CURRICULUM VITAE

Robert F. Richards
Professor
School of Mechanical and Materials Engineering
Washington State University
Pullman, WA 99164-2920

EDUCATION:

Ph. D.,	Engineering, 1990	University of California, Irvine
M. S.,	Engineering, 1987	University of California, Irvine
B.A.,	Physics, 1980	The University of Chicago

Areas of Interest: MEMS, Micropower, Thermodynamics, Heat and Mass Transfer

HONORS:

Participant National Academy of Engineering Frontiers of Engineering Education Symposium 2014
ASEE Postdoctoral Fellowship, 1990
Link Fellowship, 1985
Regents Fellowship, University of California, 1983

AWARDS:

Faculty Excellence Award Naval ROTC Battalion UI & WSU, 2009
ASME Best Paper Award MEMS Division, 2005
Teaching Excellence in Mechanical & Materials Engineering, WSU, 2003

PROFESSIONAL EXPERIENCE:

2005 – Pres. **Professor**, School of Mechanical and Materials Engineering, Washington State University, Pullman, WA

1999 – 2005, **Associate Professor**, School of Mechanical and Materials Engineering, Washington State University, Pullman, WA

1992 – 1999, **Assistant Professor**, School of Mechanical and Materials Engineering, Washington State University, Pullman, WA

1990 - 1992, **NIST/ASEE PostDoctoral Fellow**, Building and Fire Research Laboratory, National Institute of Standards and Technology, Gaithersburg, MD

1983 - 1990, **Graduate Research Assistant**,Department of Mechanical Engineering, University of California, Irvine,

1988 – 1989, **Consultant,** PDA Engineering, Santa Anna, CA.

1981 – 1983, **Analyst,** Vitro Laboratories, Silver Spring, MD.

PROFESSIONAL MEMBERSHIPS:

ASME, AIAA, ASEE, ISES/ASES

PROFESSIONAL SERVICE:

Reviewer for
Inverse Problems in Engineering
International Journal of Heat and Mass Transfer
ASME Journal of Fluids Engineering
ASME Journal of Heat Transfer
ASME Journal of Gas Turbines and Power
AIAA Journal of Thermophysics and Heat Transfer
ASME/IEEE Journal of MicroElectroMechanical Systems

Applied Thermal Engineering
Journal of Micromechanics and Microengineering
Nanotechnology
Sensors and Actuators
Journal of Micromechanics and Microengineering
Energy
Progress in Photovoltaics
Cambridge University Press
ASME National Heat Transfer Conference 1995, 1997
ASME IMECE, 1996, 2000, 2001
NSF Panels
California Energy Innovations Small Grant Program Reviewer,
CDRF

Technical Committee Member for PowerMEMS
Editorial Board for Micromachines

UNIVERSITY SERVICE:
Laboratory Equipment Committee (1994 - present)
Uncertified Major Advisor (1993 - present)
Seminar Coordinator (Fall 1995 - Spring 1996)
MERIT Coordinator (Fall 1995 - 2000)
ASME Graduate Student Conferences (Spring 1993, 1994)
Cougar Monday (1993 & 1994)
Faculty Phonathon (1994)
WSU Alive (1994)
MEP/WEP Advising (Fall 1994)
EIT Exam Review Sessions: Thermodynamics (1993 - 2006)
MME ABET Committee (1999 – 2001)
Academic Advising (1992 – 2006)
College Space Committee (2003-2006)
University Advisory Committee for Science Library (2005)
Faculty Search Committee (2005-2006)
University General Education Committee
College Tenure and Promotion Committee
Tuesday Faculty Night for Engineering in Gannon-Goldsworthy

RESEARCH GRANTS/CONTRACTS:
NSF - ***Affordable Desktop Learning Modules to Facilitate Transformation of Undergraduate Engineering Classes, High School Recruitment & Retention*** Co-PI , (PI B. van Wie) 9/14 – 8/19
$714K

Norcliffe Foundation – ***Affordable Desktop Learning Modules to Transform Puget Sound Engineering Education*** -Co-PI, (PI B. van Wie) 12/13 – 12/15
$60K

