

Hadi Ghasemi, PhD

Assistant Professor

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Summary

Professional Experience : University of Houston (*Assistant Professor*) (Sept. 2014-now)

Education: Massachusetts Institute of Technology (*Postdoc*)- Advisor: *Gang Chen*
Massachusetts Institute of Technology (*Postdoc*)- Advisor: *Alexander Mitsos*
University of Toronto (*PhD*)- Advisor: *Charles Ward*

Background: Classical thermodynamics, Nano energy, Thermal fluids,
Heat transfer, Surface thermodynamics, Statistical thermodynamics

Research Topics: Nano-scale energy transport, Solar-thermal harvesting, Evaporation kinetics,
Interfacial energy transport, Physics of wetting, Physics of adsorption,
Surface physics, Sustainable energies (Solar and geothermal energies)

Selected Honours and Awards: AFOSR Young Investigator Award (YIP)(2016)
Teaching Excellence Award, UH (2016)
Departmental Citizenship Award, UH (2015)
Finalist for World Technology Award (2014)
NSERC Postdoctoral Fellowship (2012)
Russel Reynolds Award in Thermodynamics (2010)

Publications in International Journals: 24

Patents: 6

Teaching Experience: Conduction and Radiation (University of Houston)
Interfacial Phenomena (University of Houston)
Thermodynamics I (University of Houston)
Thermo-Fluid Engineering I (MIT)
Thermodynamics (University of Toronto)

Main References: Prof. Gang Chen (*Massachusetts Institute of Technology*)
Prof. Charles Ward (*University of Toronto*)
Prof. Alexander Mitsos (*Massachusetts Institute of Technology*)
Prof. Khelil Sefiane (*The University of Edinburgh*)
Prof. Javad Mostaghimi (*University of Toronto*)

Education

- **Postdoctoral Associate**, Massachusetts Institute of Technology **Oct. 2012-July 2014**
Advisor: *Prof. Gang Chen*
 - Conducted a research program on “Aerogel-based solar collectors”.
 - Conducted a research program on “Heat localization in phase-change of water”.
 - Conducted a research program on “Stack collectors for harvesting full-spectrum of solar irradiation”.
 - Conducted a research program on “High thermal conductive polyethylene thin films” sponsored by DOE.

- **Postdoctoral Associate**, Massachusetts Institute of Technology **Dec. 2011-Dec. 2012**
Advisor: *Prof. Alexander Mitsos*
 - Conducted a research program on “Hybrid solar-geothermal power generation” sponsored by ENEL.
 - Conducted a research program on “Optimization of geothermal organic Rankine cycles ” sponsored by ENEL.
 - Conducted a research program on “Dual extremum principle in thermodynamics”.

- **Ph. D.** in Mechanical Engineering **2007-2011**
University of Toronto

Dissertation Title: “Sessile water droplets: equilibrium and evaporation”
Advisor: *Prof. Charles A. Ward*

- **M. A.** in Materials Science and Engineering **2004-2006**
Sharif University of Technology

Dissertation Title: “Investigation of the effect of copper oxide thickness, atmosphere, and porosities on mechanical properties and microstructure of alumina-copper eutectic bond”
Advisors: *Profs. A. H. Kokabi and M. A. Faghihi Sani*

- **B. S.** in Materials Science and Engineering **1999-2003**
Iran University of Science and Technology

Dissertation Title: “Investigation of the formulation and mechanical properties of bubble alumina insulating castable”
Advisor: *Prof. A. H. Sarpoolaky*

