-2016), ASME Journal of Thermal Science Engineering and Applications (2010 – 2013)
 - Research funded by NSF, ONR, Multiple offices of EERE of DOE, ARPA-E and California Energy Commission

Employment:

Lawrence Berkeley National Laboratory, Berkeley, CA

Associate Lab Director and Senior Scientist, Energy Technology Area, July 2018 – Present

- Reporting directly to the Director, responsible for providing strategic leadership and management
- Energy Technology Area (ETA) at the Lawrence Berkeley National Laboratory researches batteries and fuel cells, electricity grid technologies & policies, energy-efficient building technologies & policies and water desalination science and technology

- Co-Supervised the development of successful \$100 M DOE funded water desalination led by LBNL
- Yearly budget ~ \$125 M, Total number of staff ~450
- Conducting research in nano to macro scale thermal science and engineering for various applications such as batteries, thermal storage, building insulation, microelectronics thermal management, solar energy and machine learning for photonics
- Conducting research on experimentally validate modeling of roll-to-toll manufacturing processes for various applications as Lithium ion batteries and fuel cells
- Supervising 3 research scientists, 10 postdocs
- Research funding from ARPA-E, Buildings Technology office, Advanced Manufacturing Office, Vehicles Technology Office and Fossil Energy Office of DOE

University of California, Berkeley

Adjunct Professor, Department of Mechanical Engineering

- Advising/Co-Advising 9 Ph.D. Students
- Teaching: Undergraduate Heat Transfer, Seminar class on “Cutting Edge Applications of Thermal Science and Engineering”

Lawrence Berkeley National Laboratory, Berkeley, CA

Director, Energy Storage and Distributed Resources Division, June 2015 – Present

- Establish and sustain partnership with the wider science and technology ecosystem
- Accountable for Division budgets, funding, workforce planning, human resources management
- Actively shepherding three major new multidisciplinary research initiatives: 1) Cost-effective desalination 2) Science of scaling/manufacturing 3) Grid initiative
- Lab lead for science of manufacturing program for Advanced Manufacturing Office of DOE
- Established Thermal Energy Science and Technology Lab (TEST-Lab)

Sheetak Inc., Austin, Texas

Vice President, Product Development, Nov. 2012 – May 2015

- Sheetak is a device-to-systems thermoelectrics company focused on making low cost energy harvesters and converters based on its proprietary thermoelectrics material and devices
- Sheetak has been funded by private venture and various US government agencies due to its innovative thermoelectric chip and system
- I am responsible for developing an appliance that produces electricity based on thermoelectrics in collaboration with a major appliance maker
- Started the India subsidiary of Sheetak by relocating to India for 1.5 years

Advanced Research Projects Agency-Energy, US Department of Energy

Program Director: March 2010- November 2012

- I was one of the first program directors at ARPA-E. I was actively involved in creating the basic DNA of the agency. Due to the operational structure of ARPA-E, I got a panoramic view of the whole energy field
- As a program director my job involved program creation to define technology whitespace and opportunities, figuring out the right cost for new technology, convincing the ARPA-E director to appropriately fund the programs, selecting teams to develop technologies, active program management and developing technology commercialization strategies.
- Created and managed two programs on cooling/heating of buildings and thermal energy storage for applications such as automobiles, concentrated solar power, and fuel production from sunlight.
- Total value of the portfolio was ~ \$ 100M with more than 30 teams.
- Outreach activities for success of these programs involved significant interactions with venture capital community, other government agencies, large corporations & other entities.

- Cooling/heating program target was to develop disruptive cooling/heating technologies for buildings to increase the efficiency by > 50%
- Thermal storage program target was to deliver technologies that can increase the range of electric vehicles by ~40%, decrease cost of concentrated solar power < \$1/W and make sunlight to fuel efficiency > 10x of biofuels. The synopsis of the research behind the creation of this program was published in Science (Vol. 335, 1454, 2012).
- Technical advisory board member of the SunShot (DOE program on making solar electricity cost competitive with fossil fuel-based electricity) I advised the team on project selection and changing the technical direction to be in line with the goals of the program. I also actively participated in project selection.