NSF - ***Multi-Disciplinary Project-Based Paradigm that Uses Hands-on Desktop Learning Modules and Modern Learning Pedagogies***,
Co-PI , (PI B. van Wie) 10/10 – 10/13
$600K

Infinia Corp. - ***Coupled Free-Piston Stirling Engine (FPSE), Stirling Cooler, and Absorption Chiller (FROST) for Tactical Deployed Air Conditioning of Electronic Load***, Co-PI, (PI – C. Richards) 4/10 – 8/10
$30K

NIH - ***Implantable 16-256 Channel Data System for sleep in Mice***,
Co-PI with C.D. Richards, D.F. Bahr, G. LaRue, & D. Hyoun (PI – D. Rector),
1/06 – 1/10

TPL SBIR:DARPA – ***Integrating the P3 Microengine with TPL Inc.'s Supercapacitor Technologies,***
Co-PI with C.D. Richards (PI – D.F. Bahr)
$190K

NSF – ***Nanotube Based Structures for High Resolution Control of Thermal Transport***
Co-PI with D.F. Bahr, J. Jiao, C-S Chiang, S. Mesarovic, M. Osman (PI – CD. Richards)
$1,079 K 8/04 – 7/08

TPL – STTR/Navy – ***Piezoelectrics for Energy Harvesting***
Co-PI with C.D. Richards (PI – D.F. Bahr)
$30 K

M.J. MURDOCK CHARITABLE TRUST – ***A Fabrication Facility for MEMS Devices Based on Novel Materials***
Co-PI with C.D. Richards (PI - D.F. Bahr)
$402 K

Lockheed Martin Aeronautics – ***The P^3 Power Generation System for Converting Kinetic to Electrical Energy,***
Co–PI with C.D. Richards (PI - D.F. Bahr)
$50 K 5/03 - 5/04

US ARMY SMDC - ***The P^3 Power Generation System for Advanced Missile Defense Applications,***
Co–PI with C.D. Richards and D.F. Bahr (PI - K.G.Lynn)
$2,400 K 1/03 - 1/05

DARPA/MTO – ***The P3 Micro Power Generator***
Principal Investigator (with Co-PI's C.D. Richards and D.F. Bahr)
$1,400K 10/01 – 12/04

NSF – ***MEMS Based Power Generation for Portable Systems***
Principal Investigator (with Co-PI's C.D. Richards and D.F. Bahr)
$520 K 9/99 – 8/02

Battelle PNNL - ***Assessment of IX Resin Dissolution***,
Co-PI with W.J. Thomson.
$5K 6/94-9/94.

INEEL/AWU - ***Scientific Basis of Thermal Spray Coatings for Environmental Management***
Collaboration with J. Fincke and R. Wright at INEEL
$75 K 2/97-12/97

NIST - ***Development of an Economical Video Based Fire Detection and Location System***,
Co-PI (PI - O.A. Plumb).
$210 K 9/92-8/95.

PhD RESEARCH SUPERVISED:
Ahmad Hamzah – PhD Expected May 2018
Manufacturing Constraints on Solar Concentrators

Tawfeeq Al-Hamdi – PhD Expected May 2018
Manufacturing Constraints on Solar Concentrators

Shamus Meng Fanhe – PhD Expected May 2017
Nanostructured Materials with Tunable Thermal Conductivity

Muftah Elsahati – PhD Expected May 2015
Heat Trnafer Measurements on Nanoparticle Packed Beds

Aric McLanahan – PhD May 2011
The Design, Modeling, Fabrication, and Characterization of an EWOD Actuated Microthermal Switch

HoKi Lee – PhD December 2008
Experimental and Numerical Study of Evaporating Flow Heat Transfer in a Micro-Channel

Leland Weiss – PhD May 2008
A Novel MEMS-Based Micro Heat Engine and Operating Cycle

Scott Whalen – PhD December, 2004
Cycle Work from a MEMS Heat Engine and Characterization of the Liquid-Vapor Phase Change Actuation Mechanism

