Robert Taylor

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6/29 Forsyth St.
Kingsford, Sydney
New South Wales, 2032

Education

Doctor of Philosophy, Mechanical Engineering
Arizona State University - Tempe, August 2011
Dissertation: "Thermal Energy Conversion in Nanofluids"
Committee Members: Patrick Phelan (Chair), Ronald Adrian, Steve Trimble, Jonathan Posner, George Maracas
*University of Washington - Seattle, WA (*One year of PhD study)
Mechanical engineering courses in heat transfer and energy - 2006-2007

Master of Science, Mechanical and Aerospace Engineering
University of Missouri - Columbia, 2005
Thesis: "Comprehensive Optimization of Thermoelectric Devices"
Chair: Gary Solbrekken

Bachelor of Science, Mechanical and Aerospace Engineering
University of Missouri, 2004

Principle Areas of Interest

Solar energy

Heat transfer

Nanotechnology

Teaching Experience

Lecturer (tenure track faculty) - University of New South Wales 2011-Present - Joint appointment between the 'Mechanical and Manufacturing Engineering' and 'Renewable and Photovoltaic Engineering' Schools.

Teaching Assistant – Arizona State University 2007-2009 - Internal Combustion Engines (MAE 434, 3 semesters), Energy Systems Design (MAE446, 2 semesters), Thermodynamics (MAE382, 1 semester)

Teaching Assistant – University of Washington 2006-2007 – Electronics Packaging and Materials (MAE, 1 quarter), Machine Design and Analysis (MAE 356, 2 quarters)

Teaching Assistant – University of Missouri, 2004-2005 – Instrumentation & Measurements (MAE 3800, 2 semesters)

YES! High School Engineering Camp – Developed outdoor solar energy labs for ~50 high school students interested in perusing engineering, Summer, 2009

Curriculum Development – Helped design and implement a new "Energy & Environment" emphasis (which meets ABET requirements) in the MAE department, Arizona State University, 2008-2009

Research Experience

Lecturer (tenure track faculty) - University of New South Wales 2011-Present - Joint appointment between 'Mechanical and Manufacturing Engineering' and 'Renewable and Photovoltaic Engineering' Schools.

Graduate research assistant in 'The National Center of Excellence on SMART Innovations for Urban Climate + Energy', Arizona State University, 2009-Present: NSF grant CBET-0932720 ($325 k) "Photothermal Energy Conversion in Nanofluids"

Graduate research assistant, University of Missouri, 2005

Undergraduate research assistant, NASA Grant for undergraduate research, University of Missouri, 2004-2005.

Journal Publications

1. **Taylor, R.A,** Otanicar T.P., Rosengarten, G,"Nanofluid-Based Optical Filter Optimization for PV/T", Nature - Light: Science and Applications; [*Under Review*], (2012).

2. **Taylor R.A.**, Coulombe, S., Otanicar, T.P., Phelan PE., Gunawan, A., Lv W., Rosengarten, G., Prasher, R., and Tyagi H., "Small Particles, Big Impacts: A Review Of The Diverse Applications Of Nanofluids", Applied Physics Reviews, [*Under review*] (2012).

3. Boerema, N., Morrison, G., **Taylor, R.**, Rosengarten, G. "Liquid Sodium versus Hitec as a Heat Transfer Fluid in Solar Thermal Central Receiver Systems," Solar Energy [*Under review*] (2012).

4. GUNAWAN A., LIN C-H., BUTTRY D., MUJICA V., TAYLOR RA, PRASHER RS., PHELAN PE., Liquid thermoelectrics: review of recent and limited new data of thermogalvanic cell experiments, (2012) Nanoscale and Microscale Thermophysical Engineering; Under Review.

5. **Taylor R.A.**, Patrick E. Phelan, Ronald J. Adrian, Andrey Gunawan, and Todd P. Otanicar, "Characterization of Laser-Induced, Volumetric Boiling in Nanofluids", **56**, pp. 1-11, International Journal of Thermal Science (2012).

6. Otanicar, T.P., **Taylor, R.A.**, Phelan, P.E. "Prospects for Solar Cooling – An Economic and Environmental Assessment" Solar Energy, **86**, issue 5, pp. 1287–1299, 2012.