Arizona State University (ASU), 2004-2013

Adjunct Professor, Dept. of Mech. and Aero. Eng.

- **Courses:**
 - Co-developed two graduate courses “*Nanoscale Thermal Transport*” and “*Thermal Properties Prediction*”
 - Taught undergraduate *thermodynamics & electronics cooling* section of the graduate course on *electronics packaging*
- **Research Funding:**
 - System-level approach for multi-phase, nanotechnology-enhanced cooling of high-power microelectronic systems, \$500k (ASU portion), 05/01/07 - 04/31/12, Office of naval research, MURI
 - Transport in nanoscale colloidal systems, \$307,218, 04/15/2004 - 03/31/07, National Science Foundation
 - Nanoparticle-filled liquid fuels for efficient energy conversion, \$110,000, 09/01/06 - 08/31/07, National Science Foundation,
- Thesis committee member/co-advisor of various MS and PhD students

Intel Corporation: 1999-2010

- **Technology Development Manager**, Thermal and Fluids Core-Competency : A Team of 9 Ph.D. Engineers: 2006-2010
 - Research and development of advanced cooling technologies for Intel CPU
 - Development of new metrologies and modeling techniques for electronics thermal management
 - Development of thermal technology roadmap for electronics thermal management
 - Research and development of physics-based electronic package manufacturing
 - Research and development of advanced nano-materials
- **Sr. Technologist: 2003-2005**
 - Led various technology development projects: microchannels, thermal interface materials, Heat pipes, nanofluids, nanoscale thermoelectric
- **Sr. Thermal Engineer: 1999-2003**
 - Led various technology development projects: microchannels, thermal interface materials, heat pipes, nanofluids

Awards and honors

- **Fellow** of American Society of Mechanical Engineers (Elected 2009)
- Senior Member of IEEE (Elected 2005)
- Outstanding Young Engineer of the Year Award, Components and Packaging Society of IEEE, 2006
- Best Paper Award for “Predicted Efficiency of Nanofluid-Based Direct Absorption Solar Receiver,” Proceedings of ES 2007, Energy Sustainability 2007, Long Beach, California, June 27-30 by H. Tyagi, P. Phelan and R.S. Prasher

- **Intel Achievement Award** (highest award for technical achievement in Intel)
- IEEE society award for very significant contribution to the CPMT Phoenix Chapter
- Invited and conducted a four hour learning session on Thermal Energy Science and Technology and its relevance to climate change for Bill Gates with Prof. Arun Majumdar of Stanford University and Prof. Asegun Henry of MIT

Other professional activities:

Publications:

- **More than 100 Archival Journal publications** in top science and engineering journals (Nature Nanotechnology, Science, Physical Review Letters, Journal of Heat Transfer and etc.)
- **4 book chapters** on thermal interface materials, nanofluids and electronics cooling

Patents:

More than 30 US patents on microchannels, heat pipes, thermoelectric, thermal interface materials, nanofluids, carbon nanotubes

Associate Editor:

- *IEEE Transactions on Components and Packaging Technology* (2005-2018)
- *J. of Heat Transfer* (2016 – 2019)
- *Nanoscale and Microscale Thermophysical Engineering* (2008-present)
- *ASME Journal of Thermal Science Engineering and Applications* (2010 – 2013)
- *Annual Reviews of Environment and Resources* (2013-2018)

Tutorial:

Taught a 4 hour tutorial on Micro/Nanotechnology in Electronics Thermal Management (with Prof. Ken Goodson of Stanford University) in the ASME InterPACK, and IThERM