Kishan Padakannaya – PhD August 1998
An Inverse Radiation Problem for a Non-Gray Gaseous Medium

MS RESEARCH SUPERVISED:

Howard McDonald – MS August 2015
Design of "Trashwalls:" Low-Cost, Occupant-Installed Energy Retrofits

Kevin Clarke – MS August 2013
Experimental Measurements of Thermal Conductivity of Nanoparticle Packed Beds

Tiffany Quy – MS August 2006
Optimization of a Micro-Capillary Evaporator

Kevin Crain – MS December 2005
Mechanical Characterization and Thermal Modeling of a MEMS Thermal Switch

Travis Wiser – MS August 2005
Steady-state Heat Transfer Characterization of a Liquid Metal Thermal Switch
Karl Olsen – MS December 2004
Dynamic Behavior of a Thermal Switch

Dan Carpenter – December 2004
Fabrication and Characterization of a Micro Capillary Evaporator for MEMS Based Power Generation

Aireus Christensen – August 2003
Fabrication and Characterization of a Liquid-Metal Micro-Droplet Thermal Switch

Jeana Kanyer – August 2003
Thin-Film Evaporative Heat Transfer from Micromachined Wicking Structures

Jack Skinner – December 2002
Piezoelectric Membrane Generator Characterization and Optimization

Sreekant Narumanchi – August 1999
Benchmark Heat Transfer Measurements in a Coupled Conductive-Radiative System

Jeff Hutchison – August 1996
Onset of Thermal Instability in a Radiatively Participating Medium

Darin Peterson – August 1996
Measurement of Droplet Temperature Using Thermochromic Liquid Crystals

Brian Munk – May 1994

Evaluation of a Video Fire Detection System

Post Doctoral
Seyoul Won
3-D Numerical Model of the P3 Micro Heat Engine

HoKi Lee
Numerical Model of Microchannel Evaporator

UNDERGRADUATE COURSES TAUGHT:
ME 125, MERIT
ME 212, Dynamics
ME 301, Fundamentals of Thermodynamics
ME 305, Thermal and Fluid Laboratory
ME 402, Thermodynamic Systems
ME 402, Thermodynamic Systems Design
ME 404, Heat Transfer
ME 406, Experimental Design

GRADUATE COURSES TAUGHT:
ME 527, Macroscopic Thermodynamics
ME 526, Microscopic Thermodynamics
ME 514, Thermal Radiation Processes
ME 516, Conduction and Radiation Heat Transfer
ME 598, Graduate Seminar
MSE 514, Thermodynamics of Solids

PATENTS
Piezoelectric Micro-Transducers, Methods of Use and Manufacturing Methods for Same
Robert Richards, David Bahr, Cecilia Richards
US #7,235,914 issued
Australia # 2001297790 issued

PUBLICATIONS
H. Lee, C.D. Richards, R.F. Richards, Experimental and Numerical Study of Microchannel Heater/Evaporators for Thermal Phase-Change Actuators, Sensors and Actuators A, Vol 195, 7-20, DOI 10.1016/j.sna.2013.02.004, 2013

A. Hamdan, F. Sahli, R Richards and C Richards, Characterization of a dielectric microdroplet thermal interface material with dispersed nanoparticles, J. Nanoparticle Res., Vol. 14, no 9 DOI 10.1007/s11051-012-111-1., 2012

L. W. Weiss, C.D. Richards, R.F. Richards, Power output and force generation by a MEMS phase change actuator, JMEMS, vol. 20, no. 6. Dec., 2011

A Hamdan, R Richards and C Richards, Characterization of a liquid-metal microdroplets thermal interface material, Experimental and Thermal Fluid Science, DOI: 0.1016/j.expthermflusci.2011.04.012, 2011

A.R. McLanahan, C. Richards, R. Richards, A dielectric liquid contact thermal switch with electrowetting actuation, Journal of Micromechanics and Microengineering, 21, 104009, 2011