Journal Publications

- J24. Nazanin Farokhnia, Peyman Irajizad, Seyed Mohammad Sajadi, and **Hadi Ghasemi**, “Rational micro-nanostructuring for thin film evaporation“, Journal of Physical Chemistry C, 120 (16), 8742-8750, 2016.
- J23. Seyed Mohammad Sajadi*, Nazanin Farokhnia*, Peyman Irajizad, Munib Hasnain and **Hadi Ghasemi**, “Flexible artificially networked structure for ambient/high pressure solar steam generation“, Journal of Materials Chemistry A, 4, 4700-4705, 2016. (* Equal Contributor)
- J22. Peyman Irajizad, Nazanin Farokhnia, and **Hadi Ghasemi**, “Dispensing Nano-Pico Droplets of Ferrofluid“, Applied Physics Letters, 107, 191601, 2015.
- J21. George Ni, Nenad Miljkovic, **Hadi Ghasemi**, Xiaopeng Huang, Svetlana V. Boriskina, Cheng-Te Lin, Jian Jian Wang, Yanfei Xu, Md. Mahfuzur Rahman, TieJun Zhang, Gang Chen. “ Volumetric solar heating of nanofluids for direct vapor generation“, Nano Energy, 17, 290-301, 2015.
- J20. Mohammad Ayub, Alexander Mitsos, and **Hadi Ghasemi**, “Thermo-economic analysis of a hybrid solar-binary geothermal power plant“, Energy, 87, 326-335, 2015.
- J19. Yuan Yang, Seok Woo Lee, **Hadi Ghasemi**, James Loomis, Xiaobo Li, Daniel Kraemer, Guangyuan Zheng, Yi Cui, and Gang Chen, “ A Charging-free Electrochemical System for Harvesting Low-grade Thermal Energy”, PNAS, 111 (48), 17011-17016, 2014.
- J18. Yuan Yang, James Loomis, **Hadi Ghasemi**, Seok Woo Lee, Yi Jenny Wang, Yi Cui, and Gang Chen, “Membrane-Free Battery for Harvesting Low-Grade Thermal Energy”, Nano Letters, 14 (11), 6578-6583, 2014.
- J17. Jame Loomis *, **Hadi Ghasemi***, Xiaopeng Huang, Jianjian Wang, Nagarajan Thoppey, Jonathan Tong, Yanfei Xu, Xiaobo Li, Cheng-Te Lin and Gang Chen, “Continuous fabrication platform for highly aligned polymer films“, Technology, 2(3), 2014. * equal contributor.
- J16. **Hadi Ghasemi**, George Ni, Amy Marie Marconnet, James Loomis, Selcuk Yerci, Nenad Miljkovic, and Gang Chen, “Solar steam generation by heat localization“, Nature Communications, 5:4449, 2014.
- J15. **Hadi Ghasemi**, Elysia Sheu, Alessio Tizzanini, Marco Paci and Alexander Mitsos, “ Hybrid solareothermal power generation: Optimal retrofitting“, Applied Energy, 131, pp. 158-170, 2014.
- J14. Seok Woo Lee, Yuan Yang, Hyun-Wook Lee, **Hadi Ghasemi**, Daniel Kraemer, Gang Chen and Yi Cui, “ An electrochemical system for highly efficient harvesting of low-grade heat energy“, Nature Communications, 5:3942, 2014.

- J13. S. V. Briskina, **Hadi Ghasemi**, G. Chen, “Plasmonic materials for advanced energy applications”, Materials today, 16(10), 375-386, 2013.
- J12. **Hadi Ghasemi**, Marco Paci, Alessio Tizzanini, and Alexander Mitsos, “Modeling and optimization of a binary geothermal power plant”, Energy, 50 (1), pp. 412-428, 2013.
- J11. **H. Ghasemi** and C. A. Ward, “Mechanism of sessile water droplet evaporation: Kapitza resistance at the solid-liquid interface”. Journal of Physical Chemistry C. 115, pp. 21311-21319, 2011.
- J10. **H. Ghasemi** and C. A. Ward, “Comment on “ Discussion on a mechanical equilibrium condition of a sessile drop on a smooth solid surface””, Journal of Chem. Phys., 134, 247101, 2011.
- J9. **H. Ghasemi** and C. A. Ward, “Energy transport by thermocapillary convection during sessile-water droplet evaporation“, Physical Review Letters, 105, 136102, 2010.
- J8. **H. Ghasemi** and C. A. Ward, “Sessile-water-droplet contact angle dependence on adsorption at the solid-liquid interface“, Journal of Physical Chemistry C, 114, pp. 5088-5100, 2010.
- J7. **H. Ghasemi** and C. A. Ward, “Surface tension of solids in the absence of adsorption“, Journal of Physical Chemistry B, 113, pp. 12632-12634 , 2009.
- J6. N. Barati, M. A. Faghihi Sani, Z. Sadeghian, **H. Ghasemi**, “Titania nanostructured coating for corrosion mitigation of stainless steel“, Protection of Metals and Physical Chemistry of Surfaces, 50 (3), pp. 371-377, 2014.
- J5. N. Barati, M. A. Faghihi Sani, **H. Ghasemi**, “Photocathodic protection of 316L stainless steel by coating of Anatase nanoparticles“, Protection of Metals and Physical Chemistry of Surfaces, 49 (1), pp. 109-112, 2013.
- J4. N. Barati, M. A. Faghihi Sani, **H. Ghasemi**, Z. Sadeghian, and S. M. M. Mirhoseini, “ Preparation of uniform TiO₂ nanostructure film on 316L S.S by sol- gel dip coating“, Journal of Applied Surface Science, 225, pp. 8328-8333, 2009.
- J3. **H. Ghasemi**, A. H. Kokabi, M. A. Faghihi Sani, and Z. Riazi, “ Roles of preoxidation, Cu₂O particles, and interface pores on the strength of eutectically bonded Cu/ α - Al₂O₃“, Materials and Design, 30 (4), pp. 1098-1102, 2009.
- J2. **H. Ghasemi**, A. H. Kokabi, M. A. Faghihi Sani, and Z. Riazi, ” Alumina-Copper eutectic bond strength: contribution of preoxidation, cuprous oxides particles, and pores”, Materials Forum, 32, pp. 90-97, 2008.
- J1. **H. Ghasemi**, M. A. Faghihi Sani, and Z. Riazi, “An influence of phase development on mechanical strength of alumina-copper joint prepared by Moly-Mn method“, Iranian Journal of Materials Science and Engineering, 4, pp. 14-21, 2007.