Dissertation Committee Member of Students at Various Universities

- **Ph.D. committee: Stanford:** Xuejiao Hu (2005), Matt Panzer (2010); **U. of California Berkley:** Tao Tong (2007); **ASU:** Prajesh Bhattacharya (2005), Himanshu Tyagi (2008), Lucia Lai, Sabarish Vinod and Todd Otanicar (on going);
- **M.S committee: ASU:** Sridhar Nara (2005)

Panelist and Reviewer for Multiple Research Agencies:

NSF, Air Force Office of Scientific Research (AFOSR), American Chemical Society, US Department of Energy, National Research Council of Canada, World Bank

Reviewer for Various Archival Journals and Magazines:

Nature, Science, Nature Materials, Nature Energy, Scientific Reports, ACS Nano, Physical Review Letters, Physical Review B, J. Applied Physics, Physical Review E, ASME J. of Heat Transfer, Physics Letters A, ASME J. of Electronics Packaging, AIAA J. of Thermophysics and Heat Transfer, J. of Enhanced Heat Transfer, IEEE Transaction of Components and Packaging Technology, International J. of Thermal Sciences, International J. of Heat and Mass Transfer, Nano Today, Materials Today, Nano Letters

Invited Seminars and Lectures: Multiple invited seminars and lectures on Thermal Energy Transport and Conversion at places such as MIT, Ecole Centrale Paris Lawrence Berkeley National Laboratory, *Japan/U.S. Joint Seminar on Nanoscale Transport Phenomena - Science and Engineering*

From July 2019 onwards:

- 1) Invited NSF panel
- 2) Invited Storage X, Stanford
- 3) Invited seminar, Dynamic Thermal Storage and Transport, MIT InnoTherm (April, 2020)
- 4) Invited panelist, Thermal Energy Storage, Bits & Watts along with StorageX and the Stanford Energy and Environmental Policy Center, Stanford (March 2021), declined due to other commitments
- 5) Keynote lecture, MRS Fall meeting (2021)
- 6) Invited Panelist NSF workshop on New Frontiers on Thermal Transport, December (2020)

- 7) Invited panelist, Career Paths and Guidance for Student and Early Career Engineers, Summer Heat Transfer Conference (July 2020)
- 8) Panelist for the buildings panel International Colloquia on Thermal Innovations (InnoTherm) by MIT (May, 2020)
- 9) Panelist in the inaugural International Colloquia on Thermal Innovations (InnoTherm) by MIT (April, 2020)
- 10) Invited talk at 020 Solar Energy Systems Conference (Solar 2020), AIChE (declined)
- 11) Invited lecture at AIChE Annual meeting in San Francisco, (November, 2020)
- 12) Invited for roundtable discussion by Siemens Gas and Power (January, 2020)
- 13) Graduate Seminar, University of Illinois Urbana Champaign (October, 2019)
- 14) Graduate Seminar, MIT (November, 2019)
- 15) Invited Panelist and Attendee to 10th US-Japan Joint Seminar on Nanoscale Transport Phenomena From July 2017 – July 2019:

- 1) Fossil Energy, Department of Energy, Advances in Thermal Energy Storage, June 21, 2018
- 2) Invited to facilitate a four hour learning session on Thermal Energy Science and Technology and its relevance to climate change for Bill Gates with Prof. Arun Majumdar of Stanford University and Prof. Asegun Henry of MIT.
- 3) Invited to a Global Energy Forum organized by Stanford along with other attendees such Bill Gates and Former DOE secretary and Noble Laureate Prof. Steven Chu.
- 4) CA Senate Testimony In Oversight Hearing of The Senate Environmental Quality Committee: California's Climate Change Policies: Will The State Achieve the SB 32 Target, Feb. 20, 2019, Sacramento
- 5) Invited for giving the opening remarks in Energy Summit: The Road to Carbon Neutrality, Organized by the California Foundation on the Environment and the Economy, March 7, 2019, Napa, CA
- 6) Invited to deliver the Concluding Presentation in Clean Tech. Open 2019 National Academy West, "Technological Opportunities in Clean Energy and Water", Fremont, CA, June 7, 2019
- 7) Invited to present at an ONR workshop on non-linear thermal devices, U. of Virginia, Charlottesville, 2018
- 8) Invited Keynote lecture in Thermal and Fluids Conference, Fort Lauderdale, Florida, 2018

