Portonovo S. Ayyaswamy

Asa Whitney Professor of Dynamical Engineering (Emeritus)
MEAM, SEAS, UPenn., Philadelphia 19104
Distinguished Adjunct Professor
Mechanical and Aerospace Engineering Department
School of Engineering and Applied Science
University of California
Los Angeles, CA 90024

PERSONAL

Citizenship: U.S. Citizen
Telephone: 310-794-6370 (work, UCLA)
215-898-8362 (work, UPenn)
Mobile: 484-574-4496
Email: ayya@seas.ucla.edu
ayya@seas.upenn.edu
Web page: http://www.seas.upenn.edu/~ayya/

EDUCATION

Ph.D. (1971) University of California, Los Angeles
Thesis Title: "Natural Convection Flows in Tilted Configurations"
Advisor: Professor Ivan Catton
M.E. (1967) Columbia University, New York
Thesis Title: "A Step by Step Design for Helical Tube Multi-Start Coil Heat Transfer Equipment: Entering Tube Side Fluid in the Super Critical Region or Otherwise"
Advisor: Professor Harold G. Elrod, Jr.
M.S. (1965) Columbia University, New York
B.E. (1962) University of Mysore

POSITIONS HELD

Mechanical and Aerospace Engineering Department, University of California, Los Angeles
2019-Present Visiting Professor

Department of Mechanical Engineering and Applied Mechanics, University of Pennsylvania
2019-Present Asa Whitney Professor of Dynamical Engineering (Emeritus)
1996-2018 Asa Whitney Professor of Dynamical Engineering
1987-1996 Professor of Mechanical Engineering & Applied Mechanics
2004-2006 Chairman, Graduate Affairs
1990-1996
1984-1986 Chairman, Undergraduate Affairs
1980-1987 Associate Professor
1974-1980 Assistant Professor

Energy and Kinetics Department, University of California, Los Angeles
1972-1974 Postdoctoral Scholar

1973-1974	Supervisors:	Professors Ivan Catton and Donald K. Edwards:
	Topic:	**Capillary flows in grooved surfaces**.
1972-1973	Supervisor:	Professor David Okrent:
	Topic:	**Large scale safety of nuclear reactors**.

Institute of Geophysics and Planetary Physics, University of California, Los Angeles

1971-1972	Postdoctoral Fellow	
	Supervisor:	Professor Friedrich H. Busse
	Topic:	**Bounding theories in turbulence**.

Energy and Kinetics Department, University of California, Los Angeles

1969-1971	Post-Graduate Research Engineer	
	Supervisor:	Professor Ivan Catton
	Topic:	**Natural Convection Flows in Tilted Configurations**
1968-1969	Teaching Associate	
1967-1968	Research Assistant	
	Supervisor:	Professor Richard Perrine
	Topic:	**Desalination**

The Lummus Company, Madison Avenue, New York

1966-1967	Heat Exchanger Engineer

School of Engineering and Applied Sciences, The City University of New York, New York

1964-1966	Instructor

Electronics Research Laboratories, Columbia University, New York, New York

1963-1964	Computer Assistant

Hydro-Electric Construction Project, Government of Mysore, Bangalore

1962-1963	Junior Engineer

HONORS/DISTINCTIONS

Special Issue: Honoring Dr. Portonovo Ayyaswamy's Retirement, ASME Journal of Heat Transfer*, Transactions of the ASME*, May 2019 2019

"Frontiers, Fundamentals, and Future Directions of Transport: From Theory to Applications"
A symposium to celebrate the distinguished career of Dr. Portonovo Ayyaswamy
University of Pennsylvania, Philadelphia, May 9, 2018 2018

Symposium Key Note Lectures by:

Profs. C. Thomas Avedisian (Cornell), James W. Baish (Bucknell), Michael Carchidi (UPenn), Ivan Catton (UCLA), Vijay Dhir, *NAE* (UCLA), David M.Eckmann (UPenn),Yogesh Jaluria (Rutgers), Joshua Lampe (Zoll Medical), Yaling Lu (Lehigh), Arun Majumdar, *NAE* (Stanford), Raj Manglik (U.Cincinnati), K. Mukundakrishnan (Stone Ridge Tech), Ravi Radhakrishnan (UPenn), Satwindar S. Sadhal (USC), William A. Sirignano, *NAE* (UCI), Howard A. Stone, *NAE, NAS* (Princeton), Sheldon Weinbaum, *NAE, NAS, NAM* (CUNY)

Elected Honorary Member, Am. Soc. Mech. Engrs. Awarded for a "Life time of distinguished service to Engineering" 2018

UCLA Engineering Alumni Professional Achievement Award: 2017
One of the school's highest honors

Appointed: Editor, Am.Soc.Mech.Engrs. Journal of Heat Transfer 2015-

The Max Jakob Memorial Award "recognizes an eminent scholarly achievement and distinguished leadership in the field of heat transfer. Jointly awarded by the Am.Inst.Chem.Engrs and the Am.Soc.Mech.Engrs. It is the highest honor in the field of heat transfer these professional organizations bestow." 2014

"P. Ayyaswamy 70th Birthday Tribute" Special Sessions I & II 2014
on (I) Interfacial Fluid Dynamics and (II) Devices & Modeling Nanoparticles
7th World Congress of Biomechanics, Boston, MA

Member, Board of Governors 2014-2017
American Society for Gravitational and Space Research

75 th Anniversary Medal of the ASME Heat Transfer Division for service to the heat transfer community and contributions to the field 2013

ASME 2007 Worcester Reed Warner Medal for "outstanding contributions to the permanent literature of engineering" 2007

Expert Consultant, Workshop on "Meeting the workforce needs for the National Vision for Space Exploration," **National Research Council of the National Academies Committee, Washington, DC** 2006

Invited Participant, NAE Benchmarking **"**Virtual Congress Exercise" to determine the "best of the best" researchers in subfields and sub-subfields of Mechanical Engineering (Areas: Fluid Mechanics and Heat Transfer). **National Research Council of the National Academies Committee, Washington, DC** 2006

Invited Member, Review of NASA Strategic Roadmaps: Space Station Panel, **National Research Council of the National Academies Committee, Washington, DC** 2005

ASME Heat Transfer Memorial Award in the Science Category for "seminal contributions to such diverse fields of heat transfer as phase change, plasma, bio, and natural convection, in particular to transport processes with moving droplets and thermal design of advanced industrial equipment." 2001

Visiting Professor, Department of Mechanical Engineering, University of California, Berkeley, CA 2000

Council of Indian Organizations Award for Distinguished Contributions to Engineering Science 1999

"**Aerospace Professional of the Year**" award, Am. Inst. Aeronautics and Astronautics for "Outstanding contributions to the advancement of the arts and sciences of aeronautics and astronautics." 1997

Appointed Asa Whitney Professor of Dynamical Engineering: "In recognition of his outstanding achievements in heat transfer research, excellence in teaching, and distinguished service to the University and his profession." 1996

Appointed United Nations Expert and Consultant 1991
for Engineering and Technology, UNIDO, Vienna, Austria

Elected Fellow, American Society of Mechanical Engineers for "significant contributions to Heat Transfer;" "His studies on droplet dynamics in the presence of phase change (condensation, evaporation, and combustion) have yielded new and important insights into mechanisms of drag and heat transfer." 1990

Outstanding Faculty Advisor Award: "For dedication to quality education and development of professional awareness through student participation." 1979
American Society of Mechanical Engineers

Lindback Award for Distinguished Teaching: "For distinguished teaching, in recognition of outstanding service in stimulating and guiding the intellectual development of students at the University of Pennsylvania." 1979

Reid Warren Award for Distinguished Teaching: "In recognition of outstanding service in stimulating and guiding the intellectual development of undergraduate students at the College of Engineering and Applied Science." 1978
University of Pennsylvania, Philadelphia

PATENTS

1. Bioactive, degradable composite for tissue engineering, U.S. Patent #6328990.
2. Hollow bone mineral-like calcium phosphate particles, U.S. Patent #6416774.

IMPORTANT KEYNOTE, INVITED LECTURES

"The linear and non-linear stabilities of a Plasma-arc" 1979
University of Zurich, Zurich, Switzerland

Keynote address to Chinese Nuclear Society on "Heat and Mass Removal from Nuclear Reactor Containment by Spray Droplets," 1985
China International Conference Center for Science and Technology,
Beijing, People's Republic of China

Invited Distinguished Participant and Keynote Speaker, 1985
Eighth National Heat and Mass Transfer Conference, Visakha Patnam, India.
Invited by the Indian Society for Heat/Mass Transfer and the Ministry of Education, India. Address on "Heat and mass transfer with condensation"

"The theory of condensation on moving droplets" Cavendish Laboratory, University of Cambridge, England	1986
"Hydrodynamics of condensation on a moving drop" The Royal Institute of Technology, Stockholm, Sweden	1986
"Mathematics of direct-contact condensation on a moving drop" The Danish Center for Applied Mathematics & Mechanics, The Technical University of Denmark, Lyngby, Denmark	1986
"Direct-Contact Phase Change Processes with Moving Liquid Droplets," International Symposium/Workshop on Boiling, Condensation and Two-Phase Flow Heat Transfer, Visakha Patnam, India	1994
Bio-Heat Transfer: "Effects of Micro-Wave Radiation on Biological Tissue Heating," Bhabha Atomic Research Center, Bombay, India	1994
Am. Inst. Aeronautics and Astronautics award lecture: "Bone-cell growth in microgravity," Philadelphia, PA	1997
Bio-Mass Transfer: "Bone-cell growth in microgravity--cell biology, fluid mechanics and mass transfer," 14th National Heat and Mass Transfer Conference and the 3rd ISHMT/ASME Joint Heat and Mass Transfer Conference, Kanpur, India	1997
"Interfacial motion of a molten layer subject to plasma heating" Chia-Shun Yih Memorial Symposium, 13th U.S. National Congress of Applied Mechanics, Gainesville, FL	1998
"The culture of three-dimensional bone-like tissue under simulated microgravity conditions in NASA's rotating-wall vessels: experimental and numerical studies." Engineering foundation conference on microgravity fluid physics and heat transfer (Microgravity and fluid physics program of NASA), Oahu, Hawaii	1999
Bio-Mass Transfer Processes: "Composite microsphere: Effects of different filler materials on polymeric surface bioactivity." Engineering Foundation Conference on microgravity transport processes in fluid, thermal, biological and materials sciences II, Banff, Alberta, Canada	2001
"Electric field effects on flames." Fifth ISHMT ASME Heat and Mass Transfer Conference, Science City, Kolkata, India	2002
"Low energy plasma heat transfer as applied to microelectronic manufacturing." International Symposium on Recent Trends in Heat and Mass Transfer, Indian Institute of Technology, Guwahati, India	2002
"Three-dimensional bone-like tissue generation in rotating-wall bioreactors" The 6th Am. Soc. Mech. Engrs/Japanese Soc. Mech. Engrs. Thermal Engineering Joint Conference, Hawaii Island, Hawaii	2003
"Oscillating Flow and Heat Transfer in Porous Media" NASA Glenn Research Center, Cleveland, Ohio	2004

"Loop Heat Pipe (LHP) for Spacecraft Thermal Control" NASA Glenn Research Center, Cleveland, Ohio	2004
Plenary Speaker, 2004 ASME Heat Transfer/Fluids Engineering Summer Conference, Charlotte, NC. "Surfactant Transport to an Intravascular Bubble"	2004
Sir G.I. Taylor Memorial lecture in Fluid Mechanics, 53rd Congress of the Indian Society for Theoretical and Applied Mechanics, Hyderabad, India. "Motion Of A Finite-Sized Gas Bubble In A Blood Vessel: Non-Newtonian Effects."	2008
Keynote address in Am. Soc. Mech. Engrs./Indian Soc. Heat & Mass Transfer Conference, Mumbai, India. "Effect of a soluble surfactant on a finite-sized bubble motion in a blood vessel"	2010
Keynote address in Am. Soc. Mech. Engrs/Indian Soc. Heat & Mass Transfer Conference, IIT, Kharagpur, India. "Modeling the Effects of Multibody Interactions on Nanoparticle Hydrodynamics in an Incompressible Newtonian Fluid."	2013
Keynote address in 7th World Congress of Biomechanics, Boston, MA, "Functionalized Nanocarrier Binding to Cell Surface in Targeted Drug Delivery: Hydrodynamic and Adhesive Interactions."	2014
Max Jakob Memorial Award lecture, Int. Mech.Eng. Congress & Exposition, Houston, Texas, "Modeling of a nanoparticle in a cylindrical vessel flow: Particle shape and wall effects"	2015
Stuart W. Churchill Memorial Keynote lecture, ASME 2017 SHT, Bellevue, Washington: "Transport phenomena associated with a nano-sized carrier in targeted drug delivery"	2017
AIChE Symposium in Honor of Professor Peter C.Wayner, Jr., Invited Lecture, ASME 2019 SHT, Bellevue, Washington: "Effect of a Soluble Surfactant on a Finite-Sized Bubble in Motion in a Blood Vessel"	2019

JOURNAL EDITORSHIP

Editor, ASME Journal of Heat Transfer	2016-Present
Editorial Panel Member, Expert Review of Medical Devices, London, UK	2013-Present
Associate Technical Editor, Journal of Heat Transfer, Trans. ASME	1997-2000, 2001-2004

