

Curriculum Vitae of Hai-Lung Tsai

Department of Mechanical and Aerospace Engineering
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EDUCATION:

- Ph.D.: Mechanical Engineering, University of California, Berkeley, CA, 9/80-5/84.
Thesis: A Study of Transport Phenomena and Interface Stability During Solidification of Binary Solutions Using Front Tracking Finite Elements.
Advisor: Professor Boris Rubinsky.
- M.S.: Mechanical Engineering, State University of New York, Buffalo, NY, 8/78-7/80.
Thesis: An Experimental Study of the Operating Characteristics of A Catalytic Combustor.
Advisor: Professor Lawrence A. Kennedy.
- B.S.: Mechanical Engineering, Tatung Institute of Technology, Taiwan, 8/70-6/74.

RESEARCH INTERESTS:

- **Laser-Based Nano-/Micro-Scale Science and Engineering:** Ultrashort Pulse Laser-Material Interactions; Micro-/Nano-Scale Thermophysics and Energy Transport; Femtosecond Laser Fabrications of Micro-/Nano-Scale Sensors/Lab-on-a-Chip/Micro-Fluidics for Bio and Medical Applications.
- **Transport Phenomena in Manufacturing and Materials Processing:** GMAW, Laser Welding, Keyhole Dynamics, Hybrid Laser-MIG Welding, Dual-Beam Laser Welding, Multiple-Laser Thin-Film Coating, Cladding, and Rapid Prototyping by Direct Metal Deposition.
- **Multiscale, Multiphysics Modeling:** Quantum Mechanics Modeling, Ab Initio MD Modeling, Direct Simulation Monte Carlo Modeling, Two-Temperature Modeling, Continuum Modeling, and Material Microstructure Modeling.

PROFESSIONAL EXPERIENCE:

- **Technology/Advisory Board:** Laser Light Technologies, Inc., Hermann, MO, 2006-2009.
- **Professor:** Department of Mechanical & Aerospace Engineering, UMR/MST, 1998-Present.
- **Research Investigator:** Intelligent Systems Center, UMR/MST, 1995-Present.

- **Associate Professor:** Department of Mechanical & Aerospace Engr, UMR, 1992–98.
- **Summer Research Fellow:** Wright–Patterson Air Force Base, Dayton, OH, 1990.
- **Assistant Professor:** Department of Mechanical & Aerospace Engr, UMR, 1986–92.
- **Senior Research Engr:** General Motors Research Laboratories, Warren, MI, 1984–86.
- **Research Assistant:** Lawrence Berkeley National Laboratory, Berkeley, CA, 1980–84.
- **Teaching Associate:** University of California, Berkeley, CA, 1982.
- **Teaching/Research Assistant:** State University of New York, Buffalo, NY, 1978–80.
- **Group Leader:** Tatung Company, Taiwan, 1976–78.
- **Lieutenant:** Chinese Army, Taiwan, 1974–76.

HONORS AND AWARDS:

1. **Faculty Research Award**, Missouri S&T, 2011.
2. **Letter of Commendation for Teaching Excellence**, Missouri S&T, 2009–2010.
3. **Distinguished Investigator Award** (with \$1,500 cash), Intelligent Systems Center, Missouri S&T, 2010. (the first recipient since its inception)
4. **The Adams Memorial Membership Award** from American Welding Society (AWS) for “an academic who has contributed significantly to welding education,” awarded in the AWS 90th annual meeting, Atlanta, GA, November 2, 2010.
5. Elected to **Fellow of ASME**, June 2009.
6. **Certificate of Recognition** (with \$1,500 cash), awarded by Hewlett–Packard and ASME Heat Transfer Division for 2nd Place in the 2008 HP Student Best Paper Competition for the paper titled, “Ab Initio Calculations of Vibrational Energy Levels and Transition Dipole Moments of CO₂ Molecules,” with Z. Liang, *International Mechanical Engineering Congress & Exposition*, Boston, Massachusetts, November 2–6, 2008.
7. **Invited Keynote Lecture** on “Fundamentals and Challenges of Ultrashort Laser Pulse–Material Interactions,” *Workshop on Femtosecond Lasers 2008*, Tainan, Taiwan, Oct. 14, 2008. (with \$3,600 honorarium and expenses paid)
8. **Guest Professorship**, School of Energy Sciences and Engineering, Central South University, Changsha, China, June 2008 – June 2013.
9. **Changjiang Distinguished Chair Professorship**, Beijing Institute of Technology, China (awarded by the Ministry of Education, People’s Republic of China), 2008–present.
10. **Invited Keynote Lecture** on “Micro/Nano–Scale Energy Transport and Material Removal during Ultrafast Laser–Material Interactions,” *Colloquium on Micro/Nano*

Thermal Engineering, Seoul, Korea, August 17–19, 2005. (with \$2,500 honorarium and expenses paid)

11. **Distinguished Scholar Award**, Midwest Chinese–American Science and Technology Association (MCASTA), 2005.
12. **Guest Professorship**, Institute of Mechanical Engineering, Xi’an Jiaotong University, Xi’an, China, 9/15/2005 – 9/14/2015.
13. **Outstanding Faculty Advisor**, Missouri Tau Lambda, Pi Tau Sigma, 2001.
14. **Faculty Research Excellence Award**, Academy of Mechanical Engineers, UMR, 1999. (the first recipient since its inception)
15. **Best Paper Award** – for the paper, “Effects of Silicon Content, Coating Materials and Gating Design on Casting Defects in the Aluminum Lost Foam Process,” with Y. Sun and D.R. Askeland, American Foundry Society, 1997.
16. **Best Paper Award** – for the paper, “Influence of Pattern Geometry and Other Process Parameters on Mold Filling in Aluminum EPC Process,” with Y. Sun and D.R. Askeland, American Foundry Society, 1996.
17. **Marcus A. Grossmann Young Author Award** – for the Best Paper published in *Metallurgical Transactions* in the year of 1994, titled “Modeling of the Formation of Under–Riser Macroseggregation during Solidification of Binary Alloys,” with Q. Diao, ASM International, 1995.
18. **Best Paper Award** – for the paper, “Effect of Vent–Holes in Patterns on Filling Process and Casting Quality Using the Evaporative Pattern Process,” with J. Fu and D.R. Askeland, American Foundry Society, 1992.
19. **USAF/UES Summer Fellow**, 1990.
20. Pi Tau Sigma Honorary Member, 1990.
21. **Outstanding Teaching Award**, UMR, 1989–90.
22. **Letter of Commendation for Teaching Excellence**, UMR, 1988–89, 1997–98, 2006–07.
23. **Outstanding Teacher of the Year**, Missouri Tau Lambda, Pi Tau Sigma, 1988–89.
24. **Research Initiation Award**, NSF, 1988.
25. Outstanding Service Award, Chinese Army Hospital, 1976.
26. Undergraduate Scholarships from Tatung Company, Taiwan, 1972 and 73.

PATENTS/BOOK/ BOOK CHAPTER:

1. **U.S. Patent** (pending), “Depth and Breakthrough Detection for Laser Machining,” with J.P. Quitter and C.E. Yaworksy, filed on January 27, 2010. This patent application was also filed through European Patent Office on January 27, 2011.
2. **U.S. Patent #7,298,476**, “Method and System for Far–Field Microscopy to Exceeding Diffraction–Limit Resolution,” with Y. Cheng, November 20, 2007.

3. **U.S. Patent #7,268,319**, “Method of Metallurgically Bonding an Article and an Article Therefor,” with P.C. Wang, September 11, 2007.
4. **U.S. Patent #7,265,313**, “Method and Apparatus for Improved Cooling of Resistance Welding Cap,” with B. Stevenson, P.C. Wang, and M.J. Karagoulis, September 4, 2007.
5. **U.S. Patent #7,193,177**, “Method of Metallurgically Bonding an Article and an Article Therefor,” with P.C. Wang and L. Hector, March 20, 2007.
6. **U.S. Patent #7,154,064**, “Method of Improving Weld Quality,” with P.C. Wang and R.J. Menassa, December 26, 2006.
7. **U.S. Patent #6,844,522**, “Method of Metallurgically Bonding an Article and an Article Therefor,” with P.C. Wang and L. Hector, January 18, 2005.
8. Patent Defensive Publication, “Laser Weld Bonding,” 2004.
9. Patent Disclosure, “A Method to Remove Gaseous Polystyrene from the Sand Mold for the EPC Process,” Disclosure No. 91-UMR-014, 1991.
10. **Book Chapter**, “Chapter 2. Welding Heat Transfer,” J. Zhou and H.L. Tsai, in “Processes and Mechanisms of Welding Residual Stress and Distortion,” edited by Z. Feng, Woodhead Publishing, pp. 32–98, 2005.
11. **Book Chapter**, “Chapter 5. Hybrid Laser–Arc Welding in Aerospace Engineering,” J. Zhou, H.L. Tsai, and P.C. Wang, in “Welding and Joining of Aerospace Materials,” edited by Mahesh Chaturvedi, Woodhead Publishing, in press.
12. **Book Chapter**, “Chapter 8 – Developments in Pulsed and Continuous Wave Laser Welding Technologies,” J. Zhou and H.L. Tsai, in “Laser Welding Technologies,” edited by Seiji Katayama, Woodhead Publishing, in preparation.
13. **Book Chapter**, “Hybrid Laser–Arc Welding,” J. Zhou and H.L. Tsai in “Welding Process,” by InTech, in preparation.
14. Book (monograph): “Numerical Modeling and Simulation of Transport Phenomena in Welding Processes,” in preparation.

JOURNAL ARTICLES:

1. Z.H. Rao, J. Zhou, S.M. Liao, and H.L. Tsai, “Determination of Equilibrium Wire–Feed–Speeds for Stable Gas Metal Arc Welding,” **International Journal of Heat and Mass Transfer**, submitted.
2. Z.H. Rao, C.H. Lin, L. Jiang, and H.L. Tsai, “Multiscale Modeling of Femtosecond–Nanosecond Dual–Beam Laser Ablation of Dielectrics,” **Journal of Applied Physics**.
3. Z. Liang and H.L. Tsai, “Pump Model for Molecular Simulations of Fluid Flows in Nanochannels,” **Physics Review E**, submitted.
4. Z. Liang and H.L. Tsai, “Reduction of Solid–Solid Thermal Boundary Resistance by Inserting an Interlayer,” **International Journal of Heat and Mass Transfer**, submitted.