Patents

P6. **Hadi Ghasemi**, Peyman Irajizad, Munib Hasnain, “Magnetic Icephobic Surfaces“, United States Application, 62/313893.

P5. **Hadi Ghasemi**, Seyed Mohammad Sajadi, Nazanin Farokhnia, Peyman Irajizad, “Structures for Suppression of Leidenfrost Phenomenon“, United States Application: 62/308459.

P4. Gang Chen, **Hadi Ghasemi**, Xiaopeng Huang, James Loomis, Jonathan Tong, and Jianjian Wang “A continuous platform for fabrication of aligned polymer films”, United states 61/989588.

P3. Svetlana Boriskina, Kenneth McEnaney, **Hadi Ghasemi**, Selcuk Yerci, Andrej Lenert, Sungwoo Yang, Evelyn Wang, and Gang Chen, “ Internally-heated thermal and externally-cool photovoltaic cascade solar system for the full solar spectrum utilization“, US Application: 61/868715.

P2. **Hadi Ghasemi**, Amy Marie Marconnet, and Gang Chen, “ Localized solar collectors“, US Application: 61/874390.

P1. Seok Woo Lee, Yuan Yang, **Hadi Ghasemi**, Yi Cui, and Gang Chen, “An electrochemical system for highly efficient harvesting of low-grade heat energy“, US Application: 61/836593.

Invited talks

T4. **Hadi Ghasemi**, “Evaporation: fundamentals to advanced solar applications“, University of Connecticut, Storrs, CT, April 28, 2014.

T3. **Hadi Ghasemi**, “Evaporation: fundamentals to advanced solar applications“, University of Houston, Houston, TX, March 28, 2014.

T2. **Hadi Ghasemi**, “Evaporation: fundamentals to advanced solar applications“, Tufts University, Medford, MA, March 11, 2014.

T1. **Hadi Ghasemi**, “Evaporation: fundamentals to advanced solar applications“, The University of Texas at Dallas, Dallas, TX, March 6, 2014