MEMBERSHIP IN IMPORTANT PANELS, DELEGATION

Member, Review Panel, Division of CBET Systems, U.S. National Science Foundation	2012, 2013
Member, Review Panel, National Space Biomedical Research Institute, NASA, Washington, D.C.	2007, 2008, 2009, 2010,2011,2012
Invited Participant, NASA Workshop on Porous Media, NASA Glenn Research Center, Ohio	2004
Member, Requirements Definition Review Panel for Micro-Gravity Studies in Nucleate Boiling Heat Transfer, NASA Glenn, Ohio	2002
Member, NASA Bioreactor/Biosensor Research Review Panel, Washington D.C.	2002
Invited Participant, Workshop on research needs in space thermal systems and processes for human exploration of space, NASA Glenn, Ohio	2000
Member, Science Concept Review Panel for Micro-Gravity Experiments in Space, NASA, Lewis Research Center, Cleveland, Ohio	1998, 1990
Member, Review Panel for Micro-Gravity Studies in Heat Transfer and Fluid Mechanics, NASA, Washington, D.C.	1997, 1993
Invited Panelist, NSF/DOE Workshop on Advanced Thermal Manufacturing and Materials Processing: Future Needs for Research, Leesburg, Virginia	1995
United Nations Expert on Micro-Electronics: Lectured and Conducted a workshop on "Thermal Design/Analysis/Optimization in Microelectronics", Society for Applied Microwave Electronics Engineering and Research - Center for Electromagnetics, Madras, India	1992
Invited Panelist, NSF Workshop on "Thermal Engineering: Emerging Technologies and Critical Phenomena: Future needs for thermal engineering research," Chicago, Illinois	1991
Invited Panelist, National Workshop on Mass, Momentum, and Energy Exchange in Combusting Sprays: Droplet Studies, Sandia National Laboratories, Livermore, California	1988
Member, Evaluation Panel for Engineering Initiation Awards, U.S. NSF	1987
Member, Delegation on Nuclear Reactor Safety to the People's Republic of China at the invitation of the Chinese Nuclear Society and the Chinese Association for Science and Technology (Delegation leader: Professor Richard T. Lahey, Jr.)	1985

CONSULTING ACTIVITIES

Battelle, NC;
Boeing Satellite Systems, CA;
Combustion Unlimited Incorporated, PA;
General Electric Co, Valley Forge, PA;
General Motors Corporation MI;
Hughes Space and Communications, CA;
IBM Corporation, NY;
National Air Oil Burner Co., Inc., PA;
NASA, Glenn Research Center, OH;
Pathway Technology, Inc., PA;
Thermacore, Inc., PA;
United Nations Industrial Development Organization, Vienna, Austria

MASTER'S, DOCTORAL AND POST-DOCTORAL RESEARCH SUPERVISION

1. L.J. Huang, Laminar Condensation on a Moving Drop: Effects of Transients, M.S. Thesis (1986).

2. S.G. Klemick, Heat Transfer in Tissue Subject to Microwave Heating, M. S. Thesis (1988).

3. T.R. Stauffer, Multi Foil Insulation Systems for Hypersonic Vehicles, M.S. Thesis (1992).

4. J. Weiner, Thermal Stress Analysis of Multilayered Materials of Finite Thickness, M.S. Thesis (1994).

5. A. Chau, Bubble motion in a Casson fluid flowing through a vessel, M.S. Thesis (1996).

6. J.N. Chung, Laminar Condensation Phenomenon Associated with a Moving Droplet, Ph.D. Thesis (1979).
   (At present: Andrew H. Hines Jr./Florida Progress Eminent Scholar Chair Professor, U. of Florida, Gainesville.)

7. T. Sundararajan, Laminar Condensation Heat and Mass Transfer to a Drop Moving at Intermediate or High Reynolds Number, Ph.D Thesis (1983).
   (At present: Professor, Dept. of Mech. Eng., IIT, Madras, India)

8. J.M. Hogan, Wave Phenomena on the Interface Separating Fluids of Different Viscosities, Ph.D. Thesis (1984).
   (At present: Manager of Engineering, GE, Seton Center, PA)

9. G. Gogos, Evaporation and Combustion of a Moving Liquid Drop, Ph.D Thesis (1986).
   (At present: Associate Professor, Dept. of Mech. Eng., Univ. of Nebraska, Lincoln, Nebraska)

10. J.W. Baish, Convective Heat Transport Due to Blood Perfusion in Volumetrically Heated Biological Tissue, Ph.D. Thesis (1986). (Presidential Young Investigator Award Recipient)
    (At present: Professor, Dept. of Mech. Eng., Bucknell Univ., PA)

11. L.J. Huang, Fundamental Problems in Heat Transfer and Fluid Mechanics of Phase-Change Processes with Liquid Drops, Ph.D. Thesis (1989).
    (At present: Senior Engineer, R&D, GM, Lockport, NY)

12. M. Jog, Asymptotic and Numerical Studies of Plasma Arc Heat Transfer and Phase-Change Heat Transfer, Ph.D. Thesis (1993). (Engineering Initiation Award Recipient; NSF Career Award Recipient)
    (At present: Associate Professor, Dept. of Mech., Ind., and Nucl. Eng., University of Cincinnati, OH)

13. K. Zwick, The Fluid Mechanics of Bonding With Yield Stress Epoxies, Ph.D. Thesis (1996).
    (At Present: Research Engineer, Kimberly-Clark, Inc., WI)

14. W. Qin, Numerical and Experimental Studies of Heat Transfer Phenomena in Microelectronic Packaging, Ph.D. Thesis (1997).
    (At Present: Supervisor Engineer, Kulicke & Soffa Industries, PA)

15. S. Sripada, Fundamental Studies in Plasma-Arc and Phase-Change Heat Transfer, Ph.D. Thesis (1999).
    (At Present: Applications Engineer, i2 Technologies, Irving, TX)

16. H. Gao. Numerical studies of microcarrier particle dynamics and associated mass transfer in rotating wall vessels, Ph.D. Thesis (2000).
    (At Present: Engineering Specialist, Kimberly-Clark, Inc., WI)

17. M. Parker, Modeling of Looped heat pipes with applications to spacecraft thermal control (2000)
    (At Present: Thermal Engineering Specialist, Boeing Satellite Division, CA)

18. K. Mukundakrishnan, Fluid mechanics and mass transfer in rotating cylindrical vessels: A numerical and experimental study, Ph.D. Thesis (2005).
    (At Present: Engineer, Dassault Systemes Simulia, RI)

19. Josh Lampe, Interfacial characteristics of a gas bubble immersed in a surfactant and protein laden fluid: Experiments and Modeling, Ph.D. Thesis (2007) (Joint advisor: Prof. David Eckmann)
    (At Present: Research Associate, Dept. of Emergency Medicine, Univ.of Pennsylvania)

20. Dr. G.C. Das, Indian Institute of Plasma Physics, Bangalore, India, Research on the Thermal and Electrical Characteristics of Plasma Arcs (1976-77).

21. Dr. T. Sundararajan, University of Pennsylvania, Research in Hydrodynamics and Heat/Mass Transfer Associated with Condensation on Moving Spray Drops (1983-1985).

22. Dr. L.J. Huang, University of Pennsylvania, Research in Thermal and Resultant Stresses in Microelectronic Packaging (1989-1990).

23. Dr. M. Lavy, University of Cambridge, England, Research on Non-Equilibrium Wet Steam Flow in Turbine Cascades (1990-1991).

24. Dr. Q.Q. Qiu, University of Toronto, Canada, Research on the Use of Bioactive Glass Particles as Microcarriers in Microgravity Environment (supervision jointly with Professor P. Ducheyne), (1995-1999).

25. Dr. S. Radin, All-National Research Institute for Aircraft Materials, Russia, Research on Surface transformation of reactive glass in a microgravity environment (supervision jointly with Professor P. Ducheyne, 1998-2002)

26. Dr. J. Zhang, Northwestern University, Research in Fluid Mechanics/Mass Transfer associated with gas embolism, (2002-2005).

27. Dr. S. Quan, University of Massachusetts, Macromolecule Adsorption and Bubble Adhesion to Model Endothelial Surface, (2005-2007).

28. Dr. K. Mukundakrishnan, University of Pennsylvania, Numerical Studies of Intravascular Bubble Motion, (2005-2008).

29. Dr. A.J. Calderon, University of Michigan, Ann Arbor, MI, Fluid Mechanics and Mass transfer of Targeted Drug delivery, (2006-2009).

30. Dr. T.N. Swaminathan, University of Pennsylvania, Numerical Studies of Intravascular Bubble Motion, (2008-2011).

31. Dr. S. Dasgupta, Washington State University, Pullman, WA, Experimental and modeling studies of gas embolism, (2008-2009).

32. Dr. U. Balakrishnan, Indian Institute of Technology, Madras, India, Numerical modeling of gas bubble/targeted drug delivery microcarrier motion in a blood vessel, (2009-present)

33. Dr. J. Liu, Johns Hopkins University, Baltimore, MD, Numerical modeling of targeted drug delivery microcarriers, (2009-2011).

34. Dr. P. Sobolewski, University of California, San Diego, La Jolla, CA, Cellular Mechanotransduction in Gas Embolism, (2009-2012).

35. Dr. A.L. Klinger, University of Virginia, Charlottesville, Virginia, Cellular Mechanotransduction in Gas Embolism, (2009-2012).

36. Dr. Hsiu-Yu Yu, Cornell University, Ithaca, New York, Muti-scale modeling of nanocarrier thermal motion and attachment., (2012-present).

37. Dr. N. Ramakrishnan, IIT, Madras, India, Muti-scale modeling of the nanocarrier-cell adhesion interface in targeted drug delivery, (2012-present).

38. Dr. A. Sarkar, IIT, Bombay, India, Muti-scale modeling of mass transfer by nanocarriers in targeted drug delivery, (2013-2015).

39. Dr. H. Vitoshkin, Tel-Aviv University, Tel-Aviv, Israel, Muti-scale modeling of the motion and mass transport associated with nanocarriers in targeted drug delivery, (2013-2015).

40. Dr. Y. Wang, Florida State University, Tallahassee, FL, Multi-scale modeling of the motion and mass transport associated with nanocarriers in targeted drug delivery, (2014-2016).

41. Dr. Z. Jabeen, IIT, Madras, India, Bridging Multiple Scales in Modeling Targeted Drug Nanocarrier Delivery, (2016-present).

42. Dr. S. Farokhirad, CCNY, New York, Multiscale model development and application in targeted drug delivery using Hydrodynamics and Statistical Mechanical models, (2016-present).

FUNDED RESEARCH ACTIVITIES

(Only grants where Ayyaswamy is the PI or a Co-PI are listed)

1. Grant Number: UO1 EB016027-01A1
   Sponsor: NIH
   Title: Bridging Multiple Scales in Modeling Targeted Drug Nanocarrier Delivery
   Award Amount: $2,702,120
   Period of Award: 6/1/2013 - 5/30/2018

2. Grant Number: 2RO1 EB006818-05A1
   Sponsor: NIH
   Title: Targeted Microcarrier Design and Optimization
   Award Amount: $1,955,247
   Period of Award: 6/1/2013 - 5/30/2017

3. Grant Number: CBET-1236514
   Sponsor: NSF
   Title: Multiscale Modeling of the Nanocarrier-Cell Adhesion Interface in Targeted Drug Delivery
   Award Amount: $360,000
   Period of Award: 9/1/2012 - 8/31/2015

4. Grant Number: RO1 HL067986
   Sponsor: NIH
   Title: Activation of Clotting and Cell Adhesion in Response to Gas embolism
   Award Amount: $910,587
   Period of Award: 7/01/2009 - 12/31/2011

5. Grant Number: RO1 EB06818
   Sponsor: NIH/NIBIB and NIGMS
   Title: Targeted microcarrier design and optimization
   Award Amount: $1,575,000
   Period of Award: 7/1/2008 - 9/30/2012

6. Grant Number: N00014-08-1-0436
   Sponsor: ONR
   Title: Molecular Basis of Injury and Treatment of Arterial Gas Embolism
   Award Amount: $1,006,274
   Period of Award: 3/01/2008 - 8/24/2011

7. Grant Number: RO1 HL60230-S1
   Sponsor: NIH

Title: Interfacial Mechanics in Intravascular Gas Embolism (Supplemental to support a minority Post Doc)
Award Amount:
Period of Award: 7/1/2008 - 1/8/2010

8. Grant Number: NNC05GA30G
Sponsor: NASA
Title: Macromolecule Adsorption and Bubble Adhesion to Model Endothelial Surface
Award Amount: $602,245
Period of Award: 2004-2006

9. Grant Number: RO1 HL67986-01A1
Sponsor: NIH
Title: Activation of clotting and cell adhesion in Response to gas embolism
Award Amount: $1,460,000
Period of Award: 2002-2007

10. Grant Number: NAG 9-1357
Sponsor: NASA
Title: Impact of microgravity on human osteoblast life history: Experimental investigation and Numerical study
Award Amount: $745,000
Period of Award: 2001-2004

11. Grant Number: 536689
Sponsor: Kulicke & Soffa Co., PA
Title: Design Improvements on wire bonding machinery
Award Amount: $101,912
Period of Award: 9/1/00 - 8/31/01

12. Grant Number: 5-35816
Sponsor: NSF & Pathway Technologies, Inc.
Title: A feasibility study on Electro-thermal compliant wheel and a micro accelerometer
Award Amount: $106,000
Period of Award: 6/1/00 - 5/31/01

13. Grant Number: 5-08727
Sponsor: Thermacore, Inc., PA
Title: Transport Phenomena in wick structures
Award Amount: $24,303
Period of Award: 6/1/00 - 5/31/01

14. Grant Number: NAG8-1483
Sponsor: NASA
Title: Surface Transformation of Reactive Glass in a Microgravity Environment
Award Amount: $403,300
Period of Award: 2/1/98 - 1/31/02

15. Grant Number: 5-01963
    Sponsor: Delaware River Port Authority
    Title: Recirculating Aquaculture System
    Award Amount: $450,000 + $350,000
    Period of Award: 7/1/97 - 6/30/99, renewal to 6/30/01

16. Grant Number: KS-95
    Sponsor: Kulicke and Soffa Industries, Inc.
    Title: Die Attach Adhesive Characterization Study
    Award Amount: $35,263
    Period of Award: 7/1/95-9/1/96

17. Grant Number: CTS-9421598 & REU
    Sponsor: National Science Foundation
    Title: Low energy arc heat transfer with applications in microelectronic packaging technology
    Award Amount: $259,931
    Period of Award: 5/95 -4/97

18. Grant Number: NAG 9-817
    Sponsor: NASA
    Title: The use of bioactive glass particles as microcarriers in microgravity environment
    Award Amount: $730,000
    Period of Award: 7/95- 6/99

19. Grant Number: DDM 90-005732 & REU
    Sponsor: National Science Foundation
    Title: Advances in Design of Automated Wire and Die Bonding Machinery in Microelectronic Manufacturing
    Award Amount: $274,250
    Period of Award: 6/1/90 - 8/31/94

20. Grant Number: BFP #90S.5055R-01 and #89S.5055R-01
    Sponsor: Benjamin Franklin Partnership/State of Pennsylvania
    Title: Design of Automated Packaging Machinery in Microelectronic Manufacturing
    Award Amount: $60,000
    Period of Award: 6/30/90- 8/31/93