Richards C.D., R.F.Richards, M.Anderson, MEMS-based resonant heat engine: Scaling analysis, Microsystems Technologies, DOI : 10.1007/s00542-011-1306-y, 2010

H. Bardaweel, R. Richards and C Richards and M. Anderson, Cyclic operation of a MEMS based resonant heat engine: Model and Experiment, J. Appl. Phys., Vol. 107, 104901, 2010

A Hamdan, J Cho, R Johnson, D Bahr, J Jiao, R Richards and C Richards
Evaluation of a thermal interface material fabricated using thermocompression bonding of carbon nanotube turf, Nanotechnology, Vol. 21, 015702, 2010

R D Johnson, D F Bahr**,** C D Richards, R F Richards, D McClain, J Green and J Jiao Thermocompression bonding of vertically aligned carbon nanotube turfs to metalized substrates, Nanotechnology, Vol. 20, 065703, 2009.

H. Bardaweel, M. Anderson, R.Richards, C. Richards, Optimization of Dynamic and Thermal Performance of a Resonant Micro Heat Engine, Journal of Micromechanics and Microengineering, vol. 18, no. 10, 104014, 2008.

H. Bardaweel, M. Anderson, R. Richards, C. Richards, "Characterization and modelling of the dynamic behavior of a liquid-vapor phase change actuator" Sensors and Actuators, A. Physical, 149, No. 2, 284-291, 2008.

J. Cho, J. Lee, C-S Lin, L. Sanford, C. Richards, R. Richards, and J. Ahn, Demonstration of an External Combustion Micro-Heat Engine, Proc. Combustion Institute, vol. 32, no. 2, pp.3099-3105, 2008.

J. Cho, C. Richards, D. Bahr, J. Jiao and R. Richards, Evaluation of Contacts for a MEMS Thermal Switch, Journal of Micromechanics and Microengineering, vol. 18, no. 10, 105012 2008.

J.H. Cho, C.D Richards and R.F. Richards, A Facility for Characterizing the Steady-State and Dynamic Thermal Performance of MEMS Thermal Switches, Review of Scientific Instruments, vol. 79, no. 3, 034901, 2008.

M. Anderson, C. Richards, R. Richards, D. Bahr, Lumped Parameter Analysis of an Enclosed Incompressible Squeeze Film and a Central Gas Bubble, Journal of Fluids Engineering, vol. 130, no. 2, 021303 2008.

D. McClain, J. Wu, N. Taven,J. Jiao, C. McCarter, C. Richards, R. Richards, D. Bahr, Electrostatic shielding in patterned Carbon Nanotube Arrays, Journal of Physical Chemistry C, vol. 111, no. 20, 7514-7520,2007.

Taejin Kim, Mohamed Osman, Cecilia Richards, David Bahr, Robert Richards, Molecular Dynamic Simulations of Heat Pulse propagation in Multiwall Nanotubes, Phys. Rev. B, Condensed Matter and Materials Physics, vol. 76, no. 15, 155424, 2007.

J.H. Cho, L. W. Weiss, C.D Richards, D.F. Bahr and R.F. Richards, Power Production by a Dynamic Micro Heat Engine with Integrated Thermal Switch, Journal of Micromechanics and Microengineering, vol. 17, pp. 217-223, 2007.

S.A. Whalen, C. Richards, D. F. Bahr, and R. Richards, Characterization and Modeling of a Microcapillary Driven Liquid-Vapor Phase-Change Membrane Actuator Wick, Sensors and Actuators: A. Physical, vol. 134, pp. 201-212, 2007

J.H. Cho, R.F. Richards, D.F. Bahr and C.D Richards, Development of Noncontact Spring Constant Measurement and Deflection Characterization of Piezoelectric Devices, Journal of Applied Physics, vol. 101, 044014, 2007.

S. Dj. Mesarovic, C.M. McCarter, D.F. Bahr, H. Radhakrishnan, R.F.Richards, C.D.Richards, D. McClain, J. Jiao, Mechanical behavior of a carbon nanotube turf," Scripta Materialia, vol. 56, pp. 157-160, 2007.