7. **Taylor, R.A.**, Phelan, P.E., Adrian, R.J., Otanicar, T.P, Prasher, R**.,** "Nanofluid Optical Property Characterization: Towards Efficient Direct-Absorption Solar Collectors" Nanoscale Research Letters [invited submission] **6**: 225, (2011).

8. **Taylor, R.A.**, Phelan, P.E. Otanicar, T.P., Walker, C.A., Nguyen, M., Trimble, S., Prasher, R. "Applicability of Nanofluids in High Flux Solar Collectors" J. Renewable and Sustainable Energy **3**, 023104, (2011).

9. Otanicar T.P., Phelan, P.E., **Taylor, R.A.**, Tyagi, H., "Spatially Varying Extinction Coefficient for Direct Absorption Solar Thermal Collector Optimization," J. of Solar Energy Engineering 133, 024501 (2011).

10. OTANICAR TP, PHELAN PE, TAYLOR RA and TYAGI H, "Tuning the extinction coefficient for direct absorption solar thermal collector optimization", J. of Solar Energy, Vol 133, 024501 (2011).

11. Otanicar T.P., Patrick E. Phelan, Ravi S. Prasher, Gary Rosengarten, **Taylor, R.A.**, "Nanofluid-based direct absorption solar collector," J. Renewable Sustainable Energy **2**, 033102 (2010)

12. **Taylor, R.A.**, Phelan, P.E., Otanicar, T.P., Adrian, R.J., Prasher, R.S. "Vapor Generation in a Nanoparticle Liquid Suspension Using a Focused, Continuous Laser" App. Phys. Let., 95, 161907, (2009).

13. **Taylor, R.A.**, Phelan, P.E, "Pool boiling of nanofluids: Comprehensive review of existing data and limited new data" Int. J. of Heat and Mass Transfer, **52**, 5339, (2009).

14. **Taylor, R.A.**, Solbrekken, G.L., "Comprehensive System-Level Optimization of Thermoelectric Devices for Electronic Cooling Applications", Comp. and Packaging Tech., IEEE Trans., **31**, 23-31, (2008).

Book Chapters

1. Phelan, P.E., **Taylor, R.A.**, Adrian, R., Prasher, R.S., Otanicar, T., "Light-Induced Energy Conversion in Liquid Nanoparticle Suspensions" Advances in Numerical Heat Transfer and Fluid Flow, Vol. 4, [*in press*], (2012).

Conference Proceedings

1. **Taylor, R.A.**, Otanicar, TP, Rosengarten, G, Hawkes, E., Coulombe, S. ″Tunable Optical Filtration Using Liquid Nanofluids″, Proceedings of the 3rd International Conference on Nanotechnology: Fundamentals and Applications, Montreal, Canada (2012).

2. Lin, C-H, Gunawan, A., Buttry, D., Mujica V., **Taylor, R.A.**, Prasher R., Phelan P., ″Optimization of Cell Geometry for Maximizing Performance of Fe(CN)64-/ Fe(CN)63- and Cu/Cu^{2+} Aqueous Thermogalvanic Cells″, ASME 2012 International Mechanical Engineering Congress & Exposition, Houston, Texas (2012).

3. Vishwakarma, V, Singhal N, Khullar, V, Tyagi, H, **Taylor, RA**, Jain, A., ″Space Cooling Using the Concept of Nanofluids-Based Direct Absorption Solar Collectors ″, ASME 2012 International Mechanical Engineering Congress & Exposition, Houston, Texas (2012).

4. Lv W., Otanicar, TP, Phelan P, **Taylor R.**, Swaminathan, R., Prasher, R., ″Plasmon-Enhanced Properties of Metalic Nanostructures and Their Application to Direct Solar Absorption Receivers″, Proceedings of the ASME 2012 Summer Heat Transfer Conference: HT2012, Rio Grande, Puerto Rico (2012).

5. **Taylor, R.A.**, Coulombe, S., Otanicar, T., Phelan, P., Gunawan, A., Lv, W., Rosengarten, G., Prasher, R., Tyagi, H., "Critical Review of the Novel Applications and Uses of Nanofluids" Micro/Nanoscale Heat & Mass Transfer, Atlanta, Georgia, (2012).