21. Sponsor: Kulicke & Soffa Industries, Inc.
    Title: Advances in Wire Bonding
    Award Amount: $53,000
    Period of Award: 6/30/90 -8/31/94

22. Grant Number: 3-71747
    Sponsor: University of Pennsylvania Research Foundation
    Title: Numerical Simulation of Process Problems in the Design of Automated Machinery for Assembly of Semiconductor Integrated Circuit Chip
    Award Amount: $15,925
    Period of Award: 1/7/92-12/31/92

23. Grant Number: 5-21201
    Sponsor: IBM Corporation
    Title: Analysis and Simulation of Thermal Transients and Resultant Stresses in Microelectronic Equipment
    Award Amount: $29,975
    Period of Award: 7/1/90 - 6/30/91

24. Grant Number: DMC 87-09537 & REU
    Sponsor: National Science Foundation
    Title: Ball Formation Processes in Wire Bonding Apparatus
    Award Amount: $261,654
    Period of Award: 6/1/88 - 5/31/90

25. Grant Number: BFP #07,510 RU
    Sponsor: Benjamin Franklin Partnership/State of Pennsylvania
    Title: Ball Formation Processes in Wire Bonding Apparatus
    Award Amount: $19,669
    Period of Award: 9/1/88 - 8/31/89

26. Grant Number: BFP #06,500 NU
    Sponsor: Benjamin Franklin Partnership/State of Pennsylvania
    Title: Ball Formation Processes in Wire Bonding Apparatus
    Award Amount: $23,000
    Period of Award: 9/1/87 - 8/31/88

27. Grant Number: DMC 85-13128 & REU
    Sponsor: National Science Foundation
    Title: Ball Formation Processes in Wire Bonding Apparatus
    Award Amount: $220,365
    Period of Award: 9/1/85 - 1/30/88

28. Grant Number: 5-R01-CA 36624-03 Sub 01
    Sponsor: National Institute of Health
    Title: Dynamic Phantom Models for Hyperthermia Research
    Award Amount: $40,008
    Period of Award: 6/1/85 - 5/31/86

29. Grant Number: 5-RO1-CA 36624-02 SUB 01
    Sponsor: National Institute of Health
    Title: Dynamic Tissue Models for Hyperthermia Research
    Award Amount: $105,830
    Period of Award: 6/1/83 - 5/31/85

30. Grant Number: MEA82-17097
    Sponsor: National Science Foundation
    Title: Laminar Film Condensation on Drops Translating in Steam-Air Mixture
    Award Amount: $61,743
    Period of Award: 7/1/83 - 12/31/84

31. Grant Number: MEA80-23861
    Sponsor: National Science Foundation
    Title: Laminar Film Condensation on a Droplet Translating in Steam-Air Mixture
    Award Amount: $60,770
    Period of Award: 7/1/81 - 4/30/83

32. Grant Number: 5-RO1-CA-26046
    Sponsor: National Institute of Health
    Title: Microwave Dielectric Properties of Tumor and Normal Tissue
    Award Amount: $53,516
    Period of Award: 7/1/81 - 6/30/82

33. Grant Number: ENG78-25899
    Sponsor: National Science Foundation
    Title: Electrostatic Sheath Stability in Magnetohydrodynamic Flows
    Award Amount: $93,033
    Period of Award: 4/1/79 - 9/30/81

34. Grant Number: ENG77-23137
    Sponsor: National Science Foundation
    Title: Laminar Film Condensation on a Spherical Droplet Translating in a Steam-air Mixture
    Award Amount: $80,147
    Period of Award: 4/15/78 - 3/31/81

35. Grant Number: FAC. Grant & Award Project #0060
    Sponsor: University of Pennsylvania Faculty Grants and Awards
    Title: Turbulent Couette Motion
    Award Amount: $1,000
    Period of Award: 7/1/76 - 6/30/77

36. Grant Number: RP-378-1
    Sponsor: Electric Power Research Institute
    Title: Arc Discharges
    Award Amount: $166,000
    Period of Award: 12/1/74 - 6/30/77

FUNDED GRANTS FOR ACADEMIC ACTIVITIES

1. Grant Number: PO94B30032
   Sponsor: U.S. Department of Education
   Title: Patricia Roberts Harris Doctoral Fellowships
   Co-Authors of Proposal: D. Graves, W. Shieh and M. Steedman
   Award Amount: For MEAM Department: 2 Fellowships @ $28,000 per year, per student, for a total of three years.
   Period of Award: 1993-1998

2. Sponsor: National Science Foundation and Advanced Research Project Agency (NSF-ARPA)

Title: A Program for Manufacturing Management in Support of the Technology Reinvestment Program
Principal Investigators: G. Anandalingam and J. Adler
Co-Faculty Contributors: I.M. Cohen, N. Dorny, V. Kumar and W. Seider
Award Amount: $600,000
Period of Award: 1994-1997

PENDING GRANT APPLICATIONS

1. Title : None at Present
   Submitted to
   Funds requested:
   Period (expected):

PUBLICATIONS

a). REVIEW ARTICLES BY INVITATION

"Fluid Mechanics of Direct-Contact Transfer Processes with Moving Liquid Droplets**"** in **Encyclopedia of Fluid Mechanics,** Ed: N.P. Cheremisinoff, 8, 535-587 (1989)

"Combustion Dynamics of Moving Droplets" in
Encyclopedia of Environmental Control Technology, Ed: P.N. Cheremisinoff, 1, 479-532 (1989)

"Direct Contact Transfer Processes with Moving Liquid Droplets" in
Advances in Heat Transfer, Eds: Cho, Hartnett and Irvine, Jr., 26, 1-104 (1995)

"Mathematical Methods in Direct-Contact Transfer Studies with Droplets" in
Annual Review of Heat Transfer, Ed: Chang-Lin Tien, VII, 245-331 (1996)

"Low Energy Plasma Heat Transfer as Applied to Microelectronic Manufacturing" in
Annual Review of Heat Transfer, Ed: Chang-Lin Tien, V. Prasad
and F. Incropera, XII, 27-78 (2002)

"Numerical models of blood flow effects in biological tissues" (with J.W. Baish and K. Mukundakrishnan), in **Advances in Numerical Heat Transfer 3**, Eds: W.J.Minkowycz and E. M. Sparrow, III, 29-71 (2009)

"Nanoparticle transport phenomena in confined flows" (with R. Radhakrishnan, S. Farokhirad, and D.M. Eckmann), **Advances in Heat Transfer,** Eds: E.M. Sparrow, J.Abraham, and J. Gorman, 51, *In Press* (2019).

b). EDITED BOOKS AND BOOK PUBLICATIONS

Advances in Design and Analysis in Pressure Vessel Technology
Co-Editors: H. Chung, D.W. Nicholson, and W.S. Woodward, ASME Press, New York (1987).

Transport Phenomena with Drops and Bubbles
Co-Authors: S.S. Sadhal and J.N. Chung, Springer-Verlag Publishers (1997).
(Monograph contains significant new and unpublished work on Interfacial Fluid Mechanics).

Introduction to Biofluid Mechanics
Chapter 17 in *Fluid Mechanics*, P.K. Kundu and I.M. Cohen, Academic Press, MA, (2007).

c). PUBLICATIONS IN REFEREED JOURNALS (UNDER REVIEW)

None under review at present. Three articles are being readied for submission.

d). PUBLICATIONS IN REFEREED JOURNALS/BOOKS (* : INVITED PAPER / ARTICLE)

Archival Publications in : *Multi-Phase Flow &Transport, Bio Heat & Mass Transport, and Electric Arc Plasma Heat & Mass Transport*

135. "Stiffness can mediate balance between hydrodynamic forces and avidity to impact the targeting of flexible polymeric nanoparticles in flow" (with S. Farokhirad, A. Ranganathan, J. Myerson, V. Muzykantov, D.M. Eckmann, and R. Radhakrishnan), ***Nanoscale***, 11, 6916-6928 (2019).

134. "Nanofluid dynamics of flexible polymeric nanoparticles under wall confinement" (with S. Farokhirad, N. Ramakrishnan, D.M. Eckmann, and R. Radhakrishnan), ***ASME J. Heat Transfer***, Vol. 141(5):052401-052401-6 (2019).

*133. "Nanoparticle transport phenomena in confined flows" (with R. Radhakrishnan, S. Farokhirad, and D.M. Eckmann), ***Advances in Heat Transfer,*** Eds: E.M. Sparrow, J.Abraham, and J. Gorman, 51, In Press (2019).

132. "Rheology of colloidal suspensions in confined flow: Treatment of hydrodynamic interactions in particle-based simulations inspired by dynamical density functional theory" (with Z. Jabeen, H.-Y. Yu, D.M. Eckmann, and R. Radhakrishnan), ***Phys. Rev. E***, 98:042602-1-13(2018).

*131. "Nanoscale Fluid Dynamics" (with R. Radhakrishnan, D.M. Eckmann, and N. Ramakrishnan) **, 21 st Century - Nanoscience - - A Handbook,** Ed: K.D. Sattler, Taylor & Francis (CRC Press), In Press (2018).

130. "Excess area dependent scaling behavior of nano-sized membrane tethers" (with N. Ramakrishnan, K.K. Sreeja, A.Roychoudhury, D. M. Eckmann, T. Baumgart, T. Pucadyil, S.Patil, V. M. Weaver and R. Radhakrishnan), ***, Physical Biology,*** 15, 026002, (2018), (https://doi.org/10.1088/1478-3975/aa9905).

129. "Microstructure of flow-driven suspension of hardspheres in cylindrical confinement: a Dynamical Density Functional theory and Monte Carlo study" (with H.-Y. Yu, Z. Jabeen, D. M. Eckmann, and R. Radhakrishnan), ***Langmuir***, 33 (42):11332-11344, (2017).

*128. "Computational methods related to molecular structure and reaction chemistry of Biomaterials" (with S. Farokhirad, R.P. Bradley, A.Sarkar, A.Shih, S. Telesco, Y. Liu, R. Venkataramani, D.M. Eckmann, and R.Radhakrishnan), **Comprehensive Biomaterials II**, Ed: P. Ducheyne, Vol.3, 245-267, Oxford: Elsevier Publishers, (2017)

127. "Motion of a nano-spheroid in a cylindrical vessel flow: Brownian and hydrodynamic interactions" (with N. Ramakrishnan, Y. Wang, D.M. Eckmann and R. Radhakrishnan), ***J. Fluid Mech.***, Vol. 821, 117-152, (2017), (supp info: https://doi.org/10.1017/jfm.2017.182)

126. “Computational models for nanoscale fluid dynamics and transport inspired by non-equilibrium thermodynamics” (with R. Radhakrishnan, H.-Y.Yu, and D.M. Eckmann), ***ASME J. Heat Transfer***, Vol. 139, 033001- 033009, (2017)

125. “Effect of wall-mediated hydrodynamic fluctuations on the kinetics of a Brownian nano particle, ” (with H.-Y. Yu, D.M. Eckmann, and R. Radhakrishnan), ***Proc.Roy.Soc.*** **A, 472**: 20160397 (2016), (supp info: https://dxdoi.org/10.6084/m9.figshare.c.3590399)

124. Nanoparticle stochastic motion in the inertial regime and hydrodynamic interactions close to a cylindrical wall” (with H. Vitoshkin, H.-Y. Yu, D.M. Eckmann, and R. Radhakrishnan), ***Phys. Rev. Fluids***, **1**, 054104-1-12, (2016), (supp info: http://link.aps.org/supplemental/10.1103/PhysRevFluids.1.054104).

123. “Biophysically inspired model for functionalized nanocarrier adhesion to cell surface: roles of protein expression and mechanical factors” (with N. Ramakrishnan, R.W. Tourdot, D.M. Eckmann, V.R. Muzykantov, and R. Radhakrishnan), ***Royal Society Open Science,*** **3:**160260, (2016), http://dx.doi.org/10.1098/rsos.160260. (sup info: doi:10.5061/dryad.4h76d).

122. “Hydrodynamic interactions of deformable nanocarriers and effect of cross linking” (with A. Sarkar, D.M. Eckmann, and R. Radhakrishnan), ***Soft Matter***, 11, 5955-69, (2015), (doi: 10.1039/C5SM00669D).

121. “Composite Generalized Langevin Equation for Brownian Motion in Different Hydrodynamic and Adhesion Regimes” (with H.Yu, D.M.Eckmann, and R. Radhakrishnan), ***Phys. Rev. E***, 91:052303-1 – 052303-11 (2015).

120. “Modeling of Binding Free Energy of Targeted Nanocarriers to Cell Surface” (with J. Liu, D.M. Eckmann, and R. Radhakrishnan), ***Heat and Mass Transfer, (Springer)***, 50 (3), 315-321 (2014), (doi: 10.1007/s 00231-013-1274-0).

119. “Review of Evaluation Methodologies for Satellite Exterior Materials in Low Earth Orbit (LEO)”(with D. Angirasa) , ***J. Spacecraft and Rockets,*** 51 (3), 750-761 (2014),(doi: 10.2514/1.A32742).

118. “Temporal Multiscale Approach for Nanocarrier Motion with Simultaneous Adhesion and Hydrodynamic Interactions in Targeted Drug Delivery” (with R.Radhakrishnan, B.Uma, J.Liu, and D.M.Eckmann) , ***J. Comp. Phys.***, 244, 252-263, (2013).(doi.org/10.1016/j.jcp.2012.10.026)

117. “Nanocarrier hydrodynamics and binding in targeted drug delivery : Challenges in numerical modeling and experimental validation ” (with V.R. Muzykantov, D.M.Eckmann, and R.Radhakrishnan) **,** ***ASME J. Nanotechnology in Engineering and Medicine*** , Vol.4, No.1, 011001-1-10, (2013).

116. “Understanding the Role of Exogenous and Endogenous Surfactants in Gas Embolism,” (with J. Lampe and D.M. Eckmann) , **Proteins at Interfaces III State of the Art**, Eds: T. Horbett, J.L. Brash, and W.Norde, Publisher : ACS Symposium Series 1120**,** Am. Chemical Soc., Washington, DC , Distributed in print by Oxford University Press, Chapter 18, 395 - 418 (2013).