5. C.H. Lin, Z. Liang and H.L. Tsai, “Femtosecond and Nanosecond Dual-Laser Optical Emission Spectroscopy of Gas Mixtures,” **Optics Letters**.
6. G. Xu, J. Hu, and H.L. Tsai, “Modeling and Verification of 3D Plasma Arc in Gas Tungsten Arc Welding,” **ASME Journal of Manufacturing Science and Engineering**, in press.
7. N. Lin, L. Jiang, S. Wang, H. Xiao, H.L. Tsai, and Y.F. Lu, “Ultrasensitive Thermal Sensors Based on Whispering Gallery Modes in a Polymer Core Optical Ring Resonator,” **Applied Optics**, vol. 50, pp. 6254–6260, 2011.
8. Z. Liang and H.L. Tsai, “Effect of Thin Film Confined between Two Dissimilar Solids on Interfacial Thermal Resistance,” **Journal of Physics: Condensed Matter**, vol. 23, 495303, 2011.
9. N. Lin, L. Jiang, S. Wang, H. Xiao, H.L. Tsai, and Y.F. Lu, “Simulation and Optimization of Polymer-Coated Microsphere Resonators in Chemical Vapor Sensing,” **Applied Optics**, vol. 50, pp. 5465–5472, 2011.
10. J.P. Yang, L. Jiang, S. Wang, B.Y. Li, M.M. Wang, H. Xiao, Y.F. Lu, and H.L. Tsai, “High Sensitivity of Taper-Based Mach-Zehnder Interferometer Embedded in a Thinned Optical Fiber for Refractive Index Sensing,” **Applied Optics**, vol. 50, pp. 5503–5507, 2011.
11. A. Hamdorf, M. Olson, C.H. Lin, L. Jiang, J. Zhou, H. Xiao, and H.L. Tsai, “Femtosecond and Nanosecond Laser Fabricated Substrate for Surface-Enhanced Raman Scattering,” **Optics Letters**, vol. 36, pp. 3353–3355, 2011.
12. C. Wang, L. Jiang, F. Wang, X. Li, Y.P. Yuan, and H.L. Tsai, “First-Principles Calculations of the Electron Dynamics during Femtosecond Laser Pulse Train Material Interactions,” **Physics Letters A**, vol. 375, pp. 3200–3204, 2011.
13. Z. Liang and H.L. Tsai, “Effect of Molecular Film Thickness on Thermal Conduction Across Solid-Film Interfaces,” **Physics Review E**, vol. 83, 061603, 2011.
14. B.Y. Li, L. Jiang, S.M. Wang, H.L. Tsai, and H. Xiao, “Femtosecond Laser Fabrication of Long Period Fiber Gratings and Applications in Refractive Index Sensing,” **Optics & Laser Technology**, vol. 43, pp. 1420–1423, 2011.
15. S.M. Wang, L. Jiang, B.Y. Li, L.J. Zhao, J.P. Yang, M.M. Wang, H. Xiao, Y.F. Lu, and H.L. Tsai, “Ultrafast Laser Fabrication of Novel Fiber Mach Zehnder Interferometer Sensors and Its Cost-Effective Alternative Manufacturing Methods,” **Chinese Journal of Lasers**, vol. 38, 0601002, 2011. (invited review paper)
16. N. Lin, L. Jiang, S. Wang, H. Xiao, Y.F. Lu, and H.L. Tsai, “Design and Optimization of Liquid Core Optical Ring Resonator in Refractive Index Sensing,” **Applied Optics**, vol. 50, pp. 3615–3621, 2011.
17. L. Jiang, X. Li, X.P. Zhang, Q.H. Chen, H.L. Tsai, and Y.F. Lu, “Short Pulse Laser Micro/Nano Manufacturing: Fundamentals and Applications,” **International Journal of Nanomanufacturing**, vol. 7, pp. 126–142, 2011. (invited review paper)
18. B.Y. Li, L. Jiang, S. Wang, L.Y. Zhou, H. Xiao, and H.L. Tsai, “Ultra-Abrupt Tapered Fiber Mach-Zehnder Interferometer Sensors,” **Sensors**, vol. 11, pp. 5729–5739, 2011.

19. N. Lin, L. Jiang, S. Wang, H. Xiao, Y.F. Lu, and H.L. Tsai, "Thermostable Refractive Index Sensors Based on Whispering Gallery Modes in a Microsphere Coated with Poly(Methyl Methacrylate)," **Applied Optics**, vol. 50, pp. 992–998, 2011. This paper was also selected for publication in **Virtual Journal for Biomedical Optics (VJBO)**, vol. 6, May 4, 2011.
20. Z.H. Rao, S.M. Liao, and H.L. Tsai, "Modeling of Hybrid Laser–GMA Welding: Review and Challenges," **Science and Technology of Welding and Joining**, vol. 16, pp. 300–305, 2011. (invited review paper)
21. Z. Liang and H.L. Tsai, "Thermal Conductivity of Interfacial Layers in Nanofluids," **Physics Review E**, vol. 83, 041602, 2011.
22. L.J. Zhao, L. Jiang, S. Wang, H. Xiao, Y.F. Lu, and H.L. Tsai, "A High–Quality Mach–Zehnder Interferometer Fiber Sensor by Femtosecond Laser One–Step Processing," **Sensors**, vol. 11, pp. 54–61, 2011.
23. Y. Han, Z. Liang, H. Sun, H. Xiao, and H.L. Tsai, "Nanostructured Substrate with Nanoparticles Fabricated by Femtosecond Laser for Surface–Enhanced Raman Scattering," **Applied Physics A**, vol. 102, pp. 415–419, 2011.
24. Z.H. Rao, J. Hu, S.M. Liao, and H.L. Tsai, "Modeling of the Transport Phenomena in GMAW Using Argon–Helium Mixtures – I. The Arc," **International Journal of Heat and Mass Transfer**, vol. 53, pp. 5707–5721, 2010.
25. Z.H. Rao, J. Hu, S.M. Liao, and H.L. Tsai, "Modeling of the Transport Phenomena in GMAW Using Argon–Helium Mixtures – II. The Metal," **International Journal of Heat and Mass Transfer**, vol. 53, pp. 5722–5732, 2010.
26. N. Lin, L. Jiang, S. Wang, L. Yuan, H. Xiao, Y. Lu, and H.L. Tsai, "Ultrasensitive Chemical Sensors Based on Whispering Gallery Modes in a Microsphere Coated with Zeolite," **Applied Optics**, vol. 49, pp. 6463–6471, 2010.
27. Z. Liang and H.L. Tsai, "Molecular Dynamics Simulations of Self–Diffusion Coefficient and Thermal Conductivity of Methane at Low and Moderate Densities," **Fluid Phase Equilibria**, vol. 297, pp. 40–45, 2010.
28. C.H. Lin, L. Jiang, H. Xiao, S.J. Chen, and H.L. Tsai, "Surface–Enhanced Raman Scattering Microchip Fabricated by Femtosecond Laser," **Optics Letters**, vol. 35, pp. 2937–2939, 2010. This paper was also selected for publication in **Virtual Journal for Biomedical Optics (VJBO)**, vol. 5, Oct. 22, 2010.
29. Z. Liang and H.L. Tsai, "The Vibrational Contribution to the Thermal Conductivity of a Polyatomic Fluid," **Molecular Physics**, vol. 108, pp. 1707–1714, 2010.
30. C.H. Lin, Z. Rao, L. Jiang, W.J. Tsai, P.H. Wu, C.W. Chien, S.J. Chen, and H.L. Tsai, "Investigations of Femtosecond–Nanosecond Dual–Beam Laser Ablation of Dielectrics," **Optics Letters**, vol. 35, pp. 2490–2492, 2010.
31. H. Guo, J. Hu, and H.L. Tsai, "Three–Dimensional Modeling of Gas Metal Arc Welding of Aluminum Alloys," **ASME Journal of Manufacturing Science and Engineering**, vol. 132, 021011, April 2010.

32. Z.H. Rao, J. Zhou, S.M. Liao, and H.L. Tsai, "Three-Dimensional Modeling of Transport Phenomena and Their Effect on the Formation of Ripples in Gas Metal Arc Welding," **Journal of Applied Physics**, vol. 107, 054905, 2010.
33. H. Guo, J. Hu, and H.L. Tsai, "Numerical Modeling of Cold Weld Formation and Improvement in GMAW of Aluminum Alloys," **Numerical Heat Transfer: Part A**, vol. 57, pp. 392–414, 2010.
34. C.H. Lin, L. Jiang, Y.H. Chai, H. Xiao, S.J. Chen, and H.L. Tsai, "A Method to Fabricate 2D Nanoparticle Arrays," **Applied Physics A**, vol. 98, pp. 855–860, 2010.
35. Y.K. Han, T. Wei, H.L. Tsai, and H. Xiao, "Measurement of Refractive Index Change of Optical Fiber Core Induced by Femtosecond Laser Scanning," **Optical Engineering**, vol. 49, 064301, June 2010. This paper has been selected for publication in the July 2010 issue of **Virtual Journal of Ultrafast Science**.
36. Z. Liang and H.L. Tsai, "Calculation of Thermophysical Properties for CO₂ Gas Using an *Ab Initio* Potential Model," **Molecular Physics**, vol. 108, pp. 1285–1295, 2010.
37. C.H. Lin, L. Jiang, J. Zhou, H. Xiao, S.J. Chen, and H.L. Tsai, "Laser-Treated Substrate with Nanoparticles for Surface-Enhanced Raman Scattering," **Optics Letters**, vol. 35, pp. 941–943, 2010. This paper was also selected for publication in the May 2010 issue of **Virtual Journal of Ultrafast Science** and in **Virtual Journal for Biomedical Optics (VJBO)**, vol. 5, June 2010.
38. Z.H. Rao, S.M. Liao, and H.L. Tsai, "Effects of Shielding Gas Compositions on Arc Plasma and Metal Transfer in Gas Metal Arc Welding," **Journal of Applied Physics**, vol. 107, 044902, 2010.
39. C.H. Lin, A. Rock, L. Jiang, H. Xiao, S.J. Chen, and H.L. Tsai, "Real-Time Depth Measurement of Micro-Holes Drilled by Lasers," **Measurement Science and Technology**, vol. 21, 025307, February 2010.
40. Z. Liang and H.L. Tsai, "Prediction of the Transport Property for a Polyatomic Gas," **Fluid Phase Equilibria**, vol. 293, pp. 196–204, 2010.
41. C.H. Lin, L. Jiang, Y.H. Chai, H. Xiao, S.J. Chen, and H.L. Tsai, "One-Step Fabrication of Nanostructures by Femtosecond Laser for Surface-Enhanced Raman Scattering," **Optics Express**, vol. 17, pp. 21581–21589, 2009.
42. C.H. Lin, L. Jiang, H. Xiao, Y.S. Chai, S.J. Chen, and H.L. Tsai, "Fabry-Perot Interferometer Embedded in a Glass Chip Fabricated by Femtosecond Laser," **Optics Letters**, vol. 34, pp. 2408–2410, 2009. This paper was also selected for publication in **Virtual Journal for Biomedical Optics (VJBO)**, vol. 4, Oct. 2009 and the October 2009 issue of **Virtual Journal of Ultrafast Science**.
43. X. Li, L. Jiang, and H.L. Tsai, "Phase Change Mechanisms during Ultrashort Double-Pulse Train Ablation of Nickel," **Journal of Applied Physics**, vol. 106, 064906, 2009. This paper was also selected for publication in the October 2009 issue of **Virtual Journal of Ultrafast Science**.
44. X.Y. Lan, Y.K. Han, T. Wei, Y.N. Zhang, L. Jiang, H.L. Tsai, and H. Xiao, "Surface-Enhanced Raman-Scattering Fiber Probe Fabricated by Femtosecond Laser," **Optics**

Letters, vol. 34, pp. 2285–2287, 2009. This paper was also selected for publication in the September 2009 issue of **Virtual Journal of Ultrafast Science** and in **Virtual Journal for Biomedical Optics (VJBO)**, vol. 4, Oct. 2009.