Conference Proceedings and Presentations

- C26. Peyman Irajizad, Nazanin Farokhnia, and **Hadi Ghasemi**, "Nano/pico droplets of ferrofluids", NEMB Conference, Houston, TX, 2016.
- C25. Peyman Irajizad, Nazanin Farokhnia, and **Hadi Ghasemi**, "Dispensing nano/pico droplets of ferrofluids", IMECE, Houston, TX, 2015.
- C24. Nazanin Farokhnia, Peyman Irajizad, Seyed Mohammad Sajadi, and **Hadi Ghasemi**, "Rational micro/nano structuring for thin film evaporation", IMECE, Houston, TX, 2015.
- C23. Nazanin Farokhnia and **Hadi Ghasemi**, "Optimal micro/nanostructure for thin film evaporation", Interpack 2015, San Francisco, CA, 2015.
- C22. George Ni, Nenad Miljkovic, **Hadi Ghasemi**, Svetlana V. Boriskina, Cheng-Te Lin, Yanfei Xu, and Gang Chen, "Non-Localized Solar Heating of Nanofluids for Steam Generation", MRS Fall Meeting, Boston, MA, 2014.
- C21. Xiaopeng Huang, James Loomis, **Hadi Ghasemi**, Yanfei Xu, Xiaobo Li, Jianjian Wang, Jonathan K. Tong, Nagarajan Thoppey, Cheng Te Lin and Gang Chen, "In-plane thermal conductivity measurement of freestanding film", MRS Fall Meeting, Boston, MA, 2014.
- C20. Yanfei Xu, Jianjian Wang, James Loomis, **Hadi Ghasemi**, Xiaopeng Huang, Xiaobo Li, Cheng-Te Lin, and Gang Chen, "Highly Aligned Polyethylene/Graphite Materials: Candidate Films for Thermal Management Application", MRS Fall Meeting, 2014.
- C19. James Loomis, **Hadi Ghasemi**, Xiaopeng Huang, Jianjian Wang, Nagarajan Thoppey, Jonathan Tong, Yanfei Xu, Xiaobo Li, Cheng-Te Lin, and Gang Chen, "Continuous fabrication platform for highly aligned polymer films", MRS Fall Meeting, 2014.
- C18. George Ni, Nenad Miljkovic, **Hadi Ghasemi**, Svetlana V. Boriskina, Cheng-Te Lin, Yanfei Xu, and Gang Chen, "Non-Localized Solar Heating of Nanofluids for Steam Generation", ASME 2014 8th International Conference on Energy Sustainability, Boston, MA, 2014.
- C17. **Hadi Ghasemi**, George Ni, James Loomis, Daniel Kraemer, Kenneth McEnaney, Amy Marie Marconnet and Gang Chen, "Highly efficient aerogel-based solar collectors", ASME 2014 8th International Conference on Energy Sustainability, Boston, MA, 2014.
- C16. **Hadi Ghasemi**, Amy Marconnet, George Ni, James Loomis, and Gang Chen, "Heat localization for efficient solar-thermal harvesting", ASME 2014 8th International Conference on Energy Sustainability, Boston, MA, 2014.
- C15. **Hadi Ghasemi**, Nagarajan Thoppey, Xiaopeng Huang, James Loomis, Xiaobo Li, Jonathan Tong, Jianjian Wang, and Gang Chen, "High thermal conductivity ultra-high molecular weight polyethylene (UHMWPE) films", ITherm 2014, Orlando, FL, 2014.
- C14. **Hadi Ghasemi**, Amy Marie Marconnet, Nenad Miljovic and Gang Chen, "Localized solar

harvesting for phase-change of water“, IMECE International Mechanical Engineering Congress, San Diego, CA, 2013.

C13. **Hadi Ghasemi** and Alexander Mitsos, “ A hybrid geothermal-solar power system: optimal design and operation“, IMECE International Mechanical Engineering Congress, San Diego, CA, 2013.

C12. **Hadi Ghasemi**, Alessio Tizzanini, Marco Paci, Alessio De Marzo and Alexander Mitsos, “Hybrid geothermal-solar power systems: modeling and optimization”, ICEPE, Frankfurt, Germany, 2013.

C11.**Hadi Ghasemi**, Alessio Tizzanini, Marco Paci and Alexander Mitsos, “Optimization of binary geothermal power systems”, ESCAPE, Lappeenranta, Finland, 2013.

C10. **Hadi Ghasemi** and Alexander Mitsos, “Optimal design of a geothermal power plant using a validated simulator”, IMECE International Mechanical Engineering Congress, Houston, TX, 2012.

C9. **H. Ghasemi** and C. A. Ward, “Mechanism of sessile water droplet evaporation”, APS March Meeting, Boston, MA, USA, 2012.

C8. C. A. Ward, **H. Ghasemi**, and Peichun A Tsai. “Contact angle dependence on droplet size: line tension or adsorption at the solid-liquid interface”, 85th Colloid and Surface Science Symposium. McGill University. Canada, 2011.

C7. **H. Ghasemi** and C. A. Ward. “Energy transport mechanisms at the solid-liquid interface during evaporation”. Second Annual Mechanical and Industrial Engineering Symposium. University of Toronto. Canada, 2011.

C6. **H. Ghasemi** and C. A. Ward. “Energy Transport during sessile-water-droplet evaporation”. APS March Meeting, Dallas, TX. USA, 2011.

C5. **H. Ghasemi** and C. A. Ward, “Sessile-water-droplet contact angle: the effect of adsorption”, 8th ASME International Conference on Nanochannels, Microchannels and minichannels, Montreal, 2010.

C4. **H. Ghasemi** and C. A. Ward. “Contact angle of a pinned evaporating droplet”. First Annual Mechanical and Industrial Engineering Symposium, University of Toronto. Canada, 2010.

C3. **H. Ghasemi** and C. A. Ward, “Determination of surface tension of solids”, 13th IACIS International Conference on Surface and Colloid Science, New York, 2009.