115. “A hybrid approach for the simulation of the thermal motion of a nearly neutrally buoyant nanoparticle in an incompressible Newtonian fluid medium”(with B.Uma, R.Radhakrishnan and D.M.Eckmann) , HT-12-1135, *Special Issue* ***:*** *Computational Fluid Dynamics,* ***ASME J.Heat Transfer,*** 135**,** No.1, 011011-1 - 011011-9 (2013).

114. “Fluctuating hydrodynamics approach for the simulation of nanoparticle Brownian motion in a Newtonian fluid” (with B.Uma, R.Radhakrishnan and D.M.Eckmann) , ***Intl. J. Micro-Nano Scale Transport*** , Vol.3, No. 1-2, 13-20, (June 2012). (DOI: 10.1260/1759-3093.3.1-2.13).

113. “Nanocarrier-Cell surface adhesive and hydrodynamic interactions: ligand-receptor bond sensitivity study”(with B.Uma, R.Radhakrishnan and D.M.Eckmann) , NANO-12-1074, ***ASME J. Nanotechnology in Engineering and Medicine***, 3:31009-1-8 (2012).

112.“Top-down mesoscale models and free energy calculations of multivalent protein-protein and protein-membrane interactions in nanocarrier adhesion and receptor trafficking” (with J. Liu, N.J. Agrawal, D.M. Eckmann and R. Radhakrishnan), **Innovations in Biomolecular Modeling and Simulation**, Ed: Tamar Schlick, Publisher: Royal Society of Chemistry, Cambridge, UK, Chapter 11, 272-292 (2012). (ISBN-10:1849734100; ISBN-13: 978-1849734103)

111. “A hybrid formalism combining fluctuating hydrodynamics and generalized Langevin dynamics for the simulation of nanoparticle thermal motion in an incompressible fluid medium” (with B.Uma, D.M.Eckmann, and R.Radhakrishnan), ***Molecular Physics***, 110 : 1057-1067 (2012). (DOI: 10.1080/ 00268976.2012.663510), [PMCID : PMC 341072]

110. “Computational simulation of hematocrit effects on arterial gas embolism dynamics” (with K. Mukundakrishnan and D.M. Eckmann), ***Aviation, Space, and Environmental Medicine***, 83, No. 2, 92-101, (2012).[PMCID: PMC3281524]

109. “Generalized Langevin dynamics of a nanoparticle using a finite element approach: Thermostating with correlated noise” (with B. Uma, T.N. Swaminathan, D.M. Eckmann and R. Radhakrishnan), ***J. Chem. Phys.***, 135, 114104-1-13 (2011). (DOI: 10.1063/1.3635776) [PMCID: PMC 3189970]. Erratum, ***J. Chem. Phys.***, 136, 019901-1 (2012).[PMCID:PMC 3266821]

108. “Nanoparticle Brownian motion and hydrodynamic interactions in the presence of flow fields” (with B. Uma, R. Radhakrishnan, T. Swaminathan and D.M. Eckmann), ***Phys. Fluids***, 23, 073602-1-15 (2011). (DOI: 10.1063/1.3611206) [PMCID:PMC 3172128] *Selected for inclusion in the Virtual Journal of Nanoscale Science and Technology.*

107. “Multivalent binding of nanocarrier to endothelial cells under shear flow” (with J. Liu, N. Agrawal, A.J. Calderon, D.M. Eckmann and R. Radhakrishnan), ***Biophys. J.***, 101, 319-326 (2011). [PMCID:PMC 3136762]. Selected as cover article.

106. “Protein assembly at the air-water interface studied by fluorescence microscopy” (with Z. Liao, J.W. Lampe, D.M. Eckmann and Ivan J. Dmochowski), ***Langmuir***, 27, 12775-12781 (2011). (dx.doi.org/10.1021/la203053g) [PMCID:PMC3212854]

105. “Multiscale modeling of functionalized nanocarriers in targeted drug delivery” (with J. Liu, R. Bradley, D.M. Eckmann and R. Radhakrishnan), ***Curr. Nanosci***., 7(5), 727-735 (2011). (Pubmed ID: 21767483) [PMCID: PMC 3221469]

104. “Dynamic factors controlling carrier anchoring on vascular cells” (with T.N. Swaminathan, J. Liu, B. Uma, R. Radhakrishnan and D.M. Eckmann), ***IUBMB Life***, 63(8), 640-647, (2011). (DOI:10.1002/iub.475) [PMCID: PMC 3142280]

*103."Fluid Mechanics – Transport and diffusion analyses as applied in biomaterials studies" (with K. Mukundakrishnan), **Comprehensive Biomaterials**, Eds: P. Ducheyne, K. Healy, D. Hutmacher, D.W. Grainger, and J. Kirkpatrick, Vol.3, 133-153, Elsevier Publishers, (2011).

*102."Rotating wall vessels for cell culture" (with Qing-Qing Qiu and P. Ducheyne), **Comprehensive Biomaterials**, Eds: P. Ducheyne, K. Healy, D. Hutmacher, D.W. Grainger, and J. Kirkpatrick, Vol.5, 147-167,Elsevier Publishers, (2011).

101."Computational model for nanocarrier binding to endothelium validated using in vivo, in vitro, and atomic force microscopy experiments" (with J. Liu, G.E.R. Weller, B.Zern, D.M. Eckmann, V.R. Muzykanotv and R. Radhakrishnan), ***Proc. Natl. Acad. Sci. USA***,107(38), 16530-16535 (2010). [PMCID: PMC 2944711]

100."Using 3-D dense packing models to predict surface tension change due to protein adsorption" (with J.W. Lampe and D.M. Eckmann), ***Int. J. Transport Phenomena,*** 12:283 -300 (2011).[PMCID:PMC 3327165]

99."Numerical modeling of oxygen distributions in cortical and cancellous bone: Oxygen availability governs osteonal and trabecular dimensions" (with A.M. Zahm, M.A. Bucaro, V. Srinivas, I.M. Shapiro, C.S. Adams and K. Mukundakrishnan), ***Am. J. Physiology – Cell Physiology***, 299 (5), C922-929 (2010).

98."Surfactant properties differentially influence intravascular gas embolism mechanics" (with T.N. Swaminathan and D.M. Eckmann), ***Ann. Bio. Med. Eng.***, 38(12), 3649-3663 (2010).[PMCID: PMC2957507]

97."Imaging Macromolecular Interactions at an Interface" (with J. Lampe, Z. Liao, I. Dmochowski and D.M. Eckmann), ***Langmuir***, 26 (4), 2452-2459 (2010).(DOI:10.1021/la903703u)[PMCID: PMC 2819646]

96."Effect of a soluble surfactant on a finite-sized bubble motion in a blood vessel" (with T.N. Swaminathan, K. Mukundakrishnan and D.M. Eckmann), ***J. Fluid Mech.***, 642, 509-539 (2010).[PMCID: PMC2841450]

95."Bubble motion in a blood vessel: Shear stress induced endothelial cell injury" (with K. Mukundakrishnan and D.M. Eckmann), ***ASME J. Biomech. Eng.***, Vol 131, No.7, 074516 (2009).

94.*"Numerical models of blood flow effects in biological tissues" (with J.W. Baish and K. Mukundakrishnan), ***Advances In Numerical Heat Transfer***, Taylor and Francis Publishers, Vol.III, Editors: W.J. Minkowycz and E. M. Sparrow, 29- 71 (2009).

93."Bubble motion through a Generalized Power-Law fluid flowing in a vertical tube" (with K. Mukundakrishnan and D.M. Eckmann), ***Annals of the New York Academy of Sciences***, Vol. 1161, 256-267 (2009).

92."Finite-sized gas bubble motion in a blood vessel: non-Newtonian effects" (with K. Mukundakrishnan and D.M. Eckmann), ***Phys. Rev. E***, 78:036303 (2008).

91."The dynamics of two spherical particles in a confined rotating flow: Pedaling motion" (with K. Mukundakrishnan and H. Hu), ***J. Fluid. Mech.***, 599, 169-204 (2008).

90."Numerical study of wall effects on buoyant gas-bubble rise in a liquid-filled finite cylinder" (with K. Mukundakrishnan, S. Quan and D.M. Eckmann), ***Phys. Rev. E***, 76: 036308 (2007).

89."The effect of simulated microgravity on osteoblasts is independent of the induction of apoptosis," (with M.A. Bacaro, A.M. Zahm, M.V. Risbud, K. Mukundakrishnan, M.J. Steinbeck, I.M. Shapiro and C.S. Adams), ***J. Cellular Biochemistry***, 102 (2): 483-495 (2007).

88."Escherichia coli Biofilms formed under low shear modeled microgravity in a ground based system," (with S.V. Lynch, K. Mukundakrishnan, M.R. Benoit and A. Matin), ***Applied and Environmental Microbiology***, 72 (12): 7701-7710 *(*2007).

87."Optimal conditions for simulating microgravity employing NASA designed rotating wall vessels" (with K. Mukundakrishnan), ***Acta Astronautica***, 60, 397-405 (2007).

86."Numerical modeling of the transport to an intravascular bubble in a tube with a soluble/insoluble surfactant" (with J. Zhang and D.M. Eckmann), ***Interdisciplinary Transport Phenomenon in the Space Sciences, Annals of the New York Academy of Sciences***, Vol. 1077, 270-286 (2006).

85."A Front Tracking Method for a Deformable Intravascular Bubble in a Tube with Soluble Surfactant" (with J. Zhang and D.M. Eckmann), ***J. Comp. Phys.***, 214,366-396 (2006).

84."Gas Embolism and surfactant-based intervention: Implications for long duration space-based activity" (with D.M. Eckmann, J. Zhang, and J. Lampe), ***Interdisciplinary Transport Phenomenon in the Space Sciences, Annals of the New York Academy of Sciences***, Vol. 1077, 256-269 (2006).

83."Ground based Studies with a Loop Heat Pipe (LHP) for Spacecraft Thermal Control: Part II: Experiments under Ambient Conditions" (with M. Parker and B. Drolen), ***J. Thermophysics and Heat Transfer***, 19, 2, 129-136 (2005).

82."Modeling of Phosphate Ion Transfer to the Surface of Osteoblasts under normal gravity and simulated microgravity conditions" (with K. Mukundakrishnan, M. Risbud, H. Hu and I. M. Shapiro), ***Transport Phenomena in Microgravity, Annals of the New York Academy of Sciences***, 85-98 (2004).

81."Bone Cell Survival in Microgravity: Evidence that Modeled Microgravity Increases Osteoblast Sensitivity to Apoptogens" (with I. M. Shapiro, M. Bucaro, C. S. Adams, K. Mukundakrishnan and M. V. Risbud), ***Transport Phenomena in Microgravity, Annals of the New York Academy of Sciences***, Vol. 1027, 64-73 (2004).

80."Ground based Studies with a Loop Heat Pipe (LHP) for Spacecraft Thermal Control: Part I: Vacuum Chamber Tests" (with M. Parker and B. Drolen), ***J. Thermophysics and Heat Transfer***, 18, (4), 417-429 (2004).

79."Melting of a wire anode followed by solidification: A three-phase moving interface problem" (with S. S. Sripada and I. M. Cohen), ***ASME J. Heat Transfer,*** 125, No. 4, 661-668 (2003).

*78."Low Energy Plasma Heat Transfer as Applied to Microelectronic Packaging" (with I.M. Cohen), ***Annual Review of Heat Transfer***, XII, 27-78 (2002).

77."Bioactive, degradable composite microspheres: effect of filler material on surface reactivity," ***Microgravity Transport Processes in Fluid, Thermal, Biological and Materials Sciences, Annals of the New York Academy of Sciences***,79, 974, 556-564 (2002).

76."Surface transformation of bioactive glass in bioreactors simulating microgravity conditions: Part II: Numerical Simulation" (with S. Radin, P. Ducheyne and H. Gao), ***Biotechnology and Bioengineering***, 75, (3), 379-385 (2001).

75."Surface transformation of bioactive glass in bioreactors simulating microgravity conditions: Part I: Experimental Investigation" (with S. Radin, P. Ducheyne and H. Gao), ***Biotechnology and Bioengineering***, 75, (3), 369-378 (2001).

74."3-D bone tissue engineering with bioactive microspheres in microgravity" (with Q. Qiu and P. Ducheyne), ***In Vitro Cellular and Developmental Biology-Animal***, 37, 157-165 (2001).

73."New bioactive, degradable, composite microcarriers as tissue engineering substrates" (with Q. Qiu and P. Ducheyne), ***J. Biomed. Mater. Res.***, 52, (1) 66-76 (2000).

72."Charged particle distributions and heat transfer in a discharge between geometrically dissimilar electrodes: From breakdown to steady state" (with Wei Qin and I. M. Cohen), ***Phys. Plasmas***, ***Am.Inst.Phys.,*** 7, No. 2, 719-728 (2000).

71."The culture of three-dimensional bone-like tissue under simulated microgravity conditions in NASA's rotating-wall vessels: experimental and numerical studies," ***Microgravity Fluid Physics and Heat Transfer***, Ed: V. Dhir, 183-196, Begell house, Inc. (1999).

70."Heat affected zone in the wire electrode during electronic flame off in bonding" (with S. Sripada, I.M. Cohen, L. Medalla and B.J. Mulada), ***Int. J. Microcircuits & Electronic Packaging***, 22, 203-211 (1999).

69. "Fabrication, characterization and evaluation of hollow bioceramic microspheres used as microcarriers for 3-D bone tissue formation in rotating bioreactors" (with Q. Qiu and P. Ducheyne), ***Biomaterials***, 20, 989-1001 (1999).

68."Weakly Ionized Plasma Arc Heat Transfer Between Geometrically Dissimilar Electrodes" (with S. Sripada and I.M. Cohen), ***ASME J. Heat Transfer,*** 120, No. 4, 939-942 (1998).

*67.Interfacial Motion of a Molten Layer Subject to Plasma Heating" (with S. Sripada and I.M. Cohen), **Fluid Dynamics at Interfaces**, Ed: W. Shyy, 320-338, Cambridge University Press (1998).

66."The Dynamics of a Microcarrier Particle in a Rotating Wall Vessel" (with H. Gao and P. Ducheyne), ***Microgravity Science and Technology***, X/3, 154-165 (1997).

65."Three-Dimensional Bone Marrow Stromal Cell Culture on Microcarriers in a Rotating Wall Vessel" (with Q. Qiu, P. Ducheyne and H. Gao), ***Tissue Engineering***, 4, No. 1, 19-35 (1998).