45. Y.K. Han, X.W. Lan, T. Wei, H.L. Tsai, and H. Xiao, “Surface Enhanced Raman Scattering Silica Substrate Fast Fabrication by Femtosecond Laser Pulses,” **Applied Physics A**, vol. 97, pp. 721–724, 2009.
46. C.H. Lin, L. Jiang, Y.H. Chai, H. Xiao, S.J. Chen, and H.L. Tsai, “Fabrication of Microlens Array in Photosensitive Glass by Femtosecond Laser Direct Writing,” **Applied Physics A**, vol. 97, pp. 751–757, 2009.
47. H. Guo, J. Hu, and H.L. Tsai, “Formation of Weld Crater in GMAW of Aluminum Alloys,” **International Journal of Heat and Mass Transfer**, vol. 52, pp. 5533–5546, 2009.
48. L. Jiang, L. Li, and H.L. Tsai, “CO₂ Gas Resonance Absorption at CO₂ Laser Wavelength in Multiple Laser Coating,” **Applied Physics B**, vol. 97, pp. 199–206, 2009.
49. Y. Han, C.H. Lin, H. Xiao, and H.L. Tsai, “Femtosecond Laser–Induced Silicon Surface Morphology in Water Confinement,” **Microsystem Technologies**, vol. 15, pp. 1045–1049, 2009.
50. L. Jiang, L. Li, H.L. Tsai, and S. Wang, “Microscopic Energy Transport through Photon–Electron–Phonon Interactions during Ultrashort Laser Ablation of Wide Bandgap Materials Part I: Photon Absorption,” **Chinese Journal of Lasers**, vol. 36 (4), pp. 779–789, May 2009. (invited paper)
51. L. Li, L. Jiang, H.L. Tsai, and S. Wang, “Microscopic Energy Transport through Photon–Electron–Phonon Interactions during Ultrashort Laser Ablation of Wide Bandgap Materials Part II: Phase Change,” **Chinese Journal of Lasers**, vol. 36(5), pp. 1029–1036, June 2009. (invited paper)
52. J. Zhou and H.L. Tsai, “Investigation of Mixing and Diffusion Processes in Hybrid Laser–MIG Welding,” **Journal of Physics D: Applied Physics**, vol. 42, 095502, 2009.
53. Z.H. Rao, S.M. Liao, H.L. Tsai, P.C. Wang, and R. Stevenson, “Mathematical Modeling of Electrode Cooling in Resistance Spot Welding,” **Welding Journal**, vol. 88, pp. 111–s to 119–s, May 2009.
54. G. Xu, J. Hu, and H.L. Tsai, “Three–Dimensional Modeling of Arc Plasma and Metal Transfer in Gas Metal Arc Welding,” **International Journal of Heat and Mass Transfer**, vol. 52, pp. 1709–1724, 2009.
55. L. Jiang and H.L. Tsai, “A Plasma Model Combined with an Improved Two–Temperature Equation for Ultrafast Laser Ablation of Dielectrics,” **Journal of Applied Physics**, vol. 104, 093101, 2008. This paper was also selected for publication in the December 2008 issue of **Virtual Journal of Ultrafast Science**.
56. J. Zhou and H.L. Tsai, “Modeling of Transport Phenomena in Hybrid Laser–MIG Welding,” **International Journal of Heat and Mass Transfer**, vol. 51, pp. 4353–4366, 2008.

57. Z. Liang and H.L. Tsai, "Determination of Vibrational Energy Levels and Transition Dipole Moments of CO₂ Molecules by Density Functional Theory," **Journal of Molecular Spectroscopy**, vol. 252, pp. 108–114, 2008.
58. G. Xu, J. Hu, and H.L. Tsai, "Three-Dimensional Modeling of the Plasma Arc in Arc Welding," **Journal of Applied Physics**, vol. 104, 103301, 2008.
59. J. Hu and H.L. Tsai, "Modeling of the Transport Phenomena in 3D GMAW of Thick Metals with Groove," **Journal of Physics D: Applied Physics**, vol. 41, 065202, 2008.
60. T. Wei, Y.K. Han, Y.J. Li, H.L. Tsai, and H. Xiao, "Temperature-Insensitive Miniaturized Fiber Inline Fabry-Perot Interferometer for Highly Sensitive Refractive Index Measurement," **Optics Express**, vol. 16, no. 8, pp. 5764–5769, 2008.
61. J. Hu, H. Guo, and H.L. Tsai, "Weld Pool Dynamics and the Formation of Ripples in 3D Gas Metal Arc Welding," **International Journal of Heat and Mass Transfer**, vol. 51, pp. 2537–2552, 2008.
62. T. Wei, Y.K. Han, H.L. Tsai, and H. Xiao, "Miniaturized Fiber Inline Fabry-Perot Interferometer Fabricated with a Femtosecond Laser," **Optics Letters**, vol. 66, no. 6, pp. 536–538, 2008. Featured in **Photonics Spectra**, "Tiny Fiber Fabry-Perot Created with Femtosecond Pulses: Extrinsic interferometer could detect chemicals in harsh environments," by Breck Hitz, May, 2008. This paper was also selected for publication in **Virtual Journal for Biomedical Optics**, vol. 3, issue 4, 2008 and the May 2008 issue of **Virtual Journal of Ultrafast Science**.
63. J. Hu and H.L. Tsai, "Metal Transfer and Arc Plasma in Gas Metal Arc Welding," **ASME Journal of Heat Transfer**, vol. 129, pp. 1025–1035, 2007.
64. L. Jiang and H.L. Tsai, "Modeling of Ultrashort Laser Pulse Train Processing of Metal Thin Films," **International Journal of Heat and Mass Transfer**, vol. 50, pp. 3461–3470, 2007.
65. J. Zhou and H.L. Tsai, "Porosity Formation and Prevention in Pulsed Laser Welding," **ASME Journal of Heat Transfer**, vol. 129, pp. 1014–1024, 2007.
66. J. Zhou and H.L. Tsai, "Effects of Electromagnetic Force on Melt Flow and Porosity Prevention in Pulsed Laser Keyhole Welding," **International Journal of Heat and Mass Transfer**, vol. 50, pp. 2217–2235, 2007.
67. J. Hu and H.L. Tsai, "Heat and Mass Transfer in Gas Metal Arc Welding, Part I: The Arc," **International Journal of Heat and Mass Transfer**, vol. 50, pp. 833–846, 2007.
68. J. Hu and H.L. Tsai, "Heat and Mass Transfer in Gas Metal Arc Welding, Part II: The Metal," **International Journal of Heat and Mass Transfer**, vol. 50, pp. 808–820, 2007.
69. J. Zhou, H.L. Tsai, and T.F. Lehnhoff, "Investigation of Transport Phenomena and Defect Formation in Pulsed Laser Keyhole Welding of Zinc-Coated Steels," **Journal of Physics D: Applied Physics**, vol. 39, pp. 5338–5355, 2006.
70. Y. Cheng, H.L. Tsai, K. Sugioka, and K. Midorikawa, "Fabrication of 3D Microoptical Lenses in Photosensitive Glass Using Femtosecond Laser Micromachining," **Applied Physics A**, vol. 85, pp. 11–14, 2006.

71. J. Hu and H.L. Tsai, "Effects of Welding Current on Droplet Generation and Arc Plasma in Gas Metal Arc Welding," **Journal of Applied Physics**, vol. 100, pp. 053304 (1–12), 2006.
72. L. Jiang and H.L. Tsai, "Energy Transport and Nanostructuring of Dielectrics by Femtosecond Laser Pulse Trains," **ASME Journal of Heat Transfer**, vol. 128, pp. 926–933, Sept. 2006.
73. L. Jiang and H.L. Tsai, "Plasma Modeling for Ultrashort Laser Ablation of Dielectrics," **Journal of Applied Physics**, vol. 100, issue 2, pp. 023116(1–7), 2006. This paper was also selected for publication in **Virtual Journal of Ultrafast Science**, vol. 5, issue 8, August 2006.
74. J. Zhou, H.L. Tsai, P.C. Wang, "Transport Phenomena and Keyhole Dynamics in Pulsed Laser Welding," **ASME Journal of Heat Transfer**, vol. 128, no. 7, pp. 680–690, July 2006.
75. L. Jiang and H.L. Tsai, "Repeatable Nanostructures in Dielectrics by Femtosecond Laser Pulse Trains," **Applied Physics Letter**, vol. 87, 151104, 2005. This paper was also selected for publication in **Virtual Journal of Ultrafast Science**, vol. 4, issue 11, Nov 2005.
76. L. Jiang and H.L. Tsai, "Improved Two–Temperature Model for Femtosecond Laser Heating of Metal Thin Films," **ASME Journal of Heat Transfer**, vol. 127, no. 10, pp. 1167–1173, 2005.
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91. Y. Sun, D.R. Askeland, and H.L. Tsai, "The Effect of Silicon Content, Coating Materials and Gating Design on Casting Defects in the Aluminum Lost Foam Process," Paper# 96–092, Presented at the **100th Casting Congress,** Philadelphia, Pennsylvania, April 20–23, 1996.
92. J. Fu, D.R. Askeland, and H.L. Tsai, "Transport of Foam Decomposition Products Into the Sand in the Lost Foam Casting Process," Paper# 96–091, Presented at the **100th Casting Congress,** Philadelphia, Pennsylvania, April 20–23, 1996.
93. J.H. Chen and H.L. Tsai, "Effect of Riser Design on the Fluid Flow and Solidification Patterns During Casting Solidification," Paper# 96–177, Presented at the **100th Casting Congress,** Philadelphia, Pennsylvania, April 20–23, 1996.
94. Y. Sun, D.R. Askeland, and H.L. Tsai, "Influence of Pattern Geometry and Other Process Parameters on Mold Filling in the Aluminum EPC Process," Presented at the **99th Casting Congress,** Paper# 95–086, Kansas City, Missouri, April 23–26, 1995.
95. J. Fu, D.R. Askeland, and H.L. Tsai, "Mold Filling in Thin Section Castings Produced by the Expendable Pattern Casting Process," Presented at the **99th Casting Congress,** Paper# 95–087, Kansas City, Missouri, April 23–26, 1995.
96. F.C. Chang and H.L. Tsai, "Modeling of the Formation of Microporosity in Alloys," Presented at the **Chinese American Academic and Professional Convention,** pp. 5.27–5.30, Chicago, IL, July 2–5, 1993.