J. Cho, T. Wiser, C. Richards, D. Bahr and R. Richards, Fabrication and Characterization of a Thermal Switch, Sensors and Actuators: A. Physical, vol. 133, pp. 55-63, 2007.

C.M. McCarter, R.F.Richards, S. Dj. Mesarovic, C.D.Richards, D.F. Bahr, D. McClain, J. Jiao, Mechanical compliance of photolithographically defined vertically aligned carbon nanotubes turf," Journal of Material Science, vol. 41 , pp.7872-7878 , 2006.

M.C. Robinson, D.J. Morris, P.D. Hayenga, J.H. Cho, C.D. Richards, R.F. Richards and D.F. Bahr, Structural and Electrical Characterization of PZT on Gold for Micromachined Piezoelectric Membranes, Applied Physics A, vol. 85, pp. 135-140, 2006.

L.W. Weiss, J. Cho, K.E. McNeil, D.F. Bahr, C.D. Richards, and R.F. Richards, Characterization of an Dynamic Micro Heat Engine with Integrated Thermal Switch, Journal of Micromechanics and Microengineering, vol. 16 pp. 1-8, 2006

J.H. Cho, M.J. Anderson, R. F. Richards, D.F. Bahr, C.D. Richards, Efficiency of Energy Conversion by Piezoelectrics, Applied Physics Letters, vol. 89, p 104, 2006

O. Al-Hattamleh, J. Cho, R. Richards, D. Bahr, C. Richards, The effect of design and process parameters on electromechanical coupling for a thin-film PZT membrane, JMEMS, vol. 15, 6, p.1715, 2006

B. A. Hollenberg, C. D. Richards, R.F. Richards, D.F. Bahr, and D.M. Rector, Fabrication of a Flexible MEMS Electrode Array for Recording Surface Field Potentials, J. Neuroscience Methods, vol. 153, iss. 1, pp. 147-153 (2005).

O. I. Crabtree, S. Dj. Mesarovic, R. F. Richards, D. F. Bahr, C. D. Richards, Nonlinear Vibrations of a Pre-Stressed Laminated Thin late, International J of Mech. Sciences, Vol 48, No. 4, 451 – 459 (2006).

D. McClain, L.F. Dong, C.C. Pan, J. Jiao, C. McCarter, D. Bahr, C. Richards, R. Richards, "Synthesis and Microanalysis of Aligned Carbon Nanotube Arrays," Proceedings of Microscopy and Microanalysis 2005, Vol. 11, Supplement 2, 1920-1921 (2005).

J. Cho, M. Anderson, R. Richards, D. Bahr, C. Richards, Optimization of Electromechanical Coupling for a Thin Film PZT Membrane. Part I: Modeling, Journal of Micromechanics and Microengineering, Vol. 15 pp.1797-1803, (2005)

J. Cho, M. Anderson, R. Richards, D. Bahr, C. Richards, Optimization of Electromechanical Coupling for a Thin Film PZT Membrane. Part II: Experiment, Journal of Micromechanics and Microengineering, Vol. 15 pp. 1804-1809, (2005)

C. D. Richards, M. A. Anderson, D. F. Bahr, and R. F. Richards, Efficiency of energy conversion for devices containing a piezoelectric component, Journal of Micromechanics and Microengineering, Vol. 14, no. 5, 717 – 721 (2004).

I. Demir, A.L. Olson, J. L. Skinner, C. D. Richards, R. F. Richards, D. F. Bahr, High Strain Behavior of composite thin film piezoelectric membranes, J. Microelectronics Engineering, Vol. 75,12 – 23, (2004) .

L.M.R. Eakins, B.W. Olson, C.D. Richards, R.F. Richards, and D.F. Bahr, Influence of structure and chemistry on piezoelectric properties of PZT in a MEMS power generation application, J. Mater. Res., vol. 18, pp. 2079-2086(2003).

L.M.R. Eakins, B.W. Olson, C.D Richards, R.F Richards, D.F. Bahr, Microstructural Characterization And Mechanical Reliability Of Pt/Pzt Interfaces In MEMS Applications, Thin Solid Films, vol. 441, pp. 180-186 (2003).