64."Surface Modified Bioactive Glass Particles as Microcarriers in a Microgravity Environment" (with P. Ducheyne, T. Livingston, I. Shapiro, H. Gao and S. Radin), ***Tissue Engineering***, 3, No. 3, 219-229 (1997).

63."Oscillatory Enhancement of the Squeezing Flow of Yield Stress Fluids: A Novel Experimental Result" (with K. Zwick and I.M. Cohen), ***J. Fluid Mech***., 339, 77-87 (1997).

62."Numerical Evaluation of Heat Clearance Properties of a Radiatively Heated Biological Tissue" (with S.G. Klemick and M.A. Jog), ***Numerical Heat Transfer*** - Part A, 31, No. 5, 451-467 (1997).

61."Influence of Elasto-Plastic Behavior of Epoxy on Stresses and Strains in TAB Packaging" (with M.A.Jog and I.M. Cohen), ***Int. J. Microcircuits & Electronic Packaging***, 19, No. 3, 308-315 (1996).

60. "Condensation on a Spray of Water Drops: A Cell Model Study, Part II: Transport Quantities" (with L.J. Huang and S. Sripada), ***Int. J. Heat and Mass Transfer***, 39, No. 18, 3791-3797 (1996).

59."Condensation on a Spray of Water Drops: A Cell Model Study, Part I: Flow Description" (with S. Sripada and L.J. Huang), ***Int. J. Heat and Mass Transfer***, 39, No. 18, 3781-3790 (1996).

58."Variational Analysis of the Squeezing Flow of a Yield Stress Fluid" (with K. Zwick and I.M. Cohen), ***J. Non-Newtonian Fluid Mech.,*** 63, 179-199 (1996).

*57."Mathematical Methods in Direct-Contact Transfer Studies with Droplets," ***Annual Review of Heat Transfer***, VII, 245-331 (1996).

56."Evaporation and Combustion of a Slowly Moving Liquid Fuel Droplet: Higher Order Theory" (with M.A. Jog and I.M. Cohen), ***J. Fluid Mech.***, 307, 135-165 (1996).

55."Jet-Flow Scavenging of a Curing Oven, Part II: Numerical Simulation" (with K.J. Zwick and I.M. Cohen), ***ASME J. Electronic Packaging,*** 117, 220-224 (1995).

*54. "Direct Contact Transfer Processes with Moving Liquid Droplets," ***Advances in Heat Transfer***, 26, 1-104 (1995).

53."Jet-Flow Scavenging of a Curing Oven, Part I: Flow Visualization" (with K.J. Zwick and I.M. Cohen), ***ASME J. Electronic Packaging,*** 117, 215-219 (1995).

52."Melting and Solidification of Thin Wires: A Class of Phase-Change Problems with a Mobile Interface, Part II: Experimental Confirmation" (with L.J. Huang and I.M. Cohen), ***Int. J. Heat Mass Transfer***, 38, No. 9, 1647-1659 (1995).

51."Melting and Solidification of Thin Wires: A Class of Phase-Change Problems with a Mobile Interface, Part I: Analysis" (with L.J. Huang and I.M. Cohen), ***Int. J. Heat Mass Transfer***, 38, No. 9, 1637-1645 (1995).

50."Fixed Wand Electronic Flame Off for Ball Formation in the Wire Bonding Process - Side Discharge" (with W. Qin and I.M. Cohen), ***ASME J. Electronic Packaging,*** 116, 212-219 (1994).

49."Heat Transfer in Wire Bonding Process" (with M.A Jog and I.M. Cohen), ***ASME J. Electronic Packaging***, 116, 44-48 (1994).

48."Effect of Negative Ions on Electrical Breakdown in a Non-Uniform Air Gap" (with K. Ramakrishna and I.M. Cohen), ***Phys. Plasmas, Am. Inst. Phys.***, 1 (5), 1349-1358 (1994).

47."Analysis and Simulation of Thermal Transients and Resultant Stresses and Strains in TAB Packaging" (with M.A. Jog and I.M. Cohen), ***ASME J. Electronic Packaging,*** 115, 34-38 (1993).

46."Numerical Methods for Two-Dimensional Analysis of Electrical Breakdown in a Non-uniform Gap" (with K. Ramakrishna and I. M. Cohen), ***J. Comp. Phys.***, 104, 173-184 (1993).

45."Electrode Heating in a Wire-to-Plane Arc" (with M.A. Jog and I.M. Cohen), ***Phys. Fluids, B,*** 4 (2), 465-472 (1992).

44."Breakdown of a Wire-to-Plane Discharge: Transient Effects" (with M.A. Jog and I.M. Cohen), ***Phys. Fluids, B,*** 3 (12), 3532-3536 (1991).

43."Effect of Polarity on Heat Transfer in the Ball Formation Process" (with L.J. Huang, M.A. Jog and I. M. Cohen), ***ASME J. Electronic Packaging,*** 113, No. 1, 33-39 (1991).

42."A Note on the Interface Condition in Phase Change Problems" (with L.J. Huang and I. M. Cohen), ***ASME J. Heat Transfer,*** 113, No. 1, 244-247 (1991).

41."Effect of Insoluble Surfactants in Condensation on a Moving Drop" (with L.J. Huang), ***ASME J. Heat Transfer,*** 113, No. 1, 232-236 (1991).

40."Effect of Internal Circulation on the Transport to a Moving Drop" (with S.S. Sadhal and L.J. Huang), ***Int. Comm. Heat Mass Transfer***, 17, No. 6, 689-701 (1990).

39."Ball Formation in Wire Bonding: Part II, Real Scale Experimental Study" (with S.C. Chang, I. M. Cohen and L.J. Huang), ***Int. J. Hybrid Microelectronics***, 13 (2), 29-34 (1990).

38."Ball Formation in Wire Bonding: Part I, Upscaled Experimental Study" (with L.J. Huang, K.M. Yu, S. Powell and I. M. Cohen), ***Int. J. Hybrid Microelectronics***, 13 (1), 1-5 (1990).

37."Evaporation of a Moving Liquid Droplet: Solutions for Intermediate Reynolds Numbers" (with L.J. Huang), ***Int. Comm. Heat Mass Transfer***, 17, No. 1, 27-28 (1990).

*36. "Fluid Mechanics of Direct-Contact Transfer Processes with Moving Liquid Droplets," ***Encyclopedia of Fluid Mechanics***, 8, 535-587 (1989).

35."An Analysis of Shrinkage Porosity in Aluminum Ball Bonding Process" (with L.J. Huang, K. Ramakrishna and I.M. Cohen), ***ASME J. Electronic Packaging,*** 111, No. 3, 199-206 (1989).

34."Temperature Response of a Heated Cylinder Subject to Side Cooling - Asymptotic and Numerical Solutions" (with K. Ramakrishna and I.M. Cohen), ***ASME J. Heat Transfer,*** 111, No. 3, 592-597 (1989).

*33. "Combustion Dynamics of Moving Droplets," ***Encyclopedia of Environmental Control Technology***, 1, 479-532 (1989).

32."An Experimental Study of Ball Formation Processes with Aluminum and Copper" (with I. M. Cohen and K. Ramakrishna), ***Experimental and Thermal Fluid Science***, 2, 51-64 (1989).

31."Two-Dimensional Analysis of Electrical Breakdown in a Non-Uniform Gap between a Wire and a Plane" (with K. Ramakrishna and I.M. Cohen), ***J. Appl. Phys., Am. Inst. Phys.***, 65 (1), 41-50 (1989).

30."A Model for the Evaporation of a Slowly Moving Liquid Droplet" (with G. Gogos), ***Combustion and Flame***, 74, 111-129 (1988).

29."The Drag Coefficients Associated with a Moving Liquid Drop Experiencing Condensation" (with L.J. Huang), ***ASME J. Heat Transfer,*** 109, No. 4, 1003-1006 (1987).

28."Heat Transfer of a Nuclear Reactor Containment Spray Drop" (with L.J. Huang), ***J. Nucl. Eng. and Design***, 101, 137-148 (1987).

27."Heat and Mass Transfer Associated With a Spray drop Experiencing Condensation: A Fully Transient Analysis" (with L.J. Huang), ***Int. J. Heat Mass Transfer***, 30, No. 5, 881-891 (1987).

26."Heat Transport Mechanisms in Vascular Tissues: A Model Comparison" (with J.W. Baish and K.R. Foster), ***ASME J. BioMech. Eng.,*** 108, No. 4, 324-331 (1986).

25."Thin-Flame Theory for the Combustion of a Moving Liquid Drop: Effects Due to Variable Density" (with G. Gogos, S.S. Sadhal and T. Sundararajan), ***J. Fluid Mech.***, 171, 121-144 (1986).

24."Small Scale Temperature Fluctuations in Perfused Tissue During Local Hyperthermia" (with J.W. Baish and K.R. Foster), ***ASME J. BioMech. Eng.,*** 108, No. 3, 246-250 (1986).

23."Perfused Phantom Models of Microwave Irradiated Tissue" (with J.W. Baish and K.R. Foster), ***ASME J. BioMech. Eng.,*** 108, No. 3, 239-245 (1986).

22."Numerical Evaluation of Heat and Mass Transfer to a Moving Liquid Drop Experiencing Condensation" (with T. Sundararajan), ***Numerical Heat Transfer***, 8, No. 6, 689-706 (1985).

21."Ball Formation Processes in Aluminum Bonding Wire" (with I.M. Cohen), ***Solid State Technology***, 28, No. 12, 89-92 (1985).

20."Linear Stability of a Viscous-Inviscid Interface" (with J.M. Hogan), ***Phys. Fluids, A,*** 28 (9), 2709-2715 (1985).

19."Heat and Mass Transfer Associated with Condensation on a Moving Drop: Solutions for Intermediate Reynolds Numbers by a Boundary Layer Formulation" (with T. Sundararajan), ***ASME J. Heat Transfer,*** 107, No. 2, 409-416 (1985).

18."Hydrodynamics and Heat Transfer Associated with Condensation on a Moving Drop: Solutions for Intermediate Reynolds Numbers" (with T. Sundararajan), ***J. Fluid Mech.***, 149, 33-58 (1984).

17."Laminar Condensation on a Moving Drop. Part II. Numerical Solutions" (with J.N. Chung and S.S. Sadhal), ***J. Fluid Mech.***, 139, 131-144 (1984).

16."Laminar Condensation on a Moving Drop. Part I. Singular Perturbation Technique" (with J.N. Chung and S.S. Sadhal), ***J. Fluid Mech.***, 139, 105-130 (1984).

15."Flow Past a Liquid Drop with a Large Non-uniform Radial Velocity" (with S.S. Sadhal), ***J. Fluid Mech.***, 133, 65-81 (1983).

14."Heat Transfer in Surface-Cooled Objects Subject to Microwave Heating" (with K. R. Foster, T. Sundararajan and K. Ramakrishna), ***IEEE Trans. on Microwave Theory and Techniques, MTT-30***, No. 3, 1158-1166 (1982).

13."Material Removal Associated with Condensation on a Droplet in Motion" (with J.N. Chung), ***Int. J. Multiphase Flow***, 7, No. 3, 329-342 (1981).

12."Laminar Condensation Heat and Mass Transfer to a Moving Drop" (with J.N. Chung), ***AIChE J.***, 27, No. 3, 372-377 (1981).

11."Effect of Plug Flow on the Stability of Two-Dimensional Arcs" (with I.M. Cohen and T. Sundararajan), ***IEEE Trans. on Plasma Science, PS-8***, No. 4, 390-394 (1980).

10."Laminar Condensation Heat and Mass Transfer in the Vicinity of the Forward Stagnation Point of a Spherical Droplet Translating in a Ternary Mixture: Numerical and Asymptotic Solutions" (with J.N. Chung), ***Int. J. Heat Mass Transfer***, 21, 1309-1324 (1978).

9."Thermal and Electrical Characteristics of a Two-Dimensional Tanh-Conductivity Arc" (with G.C. Das and I.M. Cohen), ***J. Appl. Phys., Am. Inst. Phys.***, 49, No. 1, 160-165 (1978).

8."The Effect of Internal Circulation on the Heat Transfer of a Nuclear Reactor Containment Spray Droplet" (with J.N. Chung), ***Nuclear Technology, J. Am. Nuc. Soc.***, 35, No. 3, 603-610 (1977).

7."Reactor Containment Heat Removal by Passive Heat Sinks Following a LOCA" (with J.N. Chung and K.K. Niyogi), ***Nuclear Technology, J. Am. Nuc. Soc.***, 33, No. 3, 243-247 (1977).

6."On the Stability of Electric Arc Discharges" (with A.M. Whitman and I.M. Cohen), ***J. Appl. Phys., Am. Inst. Phys.***, 47, No. 11, 4827-4832 (1976).

5."Natural Convection Flow in a Finite, Rectangular Slot Arbitrarily Oriented with Respect to the Gravity Vector" (with I. Catton and R.M. Clever), ***Int. J. Heat Mass Transfer***, 17, 173-184 (1974).

4."On the Stability of Plane Parallel Flow between Differentially Heated, Tilted Planes," ***ASME J. Appl. Mech.,*** 41, No. 3, 554-556 (1974).

3."Capillary Flow in Triangular Grooves" (with I. Catton and D.K. Edwards), ***ASME J. Appl. Mech.,*** 41, No. 2, 332-336 (1974).

2."The Boundary-Layer Regime for Natural Convection in a Differentially Heated, Tilted, Rectangular Cavity" (with I. Catton), ***ASME J. Heat Transfer,*** 95, No. 4, 543-545 (1973).

1."Prediction of Momentum Transfer between Rotating Cylinders: The Narrow Gap Problem" (with I. Catton), ***ASME J. Appl. Mech.,*** 39, No. 1, 33-35 (1972).

e). PUBLICATIONS IN REFEREED CONFERENCE PROCEEDINGS (* : INVITED PAPER)

70. "Motion of a Nano-Spheroid in a Cylindrical Vessel Flow: Brownian and Hydrodynamic Interactions; Implications for Targeted Drug Delivery," (with N. Ramakrishnan, Y. Wang, D.M. Eckmann, and R. Radhakrishnan), *SB3C*, June 21-24, Tucson, Az, USA, (2017).

*69. "Multiscale numerical modeling of the motion of a spherical nanoparticle in a blood vessel: Implications for targeted drug delivery," (with H.Vitoshkin, H-Y Yu, D. M. Eckmann, and R. Radhakrishnan), *6th International Symposium on Advances in Computational Heat Transfer*, Rutgers University, Piscataway, USA, (2015).