97. H.J. Lin and H.L. Tsai, "Numerical Simulation of an Integrated Filling–Solidification Casting System," Presented at the **Conference on Modeling of Casting, Welding and Advanced Solidification Processes VI**, The Metallurgical Society, pp. 381–388, Palm Coast, FL, March 20–22, 1993.
98. Sun, Y., H.L. Tsai, and D.R. Askeland, "An Investigation of Wetting and Wicking Properties of the Refractory Coating in the Expendable Pattern Casting Process," Presented at the **96th AFS Casting Congress**, Paper# 92–167, Milwaukee, Wisconsin, May 3–7, 1992.
99. J. Fu, H.L. Tsai, and D.R. Askeland, "Effect of Vent–Holes in Patterns on Filling Process and Casting Quality Using the Evaporative Pattern Process," Presented at the **95th AFS Casting Congress**, Paper# 91–136, Birmingham, AL, May 5–9, 1991.
100. H.L. Tsai, "Determination of Latent Heat Release and Its Effect on Casting Solidification," Presented at the **5th Conference on Modeling of Casting, Welding and Advanced Solidification Processes**, The Metallurgical Society, pp. 545–552, Davos, Switzerland, Sept. 16–21, 1990.
101. H.L. Tsai, "Studies on Shrinkage Effect During Casting Solidification," Presented at the **5th Conference on Modeling of Casting, Welding and Advanced Solidification Processes**, The Metallurgical Society, pp. 749–754, Davos, Switzerland, Sept. 16–21, 1990.
102. F.C. Chang and H.L. Tsai, "Shrinkage Induced Fluid Flow and Domain Change During Solidification of Pure Substances," Presented at the **5th AIAA/ASME Thermophysics and Heat Transfer Conference**, ASME HTD–Vol. 132, Transport Phenomena in Materials Processing, pp. 73–80, Seattle, Washington, June 18–20, 1990.
103. J.H. Chen and H.L. Tsai, "An Efficient and Accurate Numerical Algorithm for Multi–Dimensional Modeling of Casting Solidification – Part I. Control Volume Method," Presented at the **94th AFS Casting Congress**, Paper# 90–132, Detroit, MI, April 21–24, 1990.
104. J.H. Chen and H.L. Tsai, "Comparison on Different Modes of Latent Heat Release for Modeling Casting Solidification," Presented at the **94th AFS Casting Congress**, Paper# 90–133, Detroit, MI, April 21–24, 1990.
105. I.J. Chiou and H.L. Tsai, "Modeling on Porosity Formation in Castings," Presented at the **94th AFS Casting Congress**, Paper# 90–164, Detroit, MI, April 21–24, 1990.
106. K.C. Chiang and H.L. Tsai, "Transient Heat Transfer with Change of Phase in Porous Sand Mold During Casting Processes," Presented at the **26th National Heat Transfer Conference**, ASME HTD–Vol. 113, Heat Transfer in Manufacturing and Materials Processing, pp. 113–122, Philadelphia, PA, August 6–9, 1989.
107. F.C. Chang and H.L. Tsai, "A Numerical Study of Fluidity in Evaporative Pattern Process Including Latent Heat Effect," Presented at the **93rd AFS Casting Congress**, Paper# 89–129, San Antonio, TX, May 7–11, 1989.
108. S.S. Abayarathna and H.L. Tsai, "Modeling of Evaporative Pattern Process II. Determination of Possible Carbon Pickup," Presented at the **93rd AFS Casting Congress**, Paper# 89–130, San Antonio, TX, May 7–11, 1989.

109. S.S. Abayarathna and H.L. Tsai, "Modeling of Evaporative Pattern Process III. Heat and Mass Transfer in Sand Mold and Its Effect on Casting Solidification," Presented at the **93rd AFS Casting Congress**, Paper# 89–130, San Antonio, TX, May 7–11, 1989.
110. H.L. Tsai, "Transient Moisture Movement in Green Sand Mold and Its Effect on Casting Solidification," **Midwest American–Chinese Science & Technology Conference**, pp. 40–43, St. Louis, MO, June 3–5, 1988.
111. H.L. Tsai, K.C. Chiang, and T.S. Chen, "Modeling of Vapor Transportation in Green Sand Mold and Its Effect on Casting Solidification," Presented at the **Conference on Modeling of Casting and Welding Processes IV**, pp. 43–57, The Metallurgical Society, Palm Coast, FL, April 17–22, 1988.
112. H.L. Tsai, K.C. Chiang, and T.S. Chen, "Movement of Moisture Front and Alloy Solidification in Green Sand Casting," Presented at the **92nd AFS Casting Congress**, Paper# 88–85, Hartford, CT, April 24–28, 1988.
113. H.L. Tsai and T.S. Chen, "Modeling of Evaporative Pattern Process: Part I. Metal Flow and Heat Transfer During the Filling Stage," Presented at the **92nd AFS Casting Congress**, Paper# 88–86, Hartford, CT, April 24–28, 1988.
114. H.L. Tsai, "Modeling of Metal Filling Process in the Evaporative Foam Casting," Presented at the **2nd International Evaporative Foam Casting Technology Conference**, pp. 158–176, The American Foundrymen's Society, Rosemont, Illinois, November 12–13, 1986.
115. H.L. Tsai and B. Rubinsky, "A Front Tracking Finite Element Study on Change of Phase Interface Stability During Solidification Processes in Solutions," Presented at the **6th American Conference on Crystal Growth and 6th International Conference on Vapor Growth and Epitaxy**, Atlantic City, NJ, July 15–20, 1984.

INVITED SEMINARS/PRESENTATIONS: (No associated papers or abstract only)

1. **NSF Workshop on Laser Processing and Energy Applications**, "Femtosecond Laser Fabrication of Microsensors for Chemical and Biological Sensing and Detection," Berkeley, CA, January 28-29, 2011. (with extended abstract)
2. **Industrial Technology Research Institute South**, "Femtosecond Laser Fabrication of Microsensors for Chemical and Biological Sensing and Detection," Tainan, Taiwan, January 4, 2011.
3. The **47th Annual Technical Meeting of Society of Engineering Science**, "Ab Initio Simulation of Photo-Dissociation of CO₂ Gas by Using Two Lasers," Ames, IA, October 4–6, 2010. (with abstract)
4. **Connecticut Center for Advanced Technology**, "Optical Breakthrough Detection for Small Hole Laser Drilling," Hartford, CT, June 22, 2010.
5. **ONR–UNL Workshop on Multi–Energy Processing**, "Generation of Desired Free Radicals for Facilitating Diamond Growth by Multiple Lasers," Lincoln, Nebraska, March 01–02, 2010.

6. **University of Missouri Energy Summit**, “Multi-Laser Technology for Clean Energy Applications: Remote Detection and Nano/Micro Fabrication,” Columbia, MO, Apr. 22–23, 2009. (abstract and poster presentation)
7. **Pratt & Whitney**, “Development and Implementation of Laser Hole Drilling Breakthrough Detection (LHDBD) Technology,” East Hartford, CT, June 12, 2008
8. **The CAMT Aerospace Manufacturing Technology Conference**, “Laser Materials Processing,” Dayton, OH, June 10, 2008.
9. **Industrial Technology Research Institute South**, “Modeling of Ultrafast Laser–Material Interactions,” Tainan, Taiwan, December 14, 2007.
10. **US Army RDECOM–ARDEC**, “A Novel Dual-Laser LIBS System for Long-Distance, Stand-off Detection of Explosives,” Picatinny, NJ, October 22, 2007.
11. **Pennsylvania State University and Applied Research Laboratory**, “Multi-Laser Diamond Thin Film Coating – Multiscale Modeling,” State College, PA, September 24, 2007.
12. **Beijing Institute of Technology**, “Modeling and Experimental Studies for Various Welding Processes: Part I: Gas Metal Arc Welding,” Beijing, China, June 19, 2007.
13. **National Taiwan University**, “Ultrafast Laser–Material Interactions and Applications,” Taipei, Taiwan, May 22, 2007.
14. **Industrial Technology Research Institute**, “Ultrafast Laser–Material Interactions and Applications,” Hsinchu, Taiwan, May 21, 2007.
15. **National Sun–Yat–Sen University**, “Precision Laser Micromachining,” Kaohsiung, Taiwan, May 17, 2007.
16. **Industrial Technology Research Institute South**, “Precision Laser Micromachining,” Tainan, Taiwan, May 16, 2007.
17. **US Army RDECOM–ECBC**, “Center of Ultrashort Laser Spectroscopy for Standoff Detection of Explosives,” Aberdeen Proving Ground, MD, May 2, 2007.
18. **Pratt & Whitney**, “Laser Processing,” East Hartford, CT, March 29, 2007.
19. **Hunan University of Science and Technology**, “Research Activities in Laser Materials Processing and Manufacturing at UMR,” China, June 12, 2006.
20. **Central South University**, “Laser–Based Materials Processing and Manufacturing,” China, June 9, 2006.
21. **Hunan University**, “Laser–Based Materials Processing and Manufacturing,” China, June 8, 2006.
22. **Xi’an Jiaotong University**, “Research Activities in Laser Materials Processing and Manufacturing at UMR,” China, October 20, 2005.
23. **Shanghai Institute of Optics and Fine Mechanics**, “Ultrafast Energy Transport During Laser Micro–/Nano–Scale Materials Processing,” China, October 18, 2005.
24. **National Cheng–Kung University**, “Micro–/Nano–Scale Materials Processing Using Ultrafast Laser Pulse–Trains,” Taiwan, May 31, 2005.

25. **Watlow Heater Technology Center**, “Introduction to Laser Micromachining,” Fenton, MO, December 2, 2004.
26. **Air Force Research Lab**, “High Precision Laser Micromachining,” Wright–Patterson, OH, Nov. 2, 2004.
27. **Intel Corporation**, “Research Capabilities in Laser–Based Materials Processing at UMR,” Chandler, AZ, September 27, 2004.
28. **Sandia National Laboratory**, “Research Capabilities and Accomplishments in Welding and Laser–Based Materials Processing at UMR,” Albuquerque, NM, Oct. 23, 2002.
29. **Edison Welding Institute**, “Research in GMAW and Laser Welding at UMR,” Columbus, OH, Oct. 4, 2002.
30. **National Dong Hwa University**, “Lasers and Their Applications in Manufacturing,” Taiwan, June 3, 2002.
31. **GM R&D Center**, “Modeling of Laser Beam Welding Process,” Warren, MI, December 3, 2001.
32. **National Cheng–Kung University**, “Basic and Applied Research in Laser Beam Welding at UMR,” Department of Naval Architecture and Marine Engineering, Taiwan, June 1, 2001.
33. **National Cheng–Kung University**, “Basic and Applied Research in Gas Metal Arc Welding at UMR,” Department of Materials Science & Engineering, Taiwan, May 31, 2001.
34. **GM R&D Center**, “Modeling Fluid Flow and Keyhole Dynamics in Laser Welding,” Warren, MI, March 5, 2001.
35. **Lincoln Electric Company**, “Modeling of Gas Metal Arc Welding Process,” Cleveland, Ohio, September 21, 2000.
36. **Caterpillar Inc.**, “Modeling of Gas Metal Arc Welding Process,” Peoria, IL, March 31, 2000.
37. **Caterpillar Inc.**, “Modeling of Weld Pool Dynamics in Gas Metal Arc Welding Process,” Peoria, IL, August 12, 1999.
38. **University of Michigan**, “Modeling of Droplet Impinging Process and Weld Dynamics in GMAW,” Ann Arbor, MI, May 7, 1999.
39. **GM R&D Center**, “Effect of Gap Size on Weld Penetration and Quality in MIG Process,” Warren, MI, March 25, 1999.
40. **NIST**, “Modeling of Impinging Process in Gas Metal Arc Welding,” Gaithersburg, MD, March 20, 1998.
41. **ARL**, “Mathematical Modeling of Arc and Laser Beam Welding,” Aberdeen, MD, March 19, 1998.
42. **Lincoln Electric Company**, “Mathematical Modeling of Gas Metal Arc Welding,” Cleveland, Ohio, February 17, 1998.