C2. **H. Ghasemi**, A. H. Kokabi, M. A. Faghihi Sani, and Z. Riazi, “Alumina-copper eutectic bond strength: Contribution of preoxidation, cuprous oxides particles, and pores”, Austceram Conference, Sydney, Australia, 2007.

C1. **H. Ghasemi**, A. H. Kokabi, M. A. Faghihi Sani, and Z. Riazi, “ Effect of copper oxide layer

thickness and oxygen partial pressure on mechanical properties of alumina-copper eutectic bond”, Ceramics International Conference, Tehran, 2007. (Awarded as the best presentation)

Textbook

B1. H. Kokabi and **H. Ghasemi**, “Ceramics Joining”, Sharif University of Technology Press, 2008.

Teaching Experience

Professor, University of Houston

2014-Present

- Conduction and Radiation: This course covers advanced fundamental aspects of conduction and radiation. In the first part, solution of heat equation in one and multi dimensional geometries exposed to a range of boundary conditions are discussed. In the second part, fundamentals of radiative heat transfer among surfaces and in enclosures, the radiative properties of surfaces, multi-mode heat transfer, and near-field and far-field electromagnetic wave theories are presented.
- Interfacial Phenomena: As the size of instruments and structures are demandingly shifted toward micro-nano scales, the role of interfaces become paramount. That is, physical principles governing the operation of these instruments should be modified to include interface roles. This course presents a theoretical framework to study the characteristics of interfaces and their contribution to the small-scale systems. The theory will be accompanied by classroom demonstrations.
- Thermodynamics: This course presents the laws that govern energy and entropy transfer and the ways that these transports manifest themselves in the system behavior.

University Lecturer: MIT

2013

- Thermo-Fluid Engineering I: This 2nd year course covers three topics: Thermodynamics, Fluid mechanics and Heat transfer.

University Lecturer: University of Toronto

2011

- Mechanical and Thermal Energy Conversion: I developed the course syllabus and laboratory manual, conducted the lectures, designed the assignments, midterm and final exams. This 3rd year course covers the thermodynamics laws and the fundamentals of heat engines and refrigeration systems.

Awards and Honours

- **2016** AFOSR Young Investigator Award
- **2016** Teaching Excellence Award, University of Houston
- **2015** Departmental Citizenship Award, University of Houston
- **2014** Finalist for World Technology Award in Energy Category
- **2014** MIT PDA Travel Grant
- **2012** NSERC Postdoctoral Fellowship for two years
- **2011** Leadership Award, University of Toronto.
- **2010** Russell Reynolds Award in Thermodynamics, University of Toronto.

Professional Membership and Service

- Topic organizer of Micro-Nano Poster Forum, IMECE 2015 and 2016.
- Guest editor of Journal of Nanotechnology in Engineering and Medicine (JNEM)
- Track chair of "micro and nano technology in energy systems" in ASME 2014, 8th International Conference on Energy Sustainability
- Topic organizer of "Solar thermochemistry and solar fuels" and "micro and nano technology in energy systems" in IMECE 2014.
- Member of NanoEngineering for Energy and Sustainability (NEES) Steering Committee of ASME
- Member of Advanced Energy Systems (ASE) Steering Committee of ASME
- Member of American Society of Mechanical Engineers (ASME)
- Member of American Physical Society (APS)
- Member of American Chemical Society (ACS)

Reviewer

- Nano Letters, Nano Energy, Langmuir, Applied Physics Letter, Advances in Colloid and Interface Science, International Journal of Heat and Mass Transfer, International Journal of Thermal Sciences, International Journal of Multiphase Flow, Current Opinion in Colloid and Interface Science, Colloids and Surfaces A, Energies, Journal of Materials Science & Engineering C, Applied Surface Science and others

References

- **Prof. Gang Chen**, Department Head, Director of NanoEngineering Lab.
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Tel: +1 617 253 0006
- **Prof. Charles A. Ward**, Emeritus Professor, Director of Thermodynamics & Kinetics Lab.,
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- **Prof. Alexander Mitsos**,
Professor, RWTH Aachen University, AVT Process Systems Eng., 52056 Aachen, Germany
Visiting Scientist, Massachusetts Institute of Technology, Department of Mechanical Eng.
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- **Prof. Khelil Sefiane**, Chair of Thermophysical Eng/ Head Institute (IMP),
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- **Prof. Javad Mostaghimi**, Professor, Director of Centre for Advanced Coating Technologies,
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