Before July 2017:

- Multiple invited seminars and lectures on Thermal Energy Transport and Conversion at places such as MIT, Stanford, UC San Diego, UC Merced, UC Berkeley, Ecole Centrale Paris Lawrence Berkeley National Laboratory, *Japan/U.S. Joint Seminar on Nanoscale Transport Phenomena - Science and Engineering*

Mentor for Semiconductor Research Corporation (SRC) (1999-2010):

- Provide both technical and strategic guidance to universities for future research needs and current research
- Thesis committee member of Ph.D. students at Stanford University

iNEMI (International Electronics Manufacturing Initiative): Co-Chair of the 2009 iNEMI Thermal Roadmap Technology Working Groups (TWGs) & **Co-Chair** of 2007 Thermal Technology Integration Group

Education

01/96-05/99 **Arizona State University** Tempe, AZ

- Ph.D. in Mechanical Engineering, (Adviser: Dr. Pat Phelan)
- Minor: Electrical Engineering

07/91-05/95 **Indian Institute of Technology (IIT)** New Delhi, India

- BS in Mechanical Engineering

Ph.D. Dissertation: Size and Interfacial Effects on the Thermophysical Properties of Thin Solid Films

- Thermal analysis of solid state devices
- Proposed a universal dimensionless parameter for the prediction of size effects on the thermodynamic properties of solids
- Developed two analytical models to predict the thermal boundary resistance at the interface of thin films used in solid state devices and their substrates
- Developed an analytical model to describe the size effects on the specific heat of semiconductor thin films and microstructures due to their reduced dimension

Refereed Journal Publications:

- 1) Lin, Y, Prasher, R.S., and Li, D., 2021, "From Nanowires to Super Heat Conductors," *J. Appl. Phys.* **130**, 220901
- 2) Lilley, D., Menon, A., Lubner, S., Kaur, S., and Prasher, R.S., 2021, "Phase Change Material for Thermal Storage: A Perspective on Linking Phonon Physics to Performance, to appear in *J. Appl. Physics*
- 3) Lilley, D., Yu, P., Jain, A., and Prasher, R.S., 2021, "Thermal fluids with High Specific Heat Capacity through Reversible Diels–Alder Reactions," to appear in *iScience*
- 4) Geffroy, C., Lilley, D., Perez, P.S., and Prasher, R.S., 2021, "Techno-economic Analysis of Waste Heat Conversion," to appear in *Joule*
- 5) Peng, Y. et al., 2021, "Integrated Cooling (i-Cool) Textile of Heat Conduction and Sweat 2 Transportation for Personal Perspiration Management, *Nature Communications*, Accepted
- 6) Odukamaiya, W. et al, 2021, "Addressing Energy Storage Needs at Lower Cost via On-Site Thermal Energy Storage in Buildings," *Energy and Environmental Science*, Accepted
- 7) Lau, J., Papp, J., Lilley, D., Khomein, P., Kaur, S., Dames, C., Liu, G. and Prasher, R.S., 2021, "Dynamic Tunability of Phase Change Material Transition Temperatures Using Ions for Thermal Energy Storage," *Cell Reports: Physical Science*, 2, 100613
- 8) Zeng, Y., Chalise, D., Fu, Y., Schaadt, J., Kaur, S., Battaglia, V., Lubner, S., and Prasher, R.S., 2021, "Operando spatial mapping of lithium concentration using thermal wave sensing," *Joule*, 5, 2195
- 9) Zeng, Y. Chalise, D., Lubner, S., Kaur, S. and Prasher, R.S., 2021 "A review of thermal physics and management inside lithium-ion batteries for high energy density and fast charging" *Energy Storage Materials*, **41**, 264
- 10) Yang, L., Huh, D., Ning, R., Rapp, V., Zeng, Y., Liu, Y., Ju, S., Tao, Y., Jiang, Y., Beak, J., Leem, J., Kaur, S., Lee, H., Zheng, X., and Prasher, R.S., 2021 "High thermoelectric figure of merit of porous Si nanowires from 300 to 700 K, *Nature Communications*, **12**, 3926
- 11) Yang, L., Gordon, M.P., Menon, A.K., Bruefach, A.A., Haas, K. Scott, M.C., Prasher, R.S., and Urban J.J. 2021, "Decoupling electron and phonon transport in single nanowire hybrid materials for high performance thermoelectrics," *Science Advances*, **7**, eabe6000
- 12) Paul, P. et al, 2021, "A Review of Existing and Emerging Methods for Lithium Detection and Characterization in Li-Ion and Li-Metal Batteries," *Advanced Energy Materials*, **11**, 2100372
- 13) Khomein, P., 2021, "Random copolymer of poly(polyethylene glycol methyl ether)methacrylate as tunable transition temperature solid-solid phase change material for thermal energy storage," *Solar Energy Materials and Solar Cells*, 225, 111030
- 14) Lilley, D., Lau, J., Dames, C., Kaur, S. and Prasher, R.S., 2021, " "Impact of size and thermal gradient on supercooling of phase change materials for thermal energy storage" *Applied Energy* 290 (2021) 116635
- 15) Lilley, D., Jain, A., and Prasher, R.S., 2021, " A Simple Model for the Entropy of Melting of Monoatomic Liquids," *Applied Physics Letters*, **118**, 083902
- 16) Booten, C., Rao, P., Rapp, V., Jackson, R., and Prasher, R.S., 2021, "Theoretical Minimum Thermal Load in Buildings," *Joule*, 5, 24
- 17) Menon, A. et al., 2021, "Solar Desalination using Thermally Responsive Ionic Liquids Regenerated with a Photonic Heater," *Environmental Science & Technology*, 55, 3260