43. **GM R&D Center**, “Numerical Simulation of Gas Metal Arc Welding Process,” Warren, MI, December 12, 1997.
44. **TRW Vehicle Safety Systems, Inc.**, “Current Research Efforts on both Arc and Laser Beam Welding,” Washington, MI, December 11, 1997.
45. **University of South Carolina**, “Modeling of Transport Phenomena in Welding Processes,” Department of Mechanical Engineering, Columbia, SC, Sept. 19, 1997.
46. **Arizona State University**, “Modeling of Heat Transfer and Fluid Flow in Welding Processes,” Department of Mechanical Engineering, Tempe, AZ, Sept. 5, 1997.
47. **Caterpillar Inc.**, “Welding Process Modeling,” Peoria, IL, January 9, 1997.
48. **GM R&D Center**, “Process Improvement Through Process Modeling in Welding Technologies,” Warren, MI, June 3, 1996.
49. **National Sun Yat-Sen University**, “Solidification Process in Metal Casting,” Department and Institute of Mechanical Engineering, Kaohsiung, Taiwan, June 24, 1992.
50. **National Chung Cheng University**, “Heat Transfer in Materials Processes and Manufacturing,” Institute of Mechanical Engineering, Chia-Yi, Taiwan, June 16, 1992.
51. **University of Missouri-Rolla**, “Solidification Process in Metal Casting,” Department of Mechanical and Aerospace Engineering and Engineering Mechanics, March 19, 1992.
52. **Florida International University**, “Heat Transfer in Materials Processes and Manufacturing,” Department of Mechanical Engineering, Miami, FL, April 12, 1992.
53. **American Foundry Society**, “Research Progress in Evaporative Pattern Progress at UMR,” Evaporative Pattern Casting Division, Des Plaines, IL, November 16, 1989.
54. **Southern Research Institute**, “Research in Evaporative Pattern Process at UMR,” Birmingham, AL, July 19, 1989.
55. **Marshall Space Flight Center**, “Interdendritic Fluid Flow and Microporosity Formation in Alloy Solidification,” Space Science Laboratory, Huntsville, AL, August 9, 1988.
56. **Tatung Institute of Technology**, “Heat Transfer in Materials Processing,” Department of Mechanical Engineering, Taipei, Taiwan, July 23, 1987.
57. **American Foundry Society**, “Research and Development in Evaporative Pattern Process at the University of Missouri-Rolla,” AFS Evaporative Pattern Process Committee, Des Plaines, IL, March 26, 1987.
58. **Saturn Corporation**, “Heat Transfer and Metal Flow in Lost Foam Process,” Troy, MI, December 19, 1986.
59. **Ohio State University**, “Lost Foam Casting Research at the General Motors,” Department of Mechanical Engineering, Columbus, OH, June 2, 1986.

60. **University of Illinois**, “Modeling of Mold Filling in Lost Foam Casting Process by the Finite Element Method,” Department of Mechanical Engineering, Chicago, IL, April 29, 1986.
61. **University of Missouri–Rolla**, “Mold Filling and Heat Transfer in Lost Foam Casting Process,” Department of Mechanical and Aerospace Engineering, Rolla, MO, April 25, 1986.

RESEARCH GRANTS/CONTRACTS:

1. “Smart Gasifier Liner Block with Embedded Sensors for In Situ Multi-Parameter Monitoring,” **DOE**, \$1,500,000, 10/11–9/14. (PI: H. Xiao, Co-PIs: H.L. Tsai, M. Leu and J. Dong at University of Cincinnati) (pending)
2. “Optical Breakthrough Detection for Small Hole Laser Drilling,” **Pratt & Whitney**, \$260,000, 4/10–11/11. (PI: H.L. Tsai)
3. “Micro-Structured Sapphire Fiber Sensors for Simultaneous Measurements of High Temperature and Dynamic Gas Pressure in Harsh Environments” **DOE**, \$896,838, 10/09–9/12. (PI: H. Xiao, Co-PIs: H.L. Tsai and J. Dong at University of Cincinnati)
4. “Integration of Laser Hole Drilling Optical Breakthrough Detection (OBD) Device into P50 Laser System,” **Pratt & Whitney**, \$50,000, 3/09–9/09. (PI: H.L. Tsai)
5. “Advanced Cardiovascular Stent Incorporated with Nitric Oxide Delivery System,” **Missouri Life Science Research Board**, \$540,000, 1/09–12/11 (PI: C.H. Lee at UMKC, Co-PIs: H.L. Tsai (\$216,000), R. Hopkins at UMKC, and Y. Lee at UMKC)
6. “Networked Zeolite-Capacitive Sensors for Distributed and Ubiquitous Detection of Chemical/Biological Threats,” **Leonard Wood Institute**, \$529,160, 9/08–12/09 (PI: H. Xiao, Co-PIs: S. Agarwal, J. Sarangapani, H.L. Tsai (20%) and J. Dong (University of Cincinnati))
7. “Multi-Laser Beam Open Atmosphere Surface Coating Techniques Based on Precursor Excitation, Photodissociation and Controlled Cooling-Phase II,” University of Nebraska-Lincoln, \$900,000, 5/08–4/11. (PI: H.L. Tsai, Co-PI: M.J. O’Keefe). This is a collaborative project with the University of Nebraska-Lincoln and Iowa State University for the **MURI (ONR)** Program; total budget for Phase II is \$2,000,000).
8. “Development and Implementation of Laser Hole Drilling Breakthrough Detection (LHDBD) Technology,” **Pratt & Whitney**, \$100,000, 3/08–12/08. (PI: H.L. Tsai)
9. “Development of Femto-/Nano-Second Dual-Beam Laser Micro-Processing Technology,” **Industrial Technology Research Institute**, Taiwan, \$52,000, 5/08–11/08. (PI: H.L. Tsai)
10. “Characterization of Non-Chrome Coating and Other Materials,” **AFRL**, \$900,000, 4/08–4/10 (PI: F.S. Miller, Co-PIs: M. Leu, H.L. Tsai, M. O’Keefe, W. Fahrenholtz and R. Mishra)

11. "Acquisition of a Dual Beam Focused Ion Beam System as a Regional Resource for Collaborative Research and Education in Missouri," **NSF**, \$500,000, 9/07–8/08. (PI: F.S. Miller, Co-PIs: M.R. Mormile, J. A. Switzer, H.L. Tsai, and K.T. Wan)
12. "Development of Femtosecond Laser Microfabrication Technology," **Industrial Technology Research Institute, Taiwan**, \$21,000, 7/07–11/07. (PI: H.L. Tsai)
13. "A Vacuum Chamber System with 5–Axis Precision Motion Stages," New Equipment Donated by **Pratt & Whitney**, original purchased price \$793,498; donation value appraised at \$400,000, 6/07. (PI: H.L. Tsai)
14. "Program Integration and Oversight, Center for Aerospace Manufacturing Technologies," **AFRL**, \$152,800, 11/06–10/07. (PI: M. Leu, Co-PIs: R.G. Landers, D. Summers, F. Liou, H.L. Tsai, R. Mishra, M.J. O'Keefe, R. Zoughi, K. Chandrashekhara, and D. Pommerenke)
15. "Multi–Laser Beam Open Atmosphere Surface Coating Techniques Based on Precursor Excitation, Photodissociation and Controlled Cooling," University of Nebraska–Lincoln, \$1,500,000, 5/05–4/08. (PI: H.L. Tsai, Co-PIs: L. Jiang, M.J. O'Keefe and R.W. Schwartz). This is a joint project with the University of Nebraska–Lincoln for the **MURI (ONR)** Program; total budget for the program was \$3,000,000).
16. "Program Integration and Management, Center for Aerospace Manufacturing Technologies," **AFRL**, \$380,000, 5/05–4/06. (PI: M. Leu, Co-PIs: R.G. Landers, D. Summers, F. Liou, H.L. Tsai, R. Mishra, M.J. O'Keefe, R. Zoughi, K. Chandrashekhara, and D. Pommerenke)
17. "Development of Software Packages for Modeling GMA Welding of Aluminum," **GM R&D Center**, \$70,000, 2/05–12/05. (PI: H.L. Tsai)
18. "An Integrated Femtosecond and Nanosecond Dual Beam Laser System for Microfabrications," **NSF**, \$279,000, 8/04–8/08. (PI: H.L. Tsai, Co-PI: L. Jiang)
19. "High Precision Laser Micromachining," **AFRL**, \$941,714, 4/04–2/06. (PI: H.L. Tsai)
20. "Program Integration and Management, Center for Aerospace Manufacturing Technologies," **AFRL**, \$858,743, 4/04–2/06. (PI: M. Leu, Co-PIs: A. Okafor, D. Summers, F. Liou, H.L. Tsai, R. Mishra, M.J. O'Keefe, R. Zoughi, K. Chandrashekhara, and D. Pommerenke)
21. "Modeling of Hybrid Laser–MIG Welding Process (Continuation)," **GM R&D Center**, \$50,000, 1/04–12/04. (PI: H.L. Tsai)
22. "Laser–Based Manufacturing and Materials Processing," **ARL**, \$900,000, 4/03–9/04. (PI: H.L. Tsai, Co-PIs: J. Choi, F. Liou, G. Hilmas, D.C. Van Aken)
23. "Modeling of Hybrid Laser–MIG Keyhole Welding Process (Continuation)," **GM R&D Center**, \$80,000, 2/03–12/03. (PI: H.L. Tsai)
24. "Undergraduate Research Experience," **NSF**, \$12,000, 2/02–2/03. (PI: H.L. Tsai)
25. "Mathematical Modeling and Experimental Validation of Laser Welding Process," **TRW**, \$20,000, 5/02–4/03. (PI: H.L. Tsai)