68. "Modeling of a nanoparticle motion in a Newtonian fluid: A comparison between fluctuating hydrodynamics and generalized Langevin procedures" (with B.Uma, R.Radhakrishnan, and D.M.Eckmann), *Proceedings of the ASME 3rd Micro/Nanoscale Heat & Mass Transfer International Conference,* Georgia, Atlanta, Paper No. MNHMT-75019 (2012).

67. "Fluctuating hydrodynamics approach for the simulation of nanoparticle Brownian motion in a Newtonian fluid" (with B.Uma, R.Radhakrishnan, and D.M.Eckmann), *Proceedings of the 21st National & 10 th ISHMT-ASME Heat and Mass Transfer Conference,* Indian Institute of Technology Madras, India, Paper No. ISHMT_USA_020 (2011).

66. "Modeling of Binding Free Energy of Targeted Nanocarriers to Cell Surfaces" (with J. Liu, D.M. Eckmann, and R.Radhakrishnan), The Seventh Interdisciplinary Transport Phenomena Conference, *Proceedings of ITP2011, Interdisciplinary Transport Phenomena VII: Fluid, Thermal, Biological, Materials and Space Sciences,* pp 6-6 to 6-11, Dresden, Germany, (2011).

*65. "Biotransport: Fluid Mechanics, Heat and Mass Transfer," SBC 2011-53178, *ASME 2011 Summer Bioengineering Conference*, Nemacolin Woodlands Resort, Farmington, PA, June (2011).

*64. "Low energy plasma heat transfer in microelectronic manufacturing"(with I.M. Cohen), *Proc. Intl. Symp. Recent trends in heat and mass transfer,* Indian Institute of Technology, Guwahati, India (2002).

*63. "Electric field effects on ion transport in heated flows" (with K. Mukundakrishnan and I. M. Cohen) *Fifth ISHMT/ASME Heat and Mass Transfer Conference,* Kolkata, India (2002).

62. "A novel attitude control technique for miniature spacecraft"(with J. Li, S.K. Koh, G.K. Ananthasuresh and S. Ananthakrishnan) *Proc. 2001 ASME/IMECE*, New York, NY, Nov. 11-16 (2001).

61. "3-D bone tissue engineering with bioactive and resorbable microcarriers," (with Q. Qiu and P. Ducheyne) *Trans. Sixth World Biomat. Cong*., Kamuela, Hawaii, 11, 938 (2000).

60. "A novel bioactive, resorbable composite microsphere for bone tissue engineering and regeneration," (with Q. Qiu and P. Ducheyne) *Trans. Sixth World Biomat. Cong*., Kamuela, Hawaii, 1, 433 (2000).

59. "In vitro immersion simulating microgravity affects the bioactive glass surface reactions,"(with S. Radin and P. Ducheyne) *Trans. Sixth World Biomat. Cong*., Kamuela, Hawaii, 1, 279 (2000).

58. "Reactions and surface transformations of a bioactive material in a simulated microgravity environment," (with P. Ducheyne, S. Radin, and H. Gao) *Proc. NASA microgravity materials science conference*, Huntsville, AL (2000).

57. "3-D Bone tissue engineering with bioactive, restorable microcarriers" (with Q. Qiu and P. Ducheyne) *Bioceramics 13, Proc. Int. Symp. Ceram. Med*., (2000).

56. "Motion of microcarriers in rotating wall vessels," (with H. Gao and P. Ducheyne) *Advances in Heat and Mass Transfer in Biotechnology*, HTD-Vol. 363/BED-Vol. 44, Ed: E. P. Scott, 33-34, Published by ASME, New York (1999). Also Presented at the *International Mechanical Engineering Congress and Exposition,* Nashville, TN (1999).

55. “Bioactive and degradable composite microcarriers for 3-D bone tissue engineering in simulated microgravity,” (with Q. Qiu and P. Ducheyne) *Advances in Heat and Mass Transfer in Biotechnology*, HTD-Vol. 363/BED-Vol. 44, Ed: E. P. Scott, 31-32, Published by ASME, New York (1999). Also Presented at the *International Mechanical Engineering Congress and Exposition*, Nashville, TN (1999).

54. "Loop heat pipe performance in microgravity - Is subcooling required?" (with M. Parker and B. Drolen). *Proc. 5th ASME/JSME joint Thermal Engineering Conference*, Paper no. AJTE 99-6285, San Diego, CA (1999).

53. "Flight test performance of a loop heat pipe- Focus on a long steady state with no apparent subcooling " (with M. Parker and B. Drolen). Space technology and applications international forum - 1999. *AIP Conference Proceedings*, 458, 818-823 (1999).

52. "Modeling of a Deployable Radiator/Loop Heat Pipe System," (with M. Parker and B. Drolen). *Ninth Thermal and Fluid Analysis WorkshopProceedings*, Aug. 31- Sept. 4, 1998, NASA/CP-1999-208695,NASA Glenn Research Center, Cleveland, OH (1999).

51. "The effect of simulated microgravity on the reactions and surface transformations of a bone bioactive material," (with S. Radin and P. Ducheyne). *Proc. 37th Aerospace Sciences meeting*, Reno, NV, (1999); Also, Issue AIAA-99-0957 of AIAA

50. "Reactions and surface transformations of a bone bioactive material in a simulated microgravity environment," (with S. Radin and P. Ducheyne). *Proc. of the 1998 NASA Microgravity Materials Science Conference*, Huntsville, AL. Eds: D. Gillies, D. McCauley and N. Bennett, 163-167, (1998).

49. "Numerical study of mass transfer associated with multiple microcarriers in a rotating wall vessel" (with H. Gao, H. Hu, M. Zhu and P. Ducheyne). *Advances in Heat and Mass Transfer in Biotechnology*, HTD-Vol. 362/BED-Vol. 40, Ed: S. Clegg, 95-102, Published by ASME, New York (1998). Also Presented at the *International Mechanical Engineering Congress and Exposition*, Anaheim, CA (1998).

48. "A multigrid simulation of the rapid solidification of a pendent molten ball" (with S.S. Sripada and I.M. Cohen). *Proc. ASME Heat Transfer Division, Vol. 4, Heat Transfer in Materials Processing*, HTD-Vol. 361-4, Eds: R.A. Nelson Jr., and U. Chandra, 281-286, Published by ASME, New York (1998). Also presented at the *International Mechanical Engineering Congress and Exposition*, Anaheim, CA (1998).

47. "Bioceramic hollow microspheres for 3-D bone tissue formation in rotating bioreactors" (with Q. Qiu and P. Ducheyne). *Bioceramics 11, Proc. Int. Symp. Ceram: Med*., Eds: R. Z. LeGeros and J. P. LeGeros, 11, 513-516, (1998).

46. "Growth and differentiation of 3-D osteoblastic cell culture on hollow bioceramic microspheres in microgravity conditions" (with Q. Qiu and P. Ducheyne). *Advances in Heat and Mass Transfer in Biotechnology*, HTD-Vol. 362/BED-Vol. 40, Ed: S. Clegg, 49-53, Published by ASME, New York (1998). Also Presented at the *International Mechanical Engineering Congress and Exposition*, Anaheim, CA (1998).

45. “Experimental and Numerical Study of Bone Marrow Stromal Cell Culture on Microcarriers in a Rotating Wall Vessel” (with Q. Qiu, P. Ducheyne, and H. Gao). *Advances in Heat and Mass Transfer in Biotechnology*, HTD-Vol. 335/BED-Vol. 37, Ed: S.T. Clegg, 43-48, published by ASME, New York (1997). Also presented at the *International Mechanical Engineering Congress and Exposition*, Dallas, TX (1997).

44. "Numerical Computation of the Heat Transfer to a Spherical Tip Anode During an Electronic Flame Off Process" (with S. Sripada and I.M. Cohen). *Proc. ASME Heat Transfer Division, Vol. 1*, HTD-Vol.351, Eds: D.A. Zumbrunnen et al., 55-61, Published by ASME, New York (1997). Also presented at the *International Mechanical Engineering Congress and Exposition*, Dallas, TX (1997).

43. "Numerical Simulation of Global Diffusive Mass Transfer in a Rotating Wall Vessel" (with H. Gao and P. Ducheyne). *Advances in Heat and Mass Transfer in Biotechnology*, HTD-Vol. 335/BED-Vol. 37, Ed: S.T. Clegg, 59-67, published by ASME, New York (1997). Also presented at the *International Mechanical Engineering Congress and Exposition*, Dallas, TX (1997).

*42. "Die-Bonding in micro-electronic packaging by oscillatory squeezing" (with K.J. Zwick and I.M. Cohen). *EEP-Vol. 19-1, Advances in Electronic Packaging-1997, Volume 1, ASME 1997,* 373-381, Eds: E. Suhir et al., *Interpack '97*, Proceedings of the Pacific Rim/ASME Intl. Intersociety Elec. & Phot. Pkg. Conf. & Exhibition, Hawaii (1997).

41. "Ball Size and HAZ as functions of EFO parameters for gold bonding wire" (with Wei Qin and I.M. Cohen). *EEP-Vol. 19-1 Advances in Electronic Packaging-1997, Volume 1, ASME 1997*, Eds: E. Suhir et al., 391-398, *Interpack '97,* Proceedings of the Pacific Rim/ASME Intl. Intersociety Elec. & Phot. Pkg. Conf. & Exhibition, Hawaii (1997).

40. "A Study of the Electronic Flame Off Discharge Process Used for Ball Bonding in Microelectronic Packaging" (with S.S. Sripada and I.M. Cohen). *Transport Phenomena in Materials Processing and Manufacturing*, HTD-Vol. 336/FED-Vol. 240, Eds: A.S. Lavine et al, 129-136, Published by ASME, New York (1996). Also presented at the *International Mechanical Engineering Congress and Exposition*, Atlanta, GA (1996).

39. "Microelectronic Chip Attach with Silver Filled Epoxies: An Analytical and Experimental Study" (with K. Zwick and I.M. Cohen). *Transport Phenomena in Materials Processing and Manufacturing*, HTD-Vol. 336/FED-Vol. 240, Eds: A.S. Lavine et al, 121-127, Published by ASME, New York (1996). Also presented at the *International Mechanical Engineering Congress and Exposition,* Atlanta, GA (1996).

38. "Oscillatory Excitation of a Viscoelastic Squeeze Film" (with K.J. Zwick, H. Hu and I.M. Cohen). *Developments and Applications of Non-Newtonian Flows*, FED-Vol. 231/MD-Vol. 65, Eds.: D.A. Siginer and H.P. Wang, 197-203, Published by the ASME, New York (1995). Also presented at the *International Mechanical Engineering Congress & Exposition*, San Francisco, CA (1995).

37. "Non-equilibrium Simulation of Ball Formation from a Bonding Wire: An Application in Microelectronic Interconnection" (with Wei Qin and I.M. Cohen). *The Symposium on Thermal Science and Engineering in Honor of Chancellor Chang-Lin Tien*, Ed.: R.O. Buckius, 365-371, Univ. of Illinois Press, Urbana-Champaign (1995). Also presented at *The Symposium in Honor of Chancellor C-L. Tien*, Berkeley, CA (1995).

36. "Low Energy Arc Heat Transfer in Micro Electronic Packaging Technology" (with W. Qin and I.M. Cohen). *Multiphase Flow and heat transfer in materials processing*, FED vol. 201/HTD vol. 297, 41-48, Ed. M.M. Chen and C.T. Crowe, ASME Publishers, (1994). Also presented at the *Winter Annual Meeting of the ASME*, Chicago, IL (1994).

35. "Ball Formation from Deformed Wire End in Wire Bonding Process: A Variational and Numerical Study" (with W. Qin and I.M. Cohen). *Thermal Processing of Materials: Thermo-Mechanics, Controls,*

and Composites, HTD-Vol. 289, Ed.: V. Prasad, et. al., 107-115, Published by the ASME, New York (1994). Also presented at the *Winter Annual Meeting of the ASME*, Chicago, IL (1994).

34. "Vibrational Excitation of Squeeze Film Flows in Microelectronic Applications" (with K.J. Zwick and I.M. Cohen). *Thermal Processing of Materials: Thermo-Mechanics, Controls, and Composites*, HTD-Vol. 289, Ed.: V. Prasad, et. al., 139-145, Published by the ASME, New York (1994). Also presented at the *Winter Annual Meeting of the ASME*, Chicago, IL (1994).

33. "Heat Clearance Properties of a Radiatively Heated Biological Tissue" (with S.G. Klemick, M.A. Jog and L.J. Huang). *Heat and Mass Transfer 94*, Eds.: S.P. Sukhatme, et. al., 85-93, Tata-McGraw-Hill Publishers, New Delhi (1994). Also presented at *The First ISHMT/ASME Heat and Mass Transfer Conference and Twelfth National Heat and Mass Transfer Conference*, Bombay, India (1994).

32. "Computational and Experimental Visualizations of Scavenging Flows in Curing Ovens" (with K.J. Zwick and I.M. Cohen). *Experimental and Numerical Flow Visualization,* FED-vol. 172, Ed.: B. Khalighi, M.J. Braun, D.H. Fruman, C.J. Freitas, J.G. Georgiadis, M. Keyhani, 343-350, Published by the ASME, New York (1993). Also presented at the *Winter Annual Meeting of ASME*, New Orleans, LA (1993).

31."Fixed Wand Electronic Flame Off for Ball Formation in the Wire Bonding Process" (with W. Qin and I.M. Cohen). *Advances in Electronic Packaging 1993*, EEP-Vol. 4-1, Eds.: P.A. Engel and W.T. Chen, 345-352, Published by the ASME, New York (1993). Also presented at *The 1993 ASME Intl. Electronic Packaging Conf.*, Binghamton, NY (Sept. 29-Oct. 2, 1993).

30."Flow Patterns in Upscaled Models of Snap Cure Ovens" (with K.J. Zwick and I.M. Cohen). *Advances in Electronic Packaging 1993*, EEP-Vol. 4-1, Eds.: P.A. Engel and W.T. Chen, 339-344, Published by the ASME, New York (1993). Also presented at *The 1993 ASME Intl. Electronic Packaging Conf.*, Binghamton, NY (Sept. 29-Oct. 2, 1993).