- 18) Gordon, M., 2021, "Understanding Diameter and Length Effects in a Solution-Processable Tellurium-PEDOT:PSS Hybrid Thermoelectric Nanowire Mesh," *Advanced Electronic Materials*, **7**, 200094
- 19) Elzouka, M., Yang, C., Albert, A., Prasher, R.S., and Lubner, S., 2020 "Interpretable forward and inverse design of particle spectral emissivity using common machine learning models," *Cell Reports Physical Science*, **1**, 100259,
- 20) Huang, Z., Ahmed, M., Kaur, S., and Prasher, R.S., 2020, "Water freezes at near-zero temperatures using carbon nanotube based electrodes under static electric fields, *ACS Appl. Mater. Interfaces*, **12**, 45525
- 21) Chalise, D., Srinivasan, V., and Prasher, R.S., 2020, "Heat of Mixing During Fast Charge/ Discharge of Lithium Ion Cell: A Study on NMC 523 Cathode," *J. Electrochemical Society*, **167**, 090560
- 22) Henry, A., Prasher, R.S., and Majumdar, A., 2020, "Five Thermal Energy Grand Challenges for Decarbonization," *Nature Energy*, **5**, 635
- 23) Spotter-Smith, E., Yu, P., Blau, S., Prasher, R. and Jain, A., 2020, "Aqueous Diels–Alder reactions for thermochemical storage and heat transfer fluids identified using density functional theory," *Journal of Computational Chemistry*, **41**, 2137
- 24) Lubner, S., Kaur, S., Battaglia, V., Bao, Y. and Prasher, R.S., 2020, "Identification and Characterization of the Dominant Thermal Resistance in Lithium-Ion Batteries using *Operando* 3-Omega Sensors," *J. Applied Physics*, **127**, 105104 (2020)
- 25) Zheng, Q., Kaur, S., Dames, C., and Prasher, R.S., 2020, "Analysis and Improvement of the Hot Disk Transient Plane Source Method for Low Thermal Conductivity Materials," *Int. J. of Heat and Mass Transfer*, Vol. 151, 119331
- 26) Menon, A., Haechler, I., Kaur, S., Lubner, S., Prasher, R.S., 2020, "Enhanced Solar Evaporation Using a Photo-Thermal Umbrella for Wastewater Management, *Nature Sustainability*, Vol. 3, 144
- 27) de la Fuente, M.S., et al., 2020, "Enhanced Charge Carrier Transport in 2D Perovskites by Incorporating Single-Walled Carbon Nanotubes or Graphene," *ACS Energy Letters*, Vol. 5, 109
- 28) Ma, F., Fu, Y., Battaglia, V., Prasher, R.S., 2019, "Microrheological Modeling of Lithium Battery Anode Slurry, *J. Power Sources*, Vol. 438, 226994
- 29) Yu., P., Jain, A., and Prasher, R.S., 2019, "Enhanced Thermochemical Heat Capacity of Liquids: Molecular to Macroscale Modeling," *Nano and Microscale Thermophysical Engineering*, Vol. 23, 3, 235
- 30) Shin, S., Elzouka, M., Prasher, R.S., and Chen, R., 2019, "Far-Field Coherent Thermal Emission From Plaritonic Resonance in Individual Anisotropic Nanoribbons," *Nature Communications*, Vol. 10, 1377
- 31) Wang, H., Kaur, S., Elzouka, M., and Prasher, R.S., 2019, "A Nano Photonic Infrared Radiative Heater," *Applied Thermal Engineering*, Vol. 153, 221
- 32) Wang, H., Haechler, I., Kaur, S. and Prasher, R.S. , 2018, "Spectrally Selective Solar Absorber Stable up to 900 °C for 120 hrs Under Ambient Condition," *Solar Energy*, Vol 174, 305
- 33) Prasher, R.S., 2018, "Acoustic Mismatch Model for Thermal Contact Conductance of Van Der Waals Contacts Under Static Force," *Nano and Microscale Thermophysical Engineering*, Vol. 22, 1
- 34) Freedman, J., Wang, H., and Prasher, R.S., 2018, "Analysis of Nanofluid-Based Parabolic Trough Collectors for Solar Thermal Applications," *Journal of Solar Energy Engineering*, Vol. 140, 051008
- 35) Chalise, D., Shah, K., Prasher, R., and Jain, A., 2018 Conjugate Heat Transfer Analysis of Thermal Management of a Li-Ion Battery Pack," *J. of Electrochemical Energy Conversion and Storage*, Vol. 15, 011008
- 36) Lee, S., et al., 2016, "Low-Temperature Melting of Silver Nanoparticles in Subcooled and Saturated Water," *J. of Heat Transfer*, Vol. 138, 052301
- 37) Vishwakarma, V., et al., 2015, "Heat transfer enhancement in a lithium-ion cell through improved material-level thermal transport," *J. of Power Sources*, Vol. 30, 123
- 38) Lee, S., et al., 2015, "The effective latent heat of aqueous nanofluids," *Materials Research Express*, Vol. 2, 065004