6. Soni, S., Tyagi, H., **Taylor, R.A.**, Kumar, A., "Numerical Analysis of Nanoparticle Distribution in a Tumor Following Intramuscular Injection of a Nanofluid", Int. Conf. on Frontiers of Nanoscience, Nanotechnology and Their Applications (NanoSciTech2012), Punjab University, Chandigarh, India, (2012).

7. Lv, W., Phelan, P., Otanicar, T.P., **Taylor, R.A**., Swaminathan, R., Dai, L., Prasher, R., "Plasmon-Enhanced Properties of Metal Nanostructures and Their Application to Direct Solar Absorption Receivers", ASME 2012 Summer Heat Transfer Conference, Puerto Rico, USA, [*under review*] (2012).

8. Lv, W., Otanicar, T., Phelan, P., Dai, L., **Taylor, R.A**, Swaminathan, R. "Surface Plasmon Resonance Shifts of a Dispersion of Core-Shell Nanoparticles for Efficient Solar Absorption", Micro/Nanoscale Heat & Mass Transfer, Atlanta, Georgia, [*to appear*] (2012).

9. Khullar, V., Tyagi, H., Phelan, P., Otanicar, T., Singh, H., **Taylor, R.A**, "Solar Energy Harvesting using a Nanofluid-Based Concentrating Solar Collector", Micro/Nanoscale Heat & Mass Transfer, Atlanta, Georgia, [*to appear*] (2012).

10. Phelan, P., Otanicar, T., **Taylor, R.A**, Prasher, R., Phelan, B., "The Socieconomic Impacts of Heat Transfer Research", 2nd Asian-US-European Thermophysics Conference in Hong Kong Thermal Science for Sustainable World, (2012).

11. **Taylor, R.A.**, Phelan, P., Adrian, R., Otanicar, T., "Characterization of a Small Direct Volumetric Steam Generator" ASME 5th International Conference on Energy Sustainability, Washington DC, August, (2011).

12. **Taylor, R.A.**, Phelan, P.E., Adrian, R., Otanicar, T., Prasher, R., "Nanofluid Extinction Coefficients for Photothermal Energy Conversion" Proceeding of the ASME/JSME 8th Thermal Engineering Joint Conference, Honolulu, HI, March (2011).

13. **Taylor R.A.**, Phelan P, Otanicar T, Trimble S, Prasher R, Adrian R "Nanofluids and their solar thermal energy applications" [Invited Speaker - Presentation Only] Nanofluids: Fundamentals and Applications II, Montreal, Canada, (2010).

14. Phelan PE, **Taylor R.A.**, Adrian RJ, Prasher RS, Otanicar TP "Photothermal Energy Conversion in Liquid-Nanoparticle Suspensions" 8th International Conference on Nanochannels, Microchannels, and Minichannels, Montreal, Canada, (2010).

15. **Taylor, R.A.**, Phelan, P.E., Otanicar, T., Tyagi, H., Trimble, S., "Applicability of Nanofluids in Concentrated Solar Energy Harvesting", ES2010-90055, ASME 4th International Conference on Energy Sustainability, Phoenix, AZ, (2010).

16. Otanicar, T.P., Phelan, P.E., **Taylor, R.A.**, Tyagi, H., "Tuning the Extinction Coefficient for Direct Absorption Solar Thermal Collector Optimization, ES2010-90022, ASME 4th International Conference on Energy Sustainability, (2010).

17. **Taylor, R.A**, Phelan, P.E., Adrian, R., Otanicar, T., Prasher, R.S., "Experimental Results for Light Induced Boiling in Water-Based Nanoparticle Suspensions". HT2009-88176, ASME Summer Heat Transfer Conference, (2009).

18. **Taylor, R.A.**, Phelan, P.E., Otanicar T, Witt, M., "Solar Collection and Utilization Using Nanotechnology" (Poster/Presentation only) EUEC Energy and Environment Conference, Phoenix, AZ, (2009).

19. Otanicar, T., **Taylor, R.A**, Phelan, P.E., Prasher, R.S., "Impact of Size, Shape, and Scattering Mode on the Optimal Solar Absorbing Nanofluid". ES2009-90066, ASME 3rd International Conference on Energy Sustainability, (2009).

20. **Taylor, R.A.**, Solbrekken, G.L.,"Optimization of Thermoelectric Cooling for Microelectronics" 10th Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems, San Diego, CA, (2006).