S. Whalen, M. Thompson, D. Bahr, C. Richards and R. Richards, Design, Fabrication and Testing of the P3 Micro Heat Engine, Sensors and Actuators, vol. 104, no.3, pp. 200-208, (2003).

J. D. Hall, N. E. Apperson, B. T. Crozier, C. Xu, R. F.Richards, D. F. Bahr, and C. D. Richards, "A facility for characterizing the dynamic mechanical behavior of thin film membranes for microelectromechanical systems devices", Review of Scientific Instruments, Vol. 73, pp. 2067-2072, 2002.

D.F. Bahr, B.T. Crozier, C.D. Richards, and R.F. Richards, "Fatigue and Fracture in Membranes for MEMS Power Generation", Mechanical Properties of Structural Films, STP No. 1413, C.L. Muhlstein and S.B. Brown, Eds., American Society for Testing and Materials, West Conshohocken, PA, (2001).

Richards, C.D., and Richards, R.F., "Convective cooling of a suspended water droplet," ASME J. Heat Trans., Vol. 119, no. 2 (1997).

Hutchison, J.E. and Richards, R.F., *"Effect of Nongray Gas Radiation on Thermal Stability in Carbon Dioxide,"* AIAA Journal of Thermophysics and Heat Transfer, vol. 13, no. 1, pp. 25-32 (1999).

Richards, C.D. and Richards, R.F., *"Transient Temperature Measurements in a Convectively Cooled Droplet,"* Experiments in Fluids, vol. 25, pp. 392-400 (1998).

Richards, R.F., Munk, B.N., and Plumb, O.A., *"Fire Detection, Location, and Heat Release Rate through Inverse Problem Solution, Part I: Theory,"* Fire Safety Journal, vol. 28, no. 4, pp. 323-350 (1997).

Richards, R.F., Ribail, R.T. , Bakkom, A.B., and Plumb, O.A., *"Fire Detection, Location, and Heat Release Rate through Inverse Problem Solution, Part II: Experiment,"* Fire Safety Journal, vol. 28, no. 4, pp. 351-378 (1997).

Abou-Ziyan, H., and Richards, R.F., *"Effect of Gap Thickness on a Rectangular-Cell Compound-Honeycomb Solar Collector,"* Solar Energy, vol. 60, no. 5, pp. 271-280 (1997).

Richards, C.D., and Richards, R.F., *"Convective Cooling of a Suspended Water Droplet,"* ASME Journal of Heat Transfer, vol.119, p. 208 (1997).

Richards, R.F., *"Thermal Stability of a Diathermanous Fluid in a Multi-Layer System with Partially Transparent Radiating Boundaries,"* International Journal of Heat and Mass Transfer, v.37, pp.2101-2112 (1994).

Richards, R.F., *"Steady-Flux Measurements of Moisture Diffusivity in Unsaturated Porous Media,"* Building and Environment, v.29, pp531-535 (1994).

Richards, R.F., Burch, D.M. and Thomas, W.C., *"Water Vapor Sorption Measurements of Common Building Materials,"* ASHRAE Transactions, v.98, pp.475-485 (1992).

Edwards, D.K. and Richards, R.F., *"Optimum Heat Rejection Temperatures for Spacecraft Heat Pumps,"* AIAA Journal of Spacecraft and Rockets, v.26, pp.303-307 (1989).

Richards, R.F. and Edwards, D.K., *"Effect of Boundary Radiation on Thermal Stability in Horizontal Layers"* International Journal of Heat and Mass Transfer, v.32, pp.81-86 (1989).

Richards, R.F., Young, M.F. and Haiad,J.C., *"Turbulent Forced Convection Heat Transfer From a Bottom Heated Open Surface Cavity,"* International Journal of Heat and Mass Transfer, v.30, pp.2281-2287 (1987).