29."Influence of Elasto-Plastic Behavior of Epoxy on Stresses and Strains in TAB Packaging" (with M.A. Jog and I.M. Cohen). *Advances in Electronic Packaging 1993*, EEP-Vol. 4-1, Eds.: P.A. Engel and W.T. Chen, 83-89, Published by the ASME, New York (1993). Also presented at *The 1993 ASME Intl. Electronic Packaging Conf.*, Binghamton, NY (Sept. 29-Oct. 2, 1993).

28."Thermal Design of Electronic Equipment" *Proc. of the Asia Pacific Conference on Electromagnetic Compatability and Workshop on Electronic Product Design*, 1-106, Madras, India (August 24-25, 1992).

27."Design Improvements of Automated Packaging Machinery in Microelectronic Manufacturing" (with I.M. Cohen, K.J. Zwick, W. Qin, H. Talbot and R. Fromer). *Proc. of the 1993 NSF Design and Manufacturing Systems Conference*, Charlotte, NC, 1553-1557 (January 6-8, 1993).

26."Thermal Stresses in Microelectronics" *Proc. of the Asia Pacific Conference on Electromagnetic Compatability and Workshop on Electronic Product Design*, Madras, India, 67-89 (August 24-25, 1992).

25."Snap Cure Oven Flows in Semiconductor Chip Assembly" (with I.M. Cohen, C.F. Ramos and K.J. Zwick). *Transport Phenomena In Materials Processing and Manufacturing* ASME-HTD-vol. 196, Ed.: M. Charmchi et al., 175-180, Published by the ASME, New York (1992). Also presented at the *National Heat Transfer Conference*, San Diego, CA (August 9-12, 1992).

24."The Effective Thermal Conductivity of Multi-Foil Insulation as a Function of Temperature and Pressure" (with T.R. Stauffer and M.A. Jog). *AIAA* Paper No. 92-2939 Also presented at the *27th AIAA Thermophysics Conference*, Nashville, TN (July 6-8, 1992).

23."Design Improvements of Bonding Machinery in Microelectronic Manufacturing" (with I.M. Cohen, C.F. Ramos, and M.A. Jog). *Proc. of the 1992 NSF Design and Manufacturing Systems Conference*, Atlanta, GA, 1001-1006 (January 8-10, 1992).

22."Analysis and Simulation of Thermal Transients and Resultant Stresses and Strains in TAB Packaging" (with M.A. Jog and I.M. Cohen). *Manufacturing Processes and Materials Challenges in Microelectronic Packaging* AMD-Vol. 131/EEP-Vol. 1, Ed: W.T. Chen, P. Engel, and W.E. Jahsman, 137-142, Published by the ASME, New York (1991). Also presented at the *Winter Annual Meeting of ASME*, Atlanta, GA (1991).

21."Heat Transfer in Electric Arc Welding" (with M.A. Jog and I.M. Cohen). *Welding and Joining Processes* PED-Vol. 51, Ed: E. Kannatey-Asibu, Jr., H.S. Cho and S. Fukuda, 135-142, Published by the ASME, New York (1991). Also presented at the *Winter Annual Meeting of ASME,* Atlanta, GA (1991).

20."Design Aspects of Automatic Wire Bonding Machinery" (with M.A. Jog, L.J. Huang and I.M. Cohen). *Proc. of the 1991 NSF Design and Manufacturing Systems Conference*, Austin, TX, 235-240 (January 9-11, 1991).

19."Effect of Polarity on Heat Transfer in the Ball Formation Process" (with L.J. Huang, M. A. Jog and I. M. Cohen). *Transport Phenomena in Materials Processing*, HTD-Vol. 146, Ed: P. J. Bishop et al., Published by the ASME, New York (1990). Also presented at the *Winter Annual Meeting of ASME*, Dallas, TX (1990).

18."Ball Formation in Wire Bonding: Progress in Experimental Modeling" (with I.M. Cohen, L.J. Huang and S.-C. Chang). *Proc. of the 1990 NSF Design and Manufacturing Systems Conference*, Tempe, AZ, 615-620 (January 8-12, 1990).

17."Effect of Internal Circulation on the Transport to a Moving Liquid Drop" (with S.S. Sadhal and L.J. Huang). *Heat Transfer in Convective Flows*, HTD-Vol. 107, Ed: R. K. Shah, 131-140, Published by the ASME, New York (1989). Also presented at the *1989 National Heat Transfer Conference*, Philadelphia, PA (1989).

16."Evaporation of a Moving Liquid Droplet: Solutions for Intermediate Reynolds Numbers" (with L.J. Huang). *Heat Transfer Phenomena in Radiation, Combustion and Fires*, HTD-Vol. 106, Ed: R.K. Shah, 431-437, Published by the ASME, New York (1989). Also presented at the *1989 National Heat Transfer Conference*, Philadelphia, PA (1989).

15."Numerical Simulation of the Ball Formation Process in Wire Bonding Apparatus" (with L.J. Huang and I.M. Cohen). *Advances in Manufacturing Systems Integration and Processes, Fifteenth Conf. on Production Research and Technology,* San Francisco, CA, Ed: D.A. Dornfeld, 637-645, (1989).

14."Temperature Response of a Heated Cylinder Subject to Side Cooling - Asymptotic and Numerical Solutions" (with K. Ramakrishna and I.M. Cohen). *Collected Papers in Heat Transfer* - 1988, HTD-Vol. 104, Ed: K.T. Yang, 29-37, Published by the ASME, New York (1988). Also presented at the *Winter Annual Meeting of ASME*, Chicago, IL (1988).

13."An Experimental Study of Ball Formation Processes with Aluminum and Copper" (with I.M. Cohen and K. Ramakrishna). *Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics*, Ed.: R.K. Shah, E.N. Ganic and K.T. Yang, 989-997, Published by Elsevier Science Publishing Co., Inc. (1988). Also presented at *The First World Conf. on Exptl. Heat Transfer, Fluid Mechanics and Thermodynamics*, Dubrovnik, Yugoslavia (September 4-9, 1988).

12."Ball Formation in Wire Bonding Apparatus - Discharge and Metallographic Studies" (with I.M. Cohen, K. Ramakrishna and H. Shaojie). *Proc. of the Fourteenth Conf. on Production Research and Technology*, Sponsored by NSF, Ann Arbor, MI, 453-460 (October 6-9, 1987).

11."Thin Film Conductive Coatings for Surface Heating and Decontamination" (with S.S. Sadhal and A.K. Stuempfle). *Trans. Fourth Army Conf. on Appl. Mathematics and Computing*, Ithaca, NY, 833-862 (1986). Also, presented at *The Fourth Army Conf. on Appl. Mathematics and Computing*, Ithaca, NY (1986).

10."The Drag Coefficient Associated With a Moving Liquid Drop Experiencing Condensation" (with L.J. Huang). *ASME* Paper No. 86-WA/HT-39. Also, presented at the *Winter Annual Meeting of ASME*, Anaheim, CA (1986).

9."Ball Formation Processes in Wire Bonding Apparatus: Some Recent Developments" (with I. Cohen). *Proc. Thirteenth Conf. on Production Research and Technology,* Sponsored by NSF, Gainesville, FL, 37-42, (1986).

8."Discontinuous Boundary Temperatures in Heat Transfer Theory" (with M.W. Nansteel and S.S. Sadhal). *Significant Questions in Buoyancy Affected Enclosure or Cavity Flows*, Ed: J.A.C. Humphrey et. al., 123-126, Published by the ASME, New York (1986). Also, presented at the *Winter Annual Meeting of ASME*, Anaheim, CA (1986).

*7. "Condensation on a Moving Drop: Effect of Time-dependent Drop Velocity" (with T. Sundararajan). *Proc. Eighth National Heat and Mass Transfer Conf.*, Visakha Patnam, India, HMT-E17-85, 453-459 (1985).

*6. Linear Stability Analysis of a Two-Dimensional Arc" (with I.M. Cohen and G.C. Das). Invited Paper. *Proc. Fourth Intl. Symp. Plasma Chemistry*, Zurich, ISPC-4, Ed: S. Veprek and J. Hertz, 596-602 (1979).

5."Material Transport with Steam Condensation on a Moving Spray Droplet Including the Effect of Internal Chemical Reaction" (with J.N. Chung). *Topics in Two-Phase Heat Transfer and Flow*, Ed: S.G. Bankoff, 153-164, Published by the ASME, New York (1978). Also, presented at the *Winter Annual Meeting of ASME*, San Francisco, CA (1978).

4."Fundamental Studies of Arc Discharges as Related to Power Circuit Breakers" (with A.M. Whitman and I.M. Cohen). *Proc. EPRI-Industry Symp. on Fault Current Limiter and Power Circuit Breaker Technology*, Buffalo, NY, Chapter 5, 1-13, (1976).

3."Thermal Energy Storage Considerations for Solar Thermal Power Generation" (with N. Lior, J. O'Leary, K.W. Kaufman, H. Yeh and H.G. Lorsch). *Proc. Eleventh Int. Soc. Ener. Conv. Conf.,* Stateline, NV, 1, 613-622 (1976).

2."Evaporation and Condensation on Circumferential Grooves on Horizontal Tubes" (with D.K. Edwards, K.D. Gier and I. Catton). *ASME* Paper No. 73-HT-25 Also, presented at the *ASME - AICHE Heat Transfer Conf.*, Atlanta, GA (1973).

1."Convective Heat Transfer between Concentric Rotating Cylinders" (with R.D. Sharman and I. Catton). *Chem. Eng. Prog. Symp. Series*, 69, No. 131, 118-125 (1973).

f). IMPORTANT PUBLISHED REPORTS

9. "Review of NASA Plans for the International Space Station" (with M.J. Osborn et al.), National Research Council of the National Academies, The National Academies Press, Washington, D.C., (2006).

8. "Low Energy Arc Heat Transfer with Applications in Microelectronic Packaging Technology" (with I.M. Cohen) NSF Final Report on Grant CTS 94-21598, Thermal Processes and Thermal Transport Program. (1998).

7. "Ball Formation Processes in Wire Bonding Apparatus" (with I.M. Cohen) NSF DDM 8709537, PSC DMC 0000000/8513128 and DMC 890001P. Also University of Pennsylvania Rept. (1990).

6. "Ball Formation Processes in Wire Bonding Apparatus" (with I.M. Cohen). NSF DMC 8513128, PSC DMC 0000000/8513128. Also Univ. of Pennsylvania Rept. (1988).

5. "Thin Film Conductive Coatings for Surface Heating and Decontamination" (with S.S. Sadhal). U.S. Army Technical Rept. CRDC-CR-85028 (1985).

4. "The Risk of Catastrophic Spills of Toxic Chemicals" (with J.A. Simmons, R.C. Erdmann, B.N. Naft and K.A. Solomon). *Reactor Safety Study WASH-1400,* Ed: N.C. Rasmussen, *RASMUSSEN Report,* Published by U.S. Nuclear Regulatory Commission (1975).

3. "Estimates of the Risks Associated with Dam Failure" (with B. Hauss, T. Hsieh, A. Moscati, T.E. Hicks and D. Okrent). *Reactor Safety Study WASH-1400,* Ed: N.C. Rasmussen, *RASMUSSEN Report,* Published by U.S. Nuclear Regulatory Commission (1974).

2. "Hydrodynamics of Thin Wiped Films" (with V.E. Denny et. al.,). *Heat and Mass Transfer Studies*: *Water Resources Center Desalination Report No. 29, State of California* (1969).

1. "Wiped Film Hydrodynamics" (with R.L. Perrine et. al.). *Heat and Mass Studies: Water Resources Center Desalination Report No. 22, State of California* (1968).

g). PUBLISHED ABSTRACTS
(* : INVITED PRESENTATION)

63."Adhesion of Functionalized Nanocarriers to Endothelium in Targeted Drug Delivery : Role of Cell Membrane Undulations ," (with Natesan, R., Eckmann, D.M., and Radhakrishnan, R.), *World Congress of Biomechanics,* Boston, MA, July 2014.

62."Hydrodynamic models for deformable functionalized nanocarriers," (with Sarkar, A., Eckmann, D.M.,

and Radhakrishnan, R.), *ACS 2014 Colloids & Surface Science Symposium,* Philadelphia, PA, June 2014.

61."Dynamics of functionalized nanocarrier binding to cell surface in the presence of hydrodynamic interactions studied using generalized Langevin equations and dynamical density functional theory ," (with Yu, H-Y, Vitoshkin, H., Eckmann, D.M., and Radhakrishnan, R.), *ACS 2014 Colloids & Surface Science Symposium,* Philadelphia, PA, June 2014.

60."Targeting functionalized nanocarriers to live cells ," (with Natesan, R., Eckmann, D.M., and Radhakrishnan, R.), *ACS 2014 Colloids & Surface Science Symposium,* Philadelphia, PA, June 2014.

59."Modeling the effects of multibody interactions on nanoparticle hydrodynamics in an incompressible Newtonian fluid," (with Yu, H-Y, Natesan, R., Eckmann,D.M., and Radhakrishnan, R), *22 nd National and 11 th ISHMT-ASME Heat and Mass Transfer Conference,* IIT Kharagpur, India, Dec. 2013.

58."Generalized Langevin dynamics for functionalized nanocarrier adhesion to cell surfaces in the presence of hydrodynamic interactions," (with Yu, H-Y, Natesan, R., Eckmann,D.M., and Radhakrishnan, R), *2013 American Institute of Chemical Engineers Annual Meeting*, San Francisco, CA, Nov. 2013.

57."Computational model for nanocarrier adhesion to cell surfaces validated using in vivo, in vitro, and atomic force microscopy experiments," (with Liu, J., Eckmann, D.M., Muzykantov, V., and Radhakrishnan, R.), *ACS Fall 2012 National Meeting & Exposition,* Philadelphia, PA, August 2012.

56."Modeling of nanoparticle motion in an incompressible Newtonian fluid: A comparison between fluctuating hydrodynamics and generalized Langevin approaches," (with Balakrishnan, U., Eckmann, D.M., and Radhakrishnan, R.), *ASME 2012 3rd Micro/Nanoscale Heat & Mass Transfer International Conference,* Atlanta, GA, March, 2012.

55."Mesoscale model of targeted vascular drug delivery using functionalized nanocarriers," (with Liu, J., Eckmann, D.M., and Radhakrishnan, R.), ASME 2012 3rd Micro/Nanoscale
Heat & Mass Transfer International Conference, Atlanta, GA, March, 2012.