21. **Taylor, R.A.**, Solbrekken, G.L., "An Improved Optimization Approach for Thermoelectric Refrigeration Applied to Portable Electronic Equipment" ASME Pacific Rim Technical Conference and Exhibition on Integration and Packaging of MEMS, NEMS, and Electronic Systems, San Francisco, CA, (2005).

Grants

2012 (REQUESTED) - R.A., Taylor, "Volumetrically absorbing nanofluids for high temperature solar thermal harvesting." ARC, DP13
110k
2012 (REQUESTED) Phelan, Lenore Dai (Co-PI). Dai, Hayden, Herrmann, Otanicar, Peralta, Reddy, Jon Sherbeck, Stechel, R.A. Taylor, Advanced Air/Gas Receiver Technology for High-Temperature Solar Energy Conversion, United States SunShot Program, DE-FOA-0000595 500k

2012 - G. Rosengarten, R.A. Taylor (researchers w/ Vast Solar): ASI Round 3, Validation of performance modelling for 1.2MWth solar array with high temperature receiver and integrated thermal storage. 437k

2011- Minor Equipment Research Grant - University of New South Wales, "Variable Concentration Tracking Solar Dish Test Bed"

2009 - National Science Foundation grant [**awarded**] CBET-0932720, entitled, "Photothermal Energy Conversion using Nanofluids".

Honors and Awards

Association of Energy Engineers Scholarship Awards (2): National & Arizona Chapter.

University Graduate Fellow, Arizona State University, 2007-Present (3)

Undergraduate Scholarships - Leadership and general scholarship awards (3)

Travel Grants - Arizona State University, 2007-Present (5)

Memberships

American Society of Mechanical Engineers

American Solar Energy Society

American Society for Heating, Refrigeration and Air-Conditioning Engineers

Tau Beta Pi Engineering Honor Society

Service

Workshop Organization:
- Organized a 3 day 'Sustainable Energy Workshop' which brought 5 students/staff from the Indian Institute of Technology - Ropar to UNSW - financial support provided by UNSW International Contestable Funds.
Conference Organization: Session chair at the Micro/Nanoscale Heat and Mass Transfer (Session: 2-5 Applications of nanofluid), Atlanta, GA, 2012, ASME Energy

Sustainability/ ASES Solar 2010, ASME Heat Transfer/Energy Sustainability/InterPack 2009, EUEC – Energy and Environment Conference, 2008.

Journal review: Reviewer for International Journal of Heat and Mass Transfer, Advances in Physics, Solar Energy, Journal of Heat Transfer, International Journal of Thermal Sciences, Journal of Nanotechnology in Engineering and Medicine, Microfluidics and Nanofluidics, Journal of Green Building.

Grant review: Graduate and Professional Students Association, Arizona State University, 2008.

Volunteer Activity: Presenter for the Staff Panel - UNSW GSOE9400, Tutor for GSOE9122/SUSD0007 Integrated Design Studio, Part-time advisor for UNSW SunSwift (solar car team).

Professional Development

Training for Teaching: Participant on SPREE academic teaching committee (fortnightly), UNSW Foundations of Learning and Teaching (5 day immersive workshop), Teaching Large Courses (3hrs.), Working with tutors workshop (3 hrs.),

Research Training: Completing Discovery Grants (3hrs.), ARC Discovery Schemes (1.5 hrs.), MME Research Summit workshop (full day), Building Research Partnerships with Industry (2hrs.)

Mentor Training: Supervision: Policies and Proceedures (2.5hrs.), The Art of Higher Degree Research Supervision (2 hrs.), Understanding HDR expectations through positive communication (2hrs.),

Occupational Health and Safety Training & Development: Green Labs, Ergonomics, OHS Awareness, Lab Safety Awareness (full day course), laser eye test and safety induction, Mechanical Engineering laboratory safety course, hazardous substances, devised new nanoparticle safety risk assessment and safe working procedure in consultation with Donna Pulham and Rohan Singh-Panwar,

Additional Experience

Solar Living Institute (www.solarliving.org) – Renewable energy / green building project facilitator which included weekly work as a solar photovoltaic installer, 2006.

Preparing Future Faculty Program – Year long program at ASU teaching intangibles of how to be successful as a researcher/teacher in academia, 2009-2010.