- 39) Shi, L., et al., 2015, "Evaluating broader impacts of nanoscale thermal transport research," *Nanoscale & Microscale Thermophysical Engineering*, Vol. 19, 127
- 40) Kaur, S., Rarvikar, N., Helm, B.A.Helms, **Prasher, R.S.**, and Ogletree, D.F., 2014, "Enhanced thermal transport at covalently functionalized carbon nanotube array interfaces," *Nature Communications*, Vol. 5, 3082
- 41) Henery, A., and **Prasher, R.S.**, 2014, "The prospect of high temperature solid state energy conversion to reduce the cost of concentrated solar power," *Energy and Environmental Science*, Vol. 7, 1819
- 42) Yang, J. et al., 2014, "Phonon transport through point contacts between graphitic nanomaterials," *Phys. Rev. Lett.*, Vol. 112, 205901
- 43) Lee, S. et al., 2014, "Experimental investigation of the latent heat of vaporization in aqueous nanofluids," *App. Phys. Lett.*, Vol. 104, 151908
- 44) Gunawan, A., 2014, "The amplifying effect of natural convection on power generation thermogalvanic cells," *Int. J. of Heat and Mass Transfer*, Vol. 78, 423
- 45) Taylor, R. et. al., 2013, "Small particle big impacts: A review of the diverse application of nanofluids," *Journal of Applied Physics*, Vol. 113, 11301
- 46) Gunawan, A., 2013, "Liquid tthermoelectrics: Review of recent and limited new data of thermogalvaic cell experiments," *Nanoscale and Microscale Thermophysical Engineering*, Vol. 17, 304
- 47) Miner, M.J. et all, 2013, "Optimized expanding microchannel geometry for flow boiling," *J. of Heat Transfer*, Vol. 135, 042901
- 48) Taylor, R. et al., 2012, "Socioeconomic impacts of heat transfer research," *International Communications in Heat and Mass Transfer*, 39, 1467
- 49) Odom, B.A., et al., 2012 "Heat Sink Effect on System Pressure and Mass Flow Rate in a Pumped Refrigerant Loop," *Journal of Thermal Science Engineering and Applications* , Vol. 4, 31009
- 50) Odom, B.A., et al., 2012, "Microchannel Two-Phase Flow Oscillation Control With an Adjustable Inlet Orifice," *Journal of Heat Transfer*, Vol. 134, 122901
- 51) Yang, J., Yang, Y., Waltermire, S.W., Wu, X., Zhang, H., Gutu, T., Jiang, Y., Chen, Y., Zinn, A., **Prasher, R.**, Xu, T. and Li, D., 2012, "Enhanced and Switchable Nanoscale Thermal Conduction due to van der Waals Interfaces, *Nature Nanotechnology*, Vol. 7, 91
- 52) Gur, I., Sawyer, K., and **Prasher, R.S.**, 2011, "Searching for a Better Thermal Battery," *Science*, 335, 1454
- 53) Taylor, R.E., et al., 2011, "Nanofluid Optical Property Characterization Towards Efficient Direct Absorption Solar Collectors," *Nanoscale Research Letters*, 6, 225
- 54) Taylor, R.E. et al., 2011, "Applicability of Nanofluids in High Flux Solar Collectors," *J. Renewable and Sustainable Energy* , 3, 023104
- 55) Otanicar, T., Phelan, P.E., **Prasher, R.S.**, Rosengarten, G., and Taylor, R.A, 2010, "Nanofluid- based direct absorption solar collector, *Journal of Renewable and Sustainable Energy*, 2, 033102
- 56) Otanicar, T., Chowdhury, E.T., Phelan, P.E., and **Prasher, R.S.**, 2010, "Parametric analysis of a coupled photovoltaic/thermal concentrating solar collector for electricity generation," *J. Applied of Physics*, 108, 114907
- 57) **Prasher, R.S.**, 2010, "Graphene Spreads the Heat," *Science*, Vol. 28, 185
- 58) Zhang, T., Peles, Y., Went, J.T., Tong, T., Chang, J-Y, **Prasher, R.S.**, and Jensen, M., 2010 "Analysis and Active Control of Pressure-drop Flow Instabilities in Boiling Microchannel System." *Int. J. of Heat and Mass Transfer*, 53, 2347
- 59) Phelan, P.E., Gupta, Y., Tyagi, H., Prasher, R.S., Catano, J., Michna, G., Zhou, R., Wen, J., Jensen, M., and Peles, Y. 2010, "Energy Efficiency of Refrigeration Systems for High-Heat-Flux Microelectronics," *J. of Thermal Science and Engineering Applications*, Vol. 2, 031004
- 60) Lai, W.Y., Phelan, P.E., and Prasher, R.S., 2010, "Pressure-drop Viscosity Measurements for γ -Al₂O₃ in Water and PG-Water Mixtures," to appear in *J. of Nanoscience and Nanotechnology*
- 61) Taylor, R., Phelan, P.E., Otanicar, T., Adrian, R., **Prasher, R.S.**, 2009, "Vapor Generation in a Nanoparticle Liquid suspension Using a Focused Continuous Laser," *Appl. Phys. Lett.*, Vol. 95,