54."Surface tension measurements cannot uniquely define surface excess concentration during competitive protein adsorption,"(with Lampe, J.W., Liao, Z.Z., and Dmochowski, J.J.),
American Chemical Society Annual Meeting, San Diego, CA, March, 2012.

53."Computational model for nanocarrier adhesion to cell surfaces validated using in vivo, in vitro, and Atomic Force Microscopy experiments," (with Natesan, R., Liu,J., Eckmann,D.M., Muzykantov,V., and Radhakrishnan, R), *2012 American Institute of Chemical Engineers Annual Meeting*, Pittsburgh, PA, Oct-Nov 2012.

52."Modeling of nanoparticle motion in an incompressible Newtonian fluid: A comparison between fluctuating hydrodynamics and generalized Langevin approaches," (Balakrishnan, U., Eckmann, D.M., and Radhakrishnan, R.), *2012 American Institute of Chemical Engineers Annual Meeting*, Pittsburgh, PA, Oct-Nov 2012.

51."Monte Carlo simulations of binding free energy of targeted nanocarriers to cell surfaces,"(with Liu,J., Zern,B., Eckmann,D.M., Muzykantov,V., and Radhakrishnan, R.),
Biophysical Society Annual Meeting, Baltimore, MD, March, 2011.

50."Protein assembly at the air-water interface studied by confocal microscopy", (with Liao,Z.Z., Lampe, J.W., and Eckmann, D.M.), *American Chemical Society Annual*

Meeting, Denver, CO, August 2011.

49."Computational modelling of binding free energy of targeted nanocarriers to cell surfaces," (with Liu,J., Eckmann,D.M., and Radhakrishnan, R.), *Interdisciplinary Transport Phenomena VII: Fluid, Thermal, Biological, Materials & Space Sciences*, Dresden, Germany, September, 2011.

48."Multiscale modeling of nanocarrier binding to endothelium,"(with Liu,J., Bradley,R., Eckmann,D.M., and Radhakrishnan, R.), *American Institute of Chemical Engineers Annual Meeting*, Minneapolis, MN, October, 2011.

47."Top-down multiscale models and free energy calculations of multivalent protein-protein and protein-membrane interactions in nanocarrier adhesion and receptor trafficking," (with Liu, J., Agrawal,N., Eckmann, D.M., and Radhakrishnan, R.),*Interagency Modeling and Analysis Group (IMAG) Multiscale Modeling (MSM) Consortium Meeting*, Bethesda, MD, October, 2011.

46."Modeling the motion of a nanocarrier for targeted drug delivery," (with Balakrishnan, U., Radhakrishnan,R., and Eckmann, D.M.), *Interagency Modeling and Analysis Group (IMAG) Multiscale Modeling (MSM) Consortium Meeting*, Bethesda, MD, October, 2011.

45."Nanoparticle thermal motion in a Newtonian fluid using fluctuating hydrodynamics,"(with Balakrishnan, U., Radhakrishnan, R., and Eckmann, D.M.), CNA *Fluids Conference: Incompressible fluids, Turbulence and Mixing*, Pittsburgh, PA, October, 2011.

44."Fluctuating hydrodynamics approach for the simulation of nanoparticle Brownian motion in a Newtonian fluid,"(with Balakrishnan, U., Radhakrishnan, R., and Eckmann, D.M.), *21st National and 10th ISHMT-ASME Heat and Mass Transfer Conference*, Madras, India, December, 2011.

43."Simulations of binding free energy of targeted nanocarriers to cell surfaces: the effects of antigen flexural rigidity, glycocalyx resistance, and shear flow," (with Liu, J., Agrawal,N., Eckmann, D.M., and Radhakrishnan, R.), *Biophysical Society Annual Meeting*, San Francisco, CA, February, 2010.

42."Simulations of binding free energy of targeted nanocarriers to cell surfaces," (with Liu,J., Agrawal,N., Eckmann, D.M., and Radhakrishnan, R.), *Association of University Anesthesiologists Annual Meeting*, Denver, CO, April 2010.

41."Monte Carlo Simulations of Absolute Binding Free Energy of Targeted Nanocarriers to cell Surfaces,"(with Liu, J., Zern, B., Eckmann, D. M., Muzykantov, V.R., and Radhakrishnan, R.), *American Physical Society, 63rd Annual Meeting of the APS Division of Fluid Dynamics*, Long Beach, CA, November 21-23, 2010.

40. "Soluble surfactants favorably modify fluid structure and wall shear stress profiles during near-occluding bubble motion in a computational model of intravascular gas embolism,"(with Swaminathan, T. N., and Eckmann, D. M.), *American Physical Society, 62nd Annual Meeting of the APS Division of Fluid Dynamics*, Minneapolis, MN, November 22-24, 2009.

39."A finite element method for simulating thermally fluctuating Brownian particles: Random force vs Random stress," (with Balakrishnan, Uma, Swaminathan, T. N, Radhakrishnan, R, and Eckmann, D. M), *American Physical Society, 62nd Annual Meeting of the APS Division of Fluid Dynamics*, Minneapolis, MN, November 22-24, 2009.

38."Drop motion through a Carreau-Yasuda fluid flowing in a vertical tube,"(with K.Mukundakrishnan, S.Quan, D.M. Eckmann), *ISHMT-ASME Heat and Mass Transfer Conference*, Hyderabad, India January 2008.

37."Bubble motion through a generalized power-law fluid in a vertical tube,"(with K. Mukundakrishnan and D.M. Eckmann), *Interdisciplinary Transport Phenomena in Microgravity and Space Sciences V*, Bansko, Bulgaria October 2007.

36."Serum protein adsorption at the gas-liquid interface: relevance to gas embolism,"(with J.Lampe and D.M. Eckmann), *Colloid and Surface Science Symposium*, Boulder, CO June 2006.

35. "Numerical modeling of the transport to an intravascular bubble surface in a tube with a soluble/insoluble surfactant,"(with J.Zhang and D.M. Eckmann), *Interdisciplinary Transport Phenomena in Microgravity and Space Sciences IV, Tomar, Portugal* August 2005.

34."A computational method to model surfactant effects on intravascular bubble dynamics,"(with D.M. Eckmann and J.Zhang). *Association of University Anesthesiologists Annual Meeting*, Baltimore, MD, May 2005.

33."A discussion of the optimal conditions for simulating microgravity employing NASA designed rotating wall vessels," (with K. Mukundakrishnan), pp. 50-51, *Book of Abstracts, 15th IAA Humans in Space Symposium*, Sponsored by the International Academy of Astronautics, Graz, Austria, 2005.

32. "Surfactant effects on the dynamics of an intravascular bubble,"(with J. Zhang and D.M. Eckmann), *Bulletin of the American Physical Society, Program of the 57th Annual Meeting of the Division of Fluid Dynamics*, Seattle, WA, November 2004.

31.."Motion of a dynamically stabilized microcarrier in a rotating flow," (with K. Mukundakrishnan and H. Hu), Bulletin of the Am. Phys. Soc., 49, No. 9, 2004.

30."Surfactant effects on the dynamics of an intravascular bubble," (with Jie Zhang and David Eckmann), Bulletin of the Am. Phys. Soc., 49, No. 9, 2004.

29."Hydrodynamic interaction of two particles suspended in a horizontally rotating cylinder," (with K. Mukundakrishnan and H. Hu), Bulletin of the Am. Phys. Soc., 48, No. 10, 2003.

28."Motion of an intravascular axisymmetric bubble," (with J. Zhang and D.M. Eckmann), Bulletin of the Am. Phys. Soc., 48, No. 10, 2003.

27."Simulated microgravity affects adsorption of serum proteins on bioactive glass microcarriers," (with S. Radin and P. Ducheyne), *Society for Biomaterials, 28th Annual Meeting sand Exposition*, April 24-29, 2002, Tampa, FL.

26."Simulated microgravity enhances reactions and surface transformations of a bone-bioactive microcarrier: An experimental and numerical study." *AIAA-2001-5027. Conference on Utilization of*

International Space Station, Cape Canaveral, FL, Oct. 15-18, 2001.

25."Numerical simulation of surface transformation of bioactive glass in simulated microgravity conditions," (with H. Gao, P. Ducheyne and S. Radin) *Society for Biomaterials, 27th Annual meeting and exposition,* April 24-29, 2001, St. Paul, Minnesota.

24."Electric field induced convection effects on flames," (with I. M. Cohen and S. S. Sripada), *Lecture presentation, Pro. 20th Intl. Cong. Theo. Appl. Mech*., Chicago, IL (2000).

23."Three-dimensional bone cell culture on microcarriers in a rotating wall vessel," (with Q. Qiu, P. Ducheyne and H. Gao), *23rd Annual Meeting of the Soc. Biomaterials in Conjunction with 29th Int. Biomat. Symp.*, April 30 - May 4, 1997, New Orleans, LA (1997).

22."Numerical Simulations of glow discharge between two dissimilar electrodes in a body fitted coordinate system," (with Ivy Wei Qin and I.M. Cohen), *Forty-Ninth Annual Gaseous Electronics Conf. of the Am. Phys. Soc*., Argonne, IL (1996).

21."The use of bioactive glass particles as microcarriers" (with P. Ducheyne, H. Gao, A. El-Ghannam, and I. Shapiro). *BED-Vol. 33, 1996 Advances in BioEngineering*, Ed: S. Rastegar, 217-218, Published by ASME, New York (1996).

20."Vibrational Enhancement of the Squeezing Flow of Yield Stress Fluids" (with K.J. Zwick and I.M. Cohen). *Bulletin of the American Physical Society, 40*, No. 12, Page 2046 (1995).
Also presented at the *Forty-Eighth Annual Meeting of the Division of Fluid Dynamics, Am. Phys. Soc*., Irvine, CA (1995).

19."Evaporation and Combustion of a Slowly Moving Liquid Fuel Droplet: Higher Order Theory" (with M.A. Jog and I. M. Cohen). *Bulletin of the American Physical Society, 39*, No. 9, Page 1944 (1994).
Also presented at the *Forty-Seventh Annual Meeting of the Division of Fluid Dynamics, Am. Phys. Soc.*, Atlanta, GA (1994).

18."Experimental Modelling of Ball Bonding Processes" (with M.A. Jog and I.M. Cohen). *Nineteenth Annual Symposium of the Intl. Soc. Hybrid. Electronics Manufacturing,* Atlantic City, NJ (1990).

17."Breakdown of a wire-to-plane discharge" (with M.A. Jog and I. M. Cohen). *Forty-Third Annual Gaseous Electronics Conf. of the Am. Phys. Soc*., Champaign-Urbana, IL (1990).

16.* "On the Selection of a Bioheat Equation for Modelling Hyperthermia Treatments" (with J.W. Baish and K.R. Foster). *Ninth Annual Meeting of the North American Hyperthermia Group*, Seattle, WA (1989).

15."Low Reynolds Number Droplet Evaporation: Variable Properties and Transient Heating; Solution by Singular Perturbation" (with G. Gogos). *Abstract No. 41, Twentieth Fall Technical Meeting, Eastern Section: The Combustion Institute, and Annual Conf. on Fire Research*, National Bureau of Standards, Gaithersburg, MD (1987).

14."Evaporation of a Slowly Moving Liquid Drop" (with G. Gogos). *The 1986 Annual Meeting of the Division of Fluid Dynamics,* Am. Phys. Soc., Columbus, OH (1986).

13."Breakdown of a Wire-to-Plane Discharge - Timewise Development" (with I.M. Cohen and K. Ramakrishna). *Thirty Ninth Gaseous Electronics Conf.*, Am. Phys. Soc., Madison, WI (1986).

12.“Thin Film Conductive Coatings for Surface Heating and Decontamination” (with S.S. Sadhal and A.K. Stuempfle). *Fourth Army Conf. on Appl. Mathematics and Computing,* Ithaca, NY (1986).

11.“Ball Formation Processes in Aluminum Bonding Wire” (with I.M. Cohen). *IEEE/NBS VLSI Packaging Workshop*, Gaithersburg, MD (1985).

10.“Thermal Modeling of Vascular Tissues Subject to Microwave Heating” (with J.W. Baish and K.R. Foster). *Seventh Annual Meeting of the BioElectromagnetics Soc*., San Francisco, CA (1985). (Best student paper award for J.W. Baish.)

9.“Dynamic Phantom Design: Principle and Practice” (with J.W. Baish and K.R. Foster). *IEEE Conf. on Engineering in Medicine and Biology*, Chicago, IL (1985).

8.“Development of Phantom Models for Simulations of the Thermal Response of Microwave Irradiated Tissue” (with J.W. Baish and K.R. Foster). *Northeast BioEngineering Conf.*, Worcester, MA (1985).

7.“Perfused Phantom Tissue Models for Microwave Research” (with J.W. Baish and K.R. Foster). *HPC Working Group Meeting on Hyperthermia Phantoms*, Allegheny Hospital, Pittsburgh, PA (1984).

6.“Perfused Phantom Tissue Models for Hyperthermia Research” (with J.W. Baish and K.R. Foster). *Thirty First Annual Meeting of the Radiation Research Soc*., San Antonio, TX (1983).

5.“Heat Transfer in Surface-Cooled Objects Subject to Microwave Heating” (with K.R. Foster, T. Sundararajan and K. Ramakrishna). *Third Annual Conf. BioElectromagnetics Soc.*, Washington, D.C. (1981).

4.“Thermal and Electrical Characteristics of a Two-Dimensional Tanh-Conductivity Arc” (with G.C. Das and I.M. Cohen). *Annual Gaseous Electronics Conf. of the Am. Phys. Soc.*, Cleveland, OH (1976).

3.“Reactor Containment Heat Removal by Passive Heat Sinks Following a Loss-of-Coolant Accident” (with J.N. Chung and K.K. Niyogi). *Trans. of the Am. Nuc. Soc. Meeting*, Toronto, Canada (1976).

2.“Interruption Criteria for Variable Property Electric Arcs” (with A.M. Whitman and I.M. Cohen). *IEEE Intl. Conf. on Plasma Science,* Austin, TX (1976).

1.“Prediction of Momentum Transfer between Rotating Cylinders: The Narrow Gap Problem” (with I. Catton). *The 1968 Annual Meeting of the Division of Fluid Dynamics*, Am. Phys. Soc., Seattle, WA (1968).