26. "Modeling of Laser–MIG Welding Process," **GM R&D Center**, \$30,000 (first phase), 5/02–12/02. (PI: H.L. Tsai)
27. "Integration and Validation of Gas Metal Arc Welding Models," **GM R&D Center/MRTC**, \$117,000, 5/01–4/02. (PI: H.L. Tsai)
28. "Acquisition of a High–Power Laser System for Research and Education in Manufacturing and Materials Processing," **NSF/UMR**, \$475,000, 9/01–2/03. (PI: H.L. Tsai, Co–PIs: J. Choi, R. Landers, M. Leu, M. Rahaman, A. Midha, J. Story, D.C. Van Aken)
29. "GAANN Doctoral Research and Training in Virtual and Rapid Prototyping," **Department of Education/UMR**, \$579,804, 7/01–6/04. (PI: M. Leu, Co–PIs: J. Choi, F. Liou, A.C. Okafor, R.G. Landers, D.A. McAdams, A. Midha, H.L. Tsai)
30. "Acquisition of a Friction Stir Welding Equipment for Metal Joining Research and Education," **NSF/UMR**, \$189,750, 6/00–5/01. (PI: R. Mishra, Co–PIs: H.L. Tsai, D.C. Van Aken)
31. "Modeling the Transport Phenomena in Gas Metal Arc Welding of Aluminum Alloys," **GM R&D Center/MRTC**, \$97,000, 5/00–4/01. (PI: H.L. Tsai)
32. "Development of Welding Performance Data for MIG Aluminum Welding," **GM Midsize and Luxury Car Group/MRTC**, \$130,500, 7/99–12/00. (PI: H.L. Tsai)
33. "Modeling of Gas Metal Arc Welding Weld Pool in the Low Current Regime – 2nd Year," **GM R&D Center**, \$106,190, 4/99–3/00. (PI: H.L. Tsai)
34. "Thermal Stress Analysis for a Diphasic System Using FEM," **Watlow/MRTC**, \$13,500, 10/98–11/98. (PI: H.L. Tsai)
35. "Development of a Five–Axis Rapid Metal Forming System," **NSF/UMR/UM Research Board**, \$756,192, 7/98–6/03. (PI: F. Liou, Co–PIs: V. Allada, K. Krishnamurthy, W. Lu, O.R. Mitchell, K. Peaslee, H.L. Tsai)
36. "Modeling of Gas Metal Arc Welding Weld Pool in the Low Current Regime," **GM R&D Center**, \$102,329, 4/98–3/99. (PI: H.L. Tsai)
37. "Studies of Transport Phenomena and Their Effect on Weld Quality in Laser Beam Welding," **ARO**, \$410,553, 4/98–3/01. (PI: H.L. Tsai)
38. "Analysis of Temperature and Thermal Stress in a Circuit Board," **MO–SCI Corp./MRTC**, \$6,000, 6/97–8/97. (PI: H.L. Tsai)
39. "Request for Matching Funds for a Laser–Beam Welding System," **UM Research Board**, \$25,000, 8/97–7/98. (PI: H.L. Tsai)
40. "Studies of Laser–Beam Welding," **MRTC**, \$83,090, 7/97–6/99. (PI: H.L. Tsai)
41. "Advanced Instrumentation for Nonequilibrium Laser Beam Welding," **ARO's DURIP**, \$419,240, 3/97–2/98. (PI: H.L. Tsai)
42. "Effects of Surface Active Elements on Pool Convection and Properties of the Weld," **ARO**, \$331,838, 4/95–3/98. (PI: H.L. Tsai)

43. "Prediction of Macrosegregation Defects in Castings," **UM Research Board**, \$17,182, 5/94–5/96. (PI: H.L. Tsai)
44. "CAD/CAE Modeling of Thermal Fatigue in Permanent Molds," jointly sponsored by **DOE, MRTC, and 3 foundries**, \$416,600, 10/93–9/96. (PI: K. Nyamekye, Co-PIs: D.R. Askeland, C.W. Ramsay, H.L. Tsai)
45. "Modeling and Its Verification on Filling and Solidification for the EPC Process – 3rd Year," jointly sponsored by a consortium consisting of **DOE, MRTC, AFS, and 28 foundries** in the USA, \$74,112, 11/91–10/92. (PI: H.L. Tsai, Co-PI: D.R. Askeland)
46. "Modeling of the Formation of Macrosegregation during Casting Solidification," **AFOSR**, \$41,541, 1/91–12/91. (PI: H.L. Tsai)
47. "Modeling and Its Verification on Filling and Solidification for the EPC Process – 2nd Year," jointly sponsored by a consortium consisting of **DOE, MRTC, AFS, and 28 foundries** in the USA, \$70,548, 10/90–9/91. (PI: H.L. Tsai, Co-PI: D.R. Askeland)
48. "Modeling and Its Verification on Filling and Solidification for the EPC Process – 1st Year," jointly sponsored by a consortium consisting of the **Department of Energy (DOE), Manufacturing Research and Training Center (MRTC), American Foundry Society (AFS), and 28 foundries** in the USA, \$32,320, 9/89–5/90. (PI: H.L. Tsai, Co-PI: D.R. Askeland)
49. "Research Initiation: Alloy Solidification and Porosity Formation," **NSF**, \$60,000, 6/88–11/90. (PI: H.L. Tsai)
50. "Modeling of the Fluid Flow and the Particle Behavior in an Atomization Process for Producing Rapidly-Solidified Powders," **Generic Mineral Technology Center for Pyrometallurgy**, \$10,000, 5/88–7/89. (PI: H.L. Tsai)
51. "Computer Aided Design Package for Metal Forming Process," **Missouri Research Assistant Acts**, \$13,920, 6/87–8/88. (PI: H.L. Tsai)
52. "Computer Aided Design Package for Metal Forming Process," **Alumax Engineered Metal Processes, Inc.**, \$12,000, 6/87–8/88. (PI: H.L. Tsai)
53. "Study of Fluidity in Evaporative Foam Casting Processes," **Weldon Spring Endowment Fund**, University of Missouri, \$15,200, 6/87–5/88. (PI: H.L. Tsai)

OTHER GRANTS:

1. "Supercomputer Hours," NSF and National Institute for Computational Sciences (NICS), over 1,000 CPU hours, 2006–present.
2. "Equipment Grant for a Metallurgical Imaging System," University of Missouri–Rolla, \$10,000, 2000–01. (PI)
3. "Equipment Grant for a Laser Gas Mixer," University of Missouri–Rolla, \$8,000, 1998–99. (PI)

4. "Studies of the Formation of Keyholes in Laser Beam Welding," Opportunities for Undergraduate Research Experience (OURE), UMR (James A. Barnett), \$1,100, 1998–99.
5. "Determination of the Optimum Welding Speeds in Laser Beam Welding," Opportunities for Undergraduate Research Experience (OURE), UMR (Thomas M. Simon), \$1,100, 1998–99.
6. "Oil Cooler Welding Procedure Development," Engine Plus, Inc., through MAMTC, \$3,000, 1995–96. (PI)
7. "Faculty Research Grant," Graduate School, University of Missouri–Rolla, 1988: \$900, 1989: \$940, 1990: \$400, 1992: \$1,070. (PI)
8. "Summer Faculty Research Grant," School of Engineering, University of Missouri–Rolla, 1988: \$3,852, 1989: \$4,025, 1990: \$5,000, 1991: \$5,000, 1992: \$2,000. (PI)
9. "Equipment Grant for Solidification and Materials Processing Research," University of Missouri–Rolla, \$8,000, 1989–1990. (PI)
10. "Equipment Grant for Solidification and Materials Processing Research," University of Missouri–Rolla, \$20,000, 1988–1989. (PI)
11. "Study of Natural Convection during Solidification of Alloys," NCSA, University of Illinois, 30 CPU hours of CRAY X–MP 48, April 1987–June 1988. (PI)
12. "Design and Improvement of Existing Manufacturing Processes for the Steelville Manufacturing Company," Small Business Institute, \$500, June 1987. (PI)
13. "Equipment Grant for Solidification and Materials Processing Research," University of Missouri–Rolla, \$10,000, 1986–1987. (PI)

GRADUATE STUDENT SUPERVISION:

Ph.D. Dissertation:

1. "Fabrication and Analysis of SERS Using Femtosecond Laser," Sultan Alqahtani, Ph.D. (in progress)
2. "Fabrication and Analysis of Lab–on–a–Chip Using Femtosecond Laser," Y.K. Han, Ph.D. (May 2011; Co–advisor: Prof. H. Xiao)
3. "High Temperature Tolerant Optical Fiber Inline Microsensors by Laser Fabrication," T. Wei, Ph.D. in Electrical and Computer Engineering (Nov. 2010; Co–advisor: Prof. H. Xiao)
4. "Molecular Simulation of the Infrared Absorption Cross Section and Thermophysical Properties of a Polyatomic Fluid," Z. Liang, Ph.D. (May 2010)
5. "Fabrications and Analysis of Functional Devices Using Femtosecond Laser," C.H. Lin, Ph.D. (May 2010; Co–advisor: Prof. S.J. Chen at National Cheng– Kung University, Tainan, Taiwan; Dr. Lin conducted his dissertation research under the supervision of

Prof. Tsai at Missouri S&T for three years and received his Ph.D. degree from National Cheng– Kung University, Tainan, Taiwan)

6. “Modeling the Arc Plasma and Metal Transfer in Gas Metal Arc Welding,” Z.H. Rao, Ph.D. (April 2010; Co–advisor: Prof. S.M. Liao at Central South University, Hunan, China; Dr. Rao conducted his dissertation research under the supervision of Prof. Tsai at Missouri S&T for two years and received his Ph.D. degree from Central South University, Hunan, China)
7. “Three–Dimensional Modeling of the Plasma Arc and Metal Transfer in Arc Welding,” G. Xu, Ph.D. (December 2006)
8. “Heat and Mass Transfer in the Gas Metal Arc Welding Process,” J. Hu, Ph.D. (December 2004)
9. “Mathematical Modeling and Experimental Validation of Gas Metal Arc Welding of Aluminum Alloys,” H. Guo, Ph.D. (December 2003)
10. “Effect of Zinc Element in Laser Welding of Galvanized Steels,” J. Zhou, Ph.D. (August 2003)
11. “A Comprehensive Dynamic Model of the Gas Metal Arc Welding Process,” F. Zhu, Ph.D. (Feb. 2002)
12. “Modeling the Formation and Collapse of a Keyhole during Laser Welding Process,” W.H. Zhang, Ph.D. (Jan. 2002)
13. “Modeling of the Heat and Mass Transfer and Fluid Flow in 3–D GMAW,” Y. Wang, Ph.D. (Sept. 1999)
14. “Modeling of the Formation of Macrosegregation during Solidification of Binary Alloys,” Q.Z. Diao, Ph.D. (Sept. 1994)
15. “An Optimization of Processing Parameters and Casting Quality in the Evaporative Pattern Casting (EPC) Process,” J. Fu, Ph.D. in Metallurgical Department (July 1992; Co–advisor: Prof. D.R. Askeland)
16. “Shrinkage–Induced Fluid Flow and Its Effect on the Formation of Macrosegregation During Alloy Solidification,” J.H. Chen, Ph.D. (May 1992)
17. “Modeling of Fluid Flow and Porosity Formation during Casting Solidification,” F.C. Chang, Ph.D. (Jan. 1991)
18. “Studies on the Shrinkage–Induced Transport Phenomena during Alloy Solidification,” K.C. Chiang, Ph.D. (August 1990; Co–advisor: Prof. T.S. Chen)

M.S. Thesis:

1. “Fabrication of Nanostructures by Femtosecond Laser for Enhancing Solar Energy Absorption,” Patrick Margavio, M.S. (in progress)
2. “Laser Hole Drilling Breakthrough Detection,” Matthew A. Olson, M.S. (May 2011)