161907.

- 62) Chowdhury, I, **Prasher, R.S.**, Lofgreen, K., Chrysler, G., Narasimhan, S., Mahajan, R., Koester, D., Alley, R., and Venkatasubramanian, R., 2009, "Site-specific and On-demand Thermoelectric Cooling of Electronic Devices," *Nature Nanotechnology*, Vol.4, 235
- 63) Zhang, T., Tong, T., Chang, J, Peles, Y., **Prasher, R.S.**, Jensen, M., Wen, J., and Phelan, P.E., 2009, "Ledinegg instability in microchannels" *Int. J. of Heat and Mass Transfer*, 52, 5661
- 64) Sarangi, R.K., Bhattacharya, A., and **Prasher, R.S.** 2009, "Numerical Modelling of Boiling Heat Transfer In Microchannels, *Applied Thermal Engineering*, 29, 300
- 65) **Prasher, R.S.**, Hu, X.J., Chalopin, Y., Mingo, N., Lofgreen, S. Volz, Cleri, F., and Koblinski, P., 2009, " Turning Carbon Nanotubes From Exceptional Heat Conductors Into Insulators," *Phys. Rev. Lett.*, Vol. 102, 105901
- 66) **Prasher, R.S.**, 2009, "Acoustic Mismatch Model for Thermal Contact Resistance of van der Waals Contacts," *Applied Physics Letters*, Vol.94, 041905
- 67) Lai, W.Y., Vinod, S., Phelan, P.E., and Prasher, R.S., 2009, "Convective Heat Transfer for Water-based Alumina Nanofluids in a Single 1.02 mm Tube," *J. Heat Transfer*, 131, 112401
- 68) Tyagi, H., Phelan, P.E., and **Prasher, R.S.**, 2008, "Predicted Efficiency of a Low-Temperature Nanofluid- Based Direct Absorption Solar Collector, to appear in *Journal of Solar Energy Engineering*
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Postdocs (at LBNL)

Justin Freedman (2016-2017): Lam Research

Hao Wang (2017-2018)

Sean Lubner (2017-2018): Research Scientist, LBNL

Fudo Ma (2017 – 2018)

Mauricio Solis de la Fuente (2016 – 2018)

Dalia Martinez Escobar (2016 – 2019)

Peiyuan Yu (2017 – 2019): Associate Professor Southern University of Science and Technology (SUSTech) in Shenzhen

Mahmoud Elzouka (2017 – 2018): Intel

Akanksha Menon (2018-): Joining G.Tech. as Assistant Professor (Fall 2021)

Qiye Zheng (2019-2021): UC Berkley

Yuqiang Zeng (2019-)

Jonathan Lau (2019- 2020): Quntum Scape,

Bei Fang (2019-): Joining Michigan Tech. as Assistant Professor (Fall 2021)

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Graduate Students

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Undergraduate Students

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Evan Lewis, ME (January 2019 – May 2019)

Christopher Jones, ME (Feb 2017- August 2017)

Jonathan Murata, ME (January 2019 – May 2019)

Sumiran Singh Thakur, Bio Engineering (May, 2018 – August, 2018)

Arun Sundar, Energy Engineering (June 2019 – present)

Albert Kisoile, ME (January 2019- Present)

Prakhar Agarwal, ME (September 2019 –Present)

Akshay Dher