REFEREED CONFERENCE PROCEEDINGS

Shamus Fanhe Meng, Franco Spadoni, Angelo Ivory, Robert Richards, "Very Low Cost Thermofluid Experiments via Vacuum Formed Plastic Hardware for Active Learning in the Classroom," iCEER2014, Hamilton, Ontario, Aug. 23-26, 2014.

Gwen Ellis, Robert Richards, Cill Richards "A Remote Access Laboratory for Fluids Education in Mechanical Engineering," iCEER2014, Hamilton, Ontario, Aug. 23-26, 2014.

Kevin Clarke, Muftah Elsahati, Robert Richards, "Experimental Measurements of the Thermal Conductivity of Nanoparticle Packed Beds," ASME IMECE2013-64979, San Diego, CA, November 15-21, 2013.

R.F. Richards, "Low-Cost, Hands-On Thermal and Fluid Experiments," Frontiers of Engineering Education Symposium, National Academy of Engineering, Irvine, CA, Oct. 27-30, 2013.

Schlect W., B. Vanwie, P. Golter, R. Richards, J. Adam, A. Ater Kranov, M. Compere, E. Maurer, D. Davis, O. Adesope, J. Law, G. Brown, P. Dutta, D. Thiessen, B. Abdul, "Multi-Disciplinary Project-Based Paradigm that Uses Hands-On Desktop Learning Modules and Modern Learning Pedagogies," Proceedings of Annual Conference of American Society for Engineering Education AC:878, 2011.

A.R. McLanahan, A. Hamdan, C. Richards, R. Richards “A Liquid Contact Thermal Switch with Electrowetting Actuation,” Proceedings of the 10th International Workshop on Micro and Nanotechnology for Power Generation and Energy Conversion Applications, Leuven, Belgium, Dec. 1-3, 2010.

H. Bardaweel, M. Anderson, R. Richards, C. Richards, “MEMS-Based Resonant Heat Engine: Thermodynamic Cycle,” Proceedings of the 10th International Workshop on Micro and Nanotechnology for Power Generation and Energy Conversion Applications, Leuven, Belgium, Dec. 1-3, 2010.

H. Bardaweel, B. Preetham, M. Anderson, R. Richards, C. Richards, “Scaling Analysis of a MEMS-Based Resonant Heat Engine,” Proceedings of the 10th International Workshop on Micro and Nanotechnology for Power Generation and Energy Conversion Applications, Leuven, Belgium, Dec. 1-3, 2010.

A.R. McLanahan, A. Hamdan, C. Richards, R. Richards “A Liquid Contact Thermal Switch with Electrowetting Actuation,” ASME IMECE2010-39269, Vancouver, British Columbia, November 5-10 109, 2010.

H. Bardaweel, M. Anderson, R. Richards, C. Richards “On the Thermodynamic Cycle of a MEMS-Based External Combustion Resonant Engine,” ASME IMECE2010, Vancouver, British Columbia, November 5-10 109, 2010.

Bardaweel H, Preetham B.S, Anderson M, Richards R and Richards C 2010 Development of scaling model for a MEMS-based micro heat engine, ASME Int'l Mech. Eng, Congress and Expo, British Columbia, Canada, Nov 5-10,2010.

Bardaweel H, Anderson M, Richards R and Richards C 2010 A resonant air-standard heat engine, ASME Int'l Mech. Eng, Congress and Expo, British Columbia, Canada, Nov 5-10, 2010.

A.Hamdan, Richards R.F., C.D.Richards, Characterization of a Liquid Metal Micro Droplets Thermal Interface Material, Proc. ASME Int'l Mech. Eng, Congress and Expo, British Columbia, Canada, Nov 5-10, 2010.

M. Yanez, E. Gramsch, R. Santander, C. Richards, R. Richards, “Developing Microfabrication Capabilities across the Americas: A Chilean – US Study, ASEE Annual Conference, Louisville, KY, June 20–23, 2010.

A.R. McLanahan, A. Hamdan, C. Richards, R. Richards “Active Thermal Control for Power MEMS,” Proceedings of the 9th International Workshop on Micro and Nanotechnology for Power Generation and Energy Conversion Applications, Washington DC, USA, Dec. 1-4, 2009.