3. "Femtosecond Laser Micromachining of Stents," Adam David Hamdorf, M.S. (May 2011)
4. "On- Line Depth Measurement of Microscale Laser Drilled Holes," R. Powell, M.S. (May 2009)
5. "Femtosecond Laser Micromachining," B.P. B. Chitturi, M.S., Changed to Non-Thesis (August 2008)
6. "Femtosecond Laser Processing of Silicon in Water," Songping Wu, M.S. (January 2008)
7. "Femtosecond Laser Fabrication of Lenses on Foturan Glass," T. Hockenull, M.S., Changed to Non- Thesis (May 2009)
8. "Modeling of Femtosecond Laser-Material Interactions," C.Z. Lin, M.S., Changed to Non-Thesis (December 2007)
9. "Effects of Wavelength on Femtosecond Laser Fabrication of Glass," N. Kondameedi, M.S. (December 2006)
10. "Applications of Laser Surface Texturing in Reduction Friction and Improving Cooking Efficiency," Krishnathejan Akumalla, M.S. (August 2005)
11. "Two-Temperature Modeling of Ultrashort Heating of Metals," N. George, M.S., Changed to Non-Thesis (December 2004)
12. "Numerical Modeling of Metal Heating Using Ultrashort Laser Pulses," B. Wu, M.S. (Jan. 2003)
13. "Modeling the Striation Phenomena in Oxygen-Assisted Laser Cutting of Steels," A. Joardar, M.S. (August 2002)
14. "Experimental Study of Gas Metal Arc Welding of Aluminum Alloys," B. Christensen, M.S. (May 2001)
15. "Modeling of the Effects of Surface Active Elements on Flow Patterns and Weld Penetration," Q. Shi, M.S. (Sept. 1996)
16. "Modeling of the Formation of Macrosegregation during Solidification of an Aluminum-Copper Alloy with Variable Cross-Section," S.J. Strubberg, M.S. (Jan. 1994)
17. "Effect of the Rate of Latent Heat Release on the Fluid Flow and Solidification Patterns during Alloy Solidification," M.J. Voss, M.S. (July 1992)
18. "A Direct Method to Include Latent Heat Effect for Modeling Casting Solidification," C.H. Su, M.S. (Feb. 1990)
19. "An Accurate and Efficient Numerical Algorithm for Multi-Dimensional Modeling of Casting Solidification," J.H. Chen, M.S. (Jan. 1990)
20. "Modeling of Interdendritic Fluid Flow and Microporosity Formation during Alloy Solidification," I.J. Chiou, M.S. (Sept. 1989)

21. "Modeling of the Fluid Flow and the Particle Behavior in an Atomization Process for Producing Rapidly-Solidified Powders," N.T. Hsiao, M.S. (July 1989)
22. "Heat and Mass Transfer in the Sand Mold and Their Effects on Casting Carburization and Solidification during the Evaporative Pattern Process," S.S. Abayarathna, M.S. (April 1989)

POSTDOCTORAL FELLOWS/VISITING SCHOLARS SUPERVISING:

1. Dr. C.H. Lin, Postdoctoral Fellow, from National Cheng– Kung University, Tainan, Taiwan, September 2011– present.
2. Dr. Xiaodong Hu, Visiting Associate Professor, from Zhejiang University of Technology, Zhjiang, China, August 2011–present.
3. Dr. Wenxian Wang, Visiting Professor, from Taiyuan University of Technology, Taiyuan, China, August 2011–present.
4. Dr. Y.K. Han, Postdoctoral Fellow, from Department of Mechanical Engineering, Missouri University of Science and Technology, Rolla, MO, May 2011 – present.
5. Dr. Z. Liang, Postdoctoral Fellow, from Department of Mechanical Engineering, Missouri University of Science and Technology, Rolla, MO, May 2010 – present.
6. Dr. Huilai Sun, Visiting Associate Professor, from Tianjin Polytechnic University, China, Dec. 2009 – Dec. 2010.
7. Ms. H.Y. Lin, Visiting Scholar, from National Cheng– Kung University, Tainan, Taiwan, Oct. 2008 – July 2009.
8. Mr. C.H. Huang, Visiting Scholar, from National Cheng– Kung University, Tainan, Taiwan, Oct. 2008 – July 2009.
9. Dr. Sumai Wang, Postdoctoral Fellow, from Beijing Institute of Technology, China, Sept. 2007 – Oct. 2008.
10. Dr. Y. Cheng, Postdoctoral Fellow, from Shanghai Institute of Optics and Fine Mechanics, Shanghai, China, July 2005 – June 2006.
11. Dr. J. Zhou, Postdoctoral Fellow, from Department of Mechanical Engineering, University of Missouri–Rolla, MO, Sept. 2003 – July 2006.
12. Dr. L. Jiang, Research Assistant Professor, from Department of Mechanical Engineering, Beijing Institute of Technology, People's Republic of China, Nov. 2002– August 2006.
13. Dr. L. Jiang, Postdoctoral Fellow, from Department of Mechanical Engineering, Beijing Institute of Technology, People's Republic of China, Oct. 2001–Oct. 2002.
14. Dr. Y. Wang, Postdoctoral Fellow (part-time), from Department of Mechanical Engineering, University of Missouri–Rolla, MO, Jan. 2000–August 2001.

15. Dr. D.Y. Shang, Postdoctoral Fellow, from Department of Ferrous Metallurgy, Northeastern University, People's Republic of China, Sept. 1997–Dec. 1997.
16. Dr. H.G. Fan, Postdoctoral Fellow, from Welding Research Institute, Xi'an Jiaotong University, People's Republic of China, Jan. 1997–Jan. 1998.
17. Prof. B.C. Liu, Visiting Scholar, from Department of Mechanical Engineering, Tsinghua University, People's Republic of China, May 1996.
18. Dr. Z.N. Cao, Postdoctoral Fellow, from Welding Department, Harbin Institute of Technology, People's Republic of China, Sept. 1995 – Jan. 1996.
19. Dr. Y.P. Yang, Postdoctoral Fellow, from Welding Department, Harbin Institute of Technology, People's Republic of China, July 1995 – Oct. 1996.
20. Prof. B.C. Liu, Visiting Scholar, from Department of Mechanical Engineering, Tsinghua University, People's Republic of China, Oct. 1992.
21. Dr. H.J. Lin, Postdoctoral Fellow, from Department of Materials Science & Engineering, National Cheng–Kung University, Taiwan, Aug. 1991 – June 1992.
22. Mr. X.S. Jin, Visiting Scholar, Associate Professor from Department of Engineering Mechanics, Southwest Jiaotong University, People's Republic of China, July 1991 – May 1992.
23. Mr. J. Fu, Visiting Scholar, Researcher from Department of Mechanical Engineering, Tsinghua University, People's Republic of China, June 1990 – Aug. 1990.

UNDERGRADUATE RESEARCH SUPPORT:

1. Mike Mitchell, “Laser Micromachining,” 2006–07.
2. Rachel Day, “Laser Micromachining,” summer 2007.
3. Keith Wire, “Laser Processing Animation,” 2006.
4. Rock Powell, “Femtosecond Laser System Integration,” 2005–07.
5. Kelly Fahey, Matthew Moran, and Ardessia D. Caldwell, “Laser Micromachining,” 2004–05.
6. Stephen Rucker, “Laser Micromachining,” 2003–04.
7. Tracy Hockenull, “Laser Cutting,” 2002–03.
8. Nolan Finch, “Laser Applications in MEMS,” 2002.
9. Sean W. Garceau, “Laser Micromachining,” 2002–03.
10. Tom Simon, “Laser Welding of Aluminum Alloys,” 1998–2000.
11. James Barnett, “Fit–up Problems in Laser Welding,” 1998–99.

STUDENT AWARD:

1. Patrick Margavio, received the 3rd place award (out of 28 graduate students) for the poster presentation titled, “Microlens Array Light Trapping CdTe Solar Cells for use in Concentrator Photovoltaics,” the 7th Annual Intelligent Systems Center poster presentation, Missouri University of Science and Technology, November 3, 2011.
2. Yukun Han, received the 3rd place award (out of 26 graduate students/teams) for the poster presentation titled, “Femtosecond Laser One–Step Fabrication of Microstructures for Sensing and Detection,” the 5th Annual Intelligent Systems Center poster presentation, Missouri University of Science and Technology, November 11, 2009.
3. Zhi Liang, received the 2nd place award (out of 22 graduate students/teams) for the paper, “A Study of Laser–Gas Interactions by Ab Initio Method,” the 2008 Intelligent Systems Center Research Symposium, Missouri University of Science and Technology, April 22, 2008.
4. Zhi Liang, received the 2nd place award (out of 22 graduate students/teams) for the paper, “Thin Film Coating at Room Temperature and in Open Atmosphere by Using Multiple Lasers,” the 2007 Intelligent Systems Center Research Symposium, University of Missouri Rolla, April 25, 2007.
5. Zhi Liang, received the 1st place award (out of 24 graduate students/teams) for the poster presentation titled, “Thin Film Coating at Room Temperature and in Open Atmosphere by Using Multiple Lasers,” the 3rd Annual Intelligent Systems Center poster presentation, University of Missouri–Rolla, November 5, 2007.
6. Tom Simon, received the 2nd place in campus OURE paper competition, “Laser Welding of Aluminum Alloys,” University of Missouri– Rolla, 1998–2000.

COURSES TAUGHT:

- **University of Missouri–Rolla:**

ME219 Thermodynamics; ME221 Applied Thermodynamics; ME225 Heat Transfer; ME231 Thermofluid Mechanics I; ME401A Transport Phenomena in Materials Processes and Manufacturing; ME325 Intermediate Heat Transfer; ME339 Computational Fluid Mechanics; ME425 Heat Conduction; ME457 Laser–based Manufacturing and Materials Processing; ME426 Micro–/Nano–Scale Thermophysics and Energy Transport.

- **University of California at Berkeley: (Teaching Associate)**

Heat Transfer; Viscous Flow I.

- **State University of New York at Buffalo: (Teaching Assistant)**

Transport Processes Lab. I – Fluid Mechanics; Transport Processes Lab. II – Heat Transfer; Fortran IV and Basic Numerical Analysis; Jet Propulsion Principles.

NEW COURSE/LABORATORY DEVELOPED:

- “Micro–/Nano–Scale Thermophysics and Energy Transport,” a Graduate Course.

- “Transport Phenomena in Materials Processes and Manufacturing,” a Graduate Course.
- “Materials Processing and Characterization Laboratory,” Room 118 Toomey Hall: Equipped with Three High or Low Constant Temperature Baths and Circulators, Programmable Temperature Controller, Metallurgical and Stereo Microscopes with Video and 35 mm Cameras, Monitoring and Recording System, Programmable Furnace, Infrared Temperature Measurements, Data Acquisition System, Spray Coaters, etc. Also equipped with weld sample preparation and testing facilities (cutter, grinder/polisher, mounting press, metallurgical imaging analysis system, microindenter, microscopes).
- “Welding Laboratory,” Room 238 Toomey Hall: Equipped with Arc Welders (MIG, for SMAW, GTAW, FCAW, and Pulsed GMAW), Tungsten Arc Welder (TIG), Oxygen–Acetylene Welder, Plasma Cutting System, Programmable Wire Feeder, Variable Speed Linear Tracker, etc.
- “Laser–Based Manufacturing Laboratory,” Rooms 115 and 117 Toomey Hall: Equipped with 5 laser systems: 1) a CO₂ laser system (1.7 KW CW, 7.5 KW pulsed; 4–axes PC controlled motion system), 2) a Nd:YAG laser system (80 W, Galvo operation, full PC controlled operation), 3) a Nd:YAG frequency tripled UV laser system (355 nm, 10 W, Galvo and 4–axis CNC controlled), 4) a femtosecond/picosecond laser system (800 nm, 1 mJ/pulse, 5–axis PC controlled stages), and 5) a fiber laser system (1067 nm, 100 W, 3–axis PC controlled stages). OPA, DDA, SLM, Spectrometer, Microscopes, lenses, etc.