H. Bardaweel, R. Richards M. Anderson, C. Richards, “Thermodynamic Characterization and Scaling of a MEMS Heat Engine,” Proceedings of the 9th International Workshop on Micro and Nanotechnology for Power Generation and Energy Conversion Applications, Washington DC, USA, Dec. 1-4, 2009.

H Bardaweel, M Anderson, R Richards, and C Richards, Resonant versus sub resonant operation of a MEMS heat engine, ASME IMECE2009-10897, Orlando, Florida, November 16- 19, 2009.

Amer Hamdan, Jeong Cho, Ryan Johnson, David Bahr, Robert Richards, Cecilia Richards, Jun Jiao, “ Evaluation of a thermal interface materials using thermocompression bonding of carbon nanotube turf,” ASME IMECE2009-10990, Orlando, Florida November 16- 19, 2009.

H-K Lee, C. D. Richards, R.F. Richards, “Numerical and Experimental Study of Evaporative Heat Transfer from a Radial Micro-Channel Evaporator for an External Combustion Micro Heat Engine,” Proceedings of the 8th International Workshop on Micro and Nanotechnology for Power Generation and Energy Conversion Applications, Sendai, Japan, Nov. 9-12, 2008.

J. Cho, C. Lin, C.D. Richards, .F. Richards, J. Ahn "Demonstration of an External Combustion Micro-Heat Engine" Proceedings of the 8th International Workshop on Micro and Nanotechnology for Power Generation and Energy Conversion Applications, Sendai Japan, November 9 -12, 2008.

Cho J., C.Lin, C.D.Richards, R.F.Richards, J. .Ahn "Demonstration of an external combustion microheat engine" ASME IMECE 2008, Boston, November 5 -12, 2008.

M. Osman, T. Kim, C. Richards, R. Richards, D. Bahr,Molecular Dynamics Simulations of the Thermal Interface Resistance between Silicon and Single Wall Carbon Nanotubes, 2008 Symposium PNW AVS, Richland, WA, Sept. 18-19, 2008

J. Cho, J. Lee, C-S Lin, L. Sanford, C. Richards, R. Richards, and J. Ahn, Demonstration of an External Combustion Micro-Heat Engine, 32nd International Symposium on Combustion, McGill University, Canada, Aug. 3-8, 2008.

Osman M.A., T.Kim, C.D.Richards, R.F.Richards, D. .Bahr ″Thermal Interface Resistance at Carbon nanotube and Silicon Interface″ ICN08 Abstracts, International Conference on Nanotechnology: Opportunity and Challenges, Jeddah Saudi Arabia, June 17 -19, 2008.

Ryan Johnson, David Bahr, Cecilia Richards, Robert Richards, Jeong-Hyun Cho, Ali Zbib, Amer Hamdan, Devon McClain, Jun Jiao, "Thermocompression Bonding of Gold Coated Carbon Nanotube Turfs for Heat Transfer Applications," TMS Annual Meeting, New Orleans, Louisiana, USA, March 9-13, 2008.

H. Bardaweel, R.F.Richards, M.Anderson, C.D. Richards, Dynamic effects in a resonant micro heat engine, PowerMEMS 07, Freiburg, Germany, Nov. 27-29, 2007.

H. Bardaweel, R.F.Richards, M.Anderson, C.D. Richards,Characterization and Modelling of a liquid vapor phase change actuator, ASME IMECE, Paper No. IMECE-42567, Seattle, WA, Nov. 11-15, 2007.

A. Zbib, D. Bahr, S. Mesarovic, R. Richards, J. Jiao, D. McClain, Characterization of the Mechanical Properties of Carbon Nanotube Turfs, ASME IMECE, IMECE2007-43186, Seattle WA, Nov. 6-12, 2007.

H-K Lee, C.D. Richards, R.F. Richards, *Experimental and Numerical Study of Evaporating Flow Heat Transfer in Microchannels*, ASME IMECE, Paper No. IMECE-42576, Seattle, WA, Nov. 11-15, 2007.

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