STUDENT TEACHING EVALUATIONS: (University of Missouri–Rolla)

- 1986–87: 3.19/4.0 (F86), 3.27/4.0 (W87); Departmental Year Average: 2.66/4.0.
- 1987–88: 3.34/4.0 (F87), 3.20/4.0 (W88); Departmental Year Average: 2.64/4.0.
- 1988–89: 3.77/4.0 (F88), 3.43/4.0 (W89); Departmental Year Average: 2.73/4.0.
- 1989–90: 4.45/5.0 (F89), 4.45/5.0 (W90); Departmental Year Average: 3.55/5.0.
- 1990–91: 3.40/4.0 (F90), 3.30/4.0 (W91); Departmental Year Average: 2.60/4.0.
- 1991–92: 3.60/4.0 (F91), 2.80/4.0 (W92); Departmental Year Average: 2.60/4.0.
- 1992–93: 3.20/4.0 (F92), 3.20/4.0 (W93); Departmental Year Average: 2.70/4.0.
- 1993–94: 3.10/4.0 (F93), 3.10/4.0 (W94); Departmental Year Average: 2.70/4.0.
- 1994–95: 3.10/4.0 (F94), 2.95/4.0 (W95); Departmental Year Average: 2.70/4.0.
- 1995–96: 2.65/4.0 (F95), 3.22/4.0 (W96); Departmental Year Average: 2.65/4.0.
- 1996–97: 3.40/4.0 (F96), 3.20/4.0 (W97); Departmental Year Average: 2.50/4.0.
- 1997–98: 3.50/4.0 (F97), 3.60/4.0 (W98); Departmental Year Average: 2.70/4.0.
- 1998–99: 3.30/4.0 (F98), 3.30/4.0 (W99); Departmental Year Average: 2.80/4.0.
- 1999–00: 3.40/4.0 (F99), 3.50/4.0 (W00); Departmental Year Average: 2.80/4.0.
- 2000–01: 3.00/4.0 (F00), 3.10/4.0 (W01); Departmental Year Average: 2.70/4.0.
- 2001–02: 3.70/4.0 (F01), 3.24/4.0 (W02); Departmental Year Average: 2.80/4.0.
- 2002–03: released (F02), 3.50/4.0 (W03); Departmental Year Average: 2.80/4.0.
- 2003–04: 3.00/4.0 (F03), 4.00/4.0 (W04); Departmental Year Average: 2.80/4.0.
- 2004–05: 2.55/4.0 (F04), released (W05); Departmental Year Average: N/A.
- 2005–06: 3.50/4.0 (F05), released (S06); Departmental Year Average: N/A.
- 2006–07: 4.00/4.0 (F06), 4.00/4.0 (S07); Departmental Year Average: N/A.

- 2007–08: 2.80/4.0 (F07), 3.15/4.0 (S08); Departmental Year Average: N/A.
- 2008–09: 3.35 (F08), 2.70/4.0 (S09); Departmental Year Average: N/A.
- 2009–10: released (F09), 3.70/4.0 (S10); Departmental Year Average: N/A.
- 2010–11: 2.85/4.0 (F10), 2.66/4.0 (S11); Departmental Year Average: N/A.

SERVICES:

- **University/School/Department:**
 - Thermal Science Committee (Department, 1986–present).
 - Search Committee for Director of Intelligent Systems Center (School, 1987).
 - Computer Committee (Department, 1988–91, 2000–2005).
 - Academic Affairs Committee (School, 1988–89).
 - Advisory Committee (Department, 1990–91).
 - Faculty Conduct Committee (University, 1990–94).
 - Member of Graduate Faculty (University, 1987–present).
 - Member of Doctoral Faculty (University, 1989–present).
 - Pi Tau Sigma Faculty Advisor (Department, 1990–2001).
 - Undergraduate Course Selection Advising, about 20–30 students/Year (Department, 1987–present).
 - Participated in University Day, Rolla Day, etc. (Department, 1988–2004).
 - Graduate Affairs Committee (Department, 1996–98).
 - Fluid Mechanics Committee (Department, 1994–present).
 - Manufacturing Processes Committee (Department, 1996–2009).
 - Department Representative for UM/CBHE Five–Year Program Reviews (University, 1997–98).
 - Member of University Academic Council (University, 1997–2009).
 - Advisory Committee (Department, 1997–99).
 - Promotion and Tenure Committee (Department, 1998–2001, 2004).
 - Search Committee Member for Wolf Professorship (Metallurgical Dept. 2001).
 - Graduate Seminar Series Committee (Department, 2003–2005).
- **Reviewer:** (papers or proposals)
 - AICHe Journal
 - Applied Optics
 - Applied Physics Letter
 - Applied Surface Science
 - Physics Letters A
 - IEEE Transactions on Nanotechnology
 - J. Applied Physics
 - Journal of Physics: Condensed Matter
 - J. Physics D: Applied Physics
 - Journal of Materials Research
 - Journal of Micromechanics and Microengineering
 - Journal of Materials Processing Technology
 - Journal of Thermophysics and Heat Transfer
 - ASME J. Heat Transfer

ASME J. Manufacturing Science & Engineering
Journal of Enhanced Heat Transfer
Int. J. Heat Mass Transfer
Heat and Mass Transfer (Germany)
Numerical Heat Transfer
Metallurgical and Materials Transactions
AFS Transactions
IEEE Transactions on Automation Science and Engineering
J. Laser Applications
Experimental Heat Transfer
J. Manufacturing Processes
Computers & Fluids, an Int. J.
Information & Software Technology
Optics Express
Optics & Laser Technology
Optics & Lasers in Engineering
Optics Letters
International Journal of Advanced Manufacturing Technology
Int. J. Computer Applications and Technology
Journal of Colloid and Interface Science
Fluid Phase Equilibria
Sensors & Actuators: B. Chemical
International Journal of Nanomanufacturing
Frontiers in Heat and Mass Transfer
International Journal of Heat and Fluid Flow
Chinese Optics Letters
International Journal of Thermal Sciences
AIAA/ASME Thermophysics and Heat Transfer Conference
ASME Winter Annual Meeting (IMECE)
ASME National Heat Transfer Conference
ASME/JSME Thermal Engineering Joint Conference
ASME PVP Conference
International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics
Idaho State Board of Education
National Research Council (for Evaluating 50 Ph.D. ME Programs in U.S.A.)
NSF
DOE
ARO
UM Research Board
Impartial Reviewer for Tenure and Promotion for several universities
The Petroleum Research Fund, American Chemical Society
Proposals for Nebraska Research Initiative (NRI)

- **Journal Editorship:**

Editorial Board, Journal of Spectroscopy & Dynamics, 2010–present.

Editorial Board of ISRN Chemical Engineering, 2011–present.

- **Conference Chair/Co–Chair:** (most recent only)

Laser Micro, Nano and Ultrafast Fabrication Committee, Pacific International Conference on Applications of Lasers and Optics (PICALO), Wuhan, China, March 23–25, 2010.

Session Organizer, ASME 2nd Micro/Nanoscale Heat & Mass Transfer International Conference, Shanghai, China, December 18–21, 2009.

Program Planning Committee on "Femtosecond Laser Microfabrication", 2009 Fall Optics and Photonics Congress, Optical Society of America, San Jose, CA, October 13, 2009.

Section Co–Chair on "Laser Applications in Manufacturing and Materials Processing," ASME IMECE, Boston, Oct. 31–November 6, 2008.

Section Chair at PICALO 2008, Beijing, China, April 14–18, 2008.

Program Committee Member, PICALO 2008 Micro, Nano and Ultrafast Fabrication, Beijing, China, April 14–18, 2008.

Section Chair at the International Symposium on Computer–Aided Welding Engineering, Jinan, China, Oct. 19–22, 2006.

Section Chair on "Laser Applications in Manufacturing," ASME IMECE, Chicago, November 5–10, 2006.

Section Chair on "Ultrafast Laser–Material Interactions," ASME IMECE, Chicago, November 5–10, 2006.

Section Co–Chair on "Laser Nano/Micro/Macro Materials Processing," ASME IMECE, Orlando, FL, November 5–11, 2005.

Section Co–Chair at the 4th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics, Cairo, Egypt, September 19–22, 2005.

International Committee Member for the Second International Symposium on Thermal Science and Engineering, Beijing, China, October 23–25, 2005.

Section Chair at the Colloquium on Micro/Nano Thermal Engineering 2005, Seoul National University, Seoul, Korea, August 17–19, 2005.

Section Co–Chair on "Laser Manufacturing and Materials Processing," ASME Heat Transfer and InterPACK '05, San Francisco, CA, July 17–22, 2005.

Program Committee Member on "High Power Lasers and Applications," the International Conference on Laser Application and Technology (LAT), St. Petersburg, Russia, May 11–15, 2005.

Section Co–Chair on "Laser Manufacturing and Materials Processing," ASME Heat Transfer and Fluid Engineering Conference, Charlotte, NC, July 11–15, 2004.

Program Committee Member on "Micro– and Nanoscale Laser Materials Processing," 41st Annual Technical Meeting of the Society of Engineering Science Conference, Lincoln, NE, October 10–13, 2004.

Section Chair on “Modeling of Laser Welding”, Int. Conference on Laser Technologies in Welding and Materials Processing, Crimea, Ukraine, May 19–23, 2003.

Section Chair on “Fundamentals of Laser Beam Welding, Cutting and Ablation,” CLEO Europe EQEC 2003, Munich, Germany, June 23–27, 2003.

Section Co–Chair on “Transport Phenomena in Laser Macro Materials Processing and Manufacturing,” ASME IMECE, Washington, D.C., Nov. 16–21, 2003.

Organizing Committee Member and Section Co–Chair on “Keyhole Formation and Dynamics,” ICALAO, Jacksonville, Florida, Oct. 13–16, 2003.

PROFESSIONAL AFFILIATIONS:

- American Society of Mechanical Engineers (ASME).
- The Metallurgical Society (TMS).
- ASM International.
- American Foundry Society (AFS).
- American Welding Society (AWS).
- Society of Manufacturing Engineers (SME).
- Laser Institute of America (LIA).
- The International Society for Optical Engineering (SPIE).
- Optical Society of America (OSA).

CONSULTING:

1. Alumax Engineered Metal Processes, Inc., St. Louis, MO.
2. MO– SCI Corp., Rolla, MO.
3. Engines Plus, Inc., Springfield, MO.
4. Saturn Corporation, Warren, MI.
5. GM R&D Center, Warren, MI.
6. SMòX, Alameda, CA.
7. Watlow Heater Technology, Fenton, MO.
8. TRW, Washington, MI.
9. Kimberly–Clark Corp., Waco, TX.
10. Honeywell International Inc., El Paso, TX.
11. ITRI, Taiwan.
12. ITRI–South, Taiwan.
13. Laser Light Technologies, Hermann, MO.
14. P&W, East Hartford, CT.
15. Continental Disc Corporation, Liberty, MO.