Andrej Lenert

Assistant Professor
Department of Chemical Engineering
University of Michigan - Ann Arbor

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EDUCATION

Massachusetts Institute of Technology (Cambridge, MA)
Ph.D., Mechanical Engineering (GPA 5.0/5.0) 2010 – 2014
Thesis: Tuning energy transport in solar thermal systems using nanostructured materials
Committee: Evelyn N. Wang (Advisor), Gang Chen, Carl V. Thompson
Major: Energy Science and Engineering
Minor: Nanoscale Materials Science and Processing

Massachusetts Institute of Technology (Cambridge, MA)
S.M., Mechanical Engineering (GPA 4.9/5.0) 2008 – 2010
Thesis: Nanofluid-based receivers for high-temperature, high-flux direct solar collectors
Advisor: Evelyn N. Wang

University of Iowa (Iowa City, IA)
B.S.Eng., Mechanical Engineering (GPA 4.0/4.0) 2004 – 2008

AWARDS AND HONORS

Forbes 30 Under 30 – Science 2016
Outstanding Graduate Research, (MIT) Wunsch Foundation Silent Hoist and Crane Award 2014
Fellow for Sustainability, Martin Family Foundation 2011 – 2012
Graduate Research Fellowship, National Science Foundation 2009 – 2012
Energy Fellowship, MIT Energy Initiative 2008 – 2009
Valedictorian, University of Iowa College of Engineering 2008

PROFESSIONAL EXPERIENCE

University of Michigan (Ann Arbor, MI)
Assistant Professor (100%), Department of Chemical Engineering 09/2016 –
Assistant Professor (0%), Department of Chemical Engineering 06/2016 – 09/2016
Postdoctoral Research Fellow, PI: Pramod Reddy, Edgar Meyhofer 09/2014 – 09/2016

Massachusetts Institute of Technology (Cambridge, MA)
Postdoctoral Research Associate, PI: Evelyn N. Wang 06/2014 – 09/2014
Research Assistant, PI: Evelyn N. Wang 09/2008 – 06/2014

PUBLICATIONS

REFERRED JOURNAL ARTICLES

1. Y. Kim, A. Lenert, E. Meyhofer, P. Reddy, “Temperature dependence of thermopower in molecular junctions”, ***Applied Physics Letters***, in press.
2. D.M. Bierman, A. Lenert, W.R. Chan, B. Bhatia, I. Celanović, M. Soljačić, E.N. Wang, “Enhanced photovoltaic energy conversion using thermally-based spectral shaping”, ***Nature Energy***, 1(6), 2016. (10.1038/nenergy.2016.68)
3. D. Liu, D.M. Bierman, A. Lenert, H.T. Yu, Z. Yang, E.N. Wang, Y.Y. Duan, “Ultrathin planar hematite film for solar photoelectrochemical water splitting”, ***Optics Express***, 23(24), p. A1491-1498, 2015.
4. J.B. Chou, Y.X. Yeng, Y.E. Lee, A. Lenert, V. Rinnerbauer, I. Celanovic, M. Soljačić, E.N. Wang, and S.G. Kim, “Enabling ideal selective solar absorption with 2D metallic dielectric photonic crystals”, ***Advanced Materials***, 26(47), p. 8041-8045, 2014.
   - Cover (Inside Front): 10.1002/adma.201470316
5. A. Lenert, Y. Nam, D.M. Bierman, E.N. Wang, "Role of spectral non-idealities in the design of solar thermophotovoltaics", ***Optics Express***, 22(6), p. 1604-1618, 2014.
6. V. Rinnerbauer, A. Lenert, D.M. Bierman, Y.X. Yeng, W.R. Chan, R.D. Geil, J.J. Senkevich, J.D. Joannopoulos, E.N. Wang, M. Soljačić, and I. Celanovic, “Metallic photonic crystal absorber-emitter for spectral control in high-temperature solar-thermophotovoltaics”, ***Advanced Energy Materials***, 4(12), 2014.
7. A. Lenert, D.M. Bierman, Y. Nam, W.R. Chan, I. Celanović, M. Soljačić, E.N. Wang, “A nanophotonic solar thermophotovoltaic device”, ***Nature Nanotechnology***, 9, p. 126-130, 2014.
   - “Addendum: A nanophotonic solar thermophotovoltaic device”, *Nature Nanotechnology*, 10, p. 563, 2015. (10.1038/nnano.2015.117)
   - **Highlighted by Nature**: 10.1038/505589d; News and Views: 10.1038/nnano.2014.9
8. Y. Nam, Y.X. Yeng, A. Lenert, P. Bermel, I. Celanović, M. Soljačić, E.N. Wang, “Solar thermophotovoltaic energy conversion systems with two-dimensional tantalum photonic crystal absorbers and emitters”, ***Solar Energy Materials and Solar Cells***, 122, p. 287-296, 2014.
9. J.B. Chou, Y.X. Yeng, A. Lenert, V. Rinnerbauer, I. Celanovic, M. Soljačić, E. N. Wang, S.-G. Kim, “Design of wide-angle selective absorbers/emitters with dielectric filled metallic photonic crystals for energy applications”, ***Optics Express***, 22(1), p. A144-A154, 2014.
10. A. Lenert, Y. Nam, B.S. Yilbas, E.N. Wang, “Focusing of phase change microparticles for local heat transfer enhancement in laminar flows”, ***International Journal of Heat and Mass Transfer***, 56(1), p. 380-389, 2013.
11. A. Lenert, E.N. Wang, “Optimization of nanofluid volumetric receivers for solar thermal energy conversion”, ***Solar Energy*****,** 86(1), p. 253-265, 2012.
12. A. Veeraragavan, A. Lenert, B.S. Yilbas, S. Al-Dini, E.N. Wang, “Analytical model for the design of volumetric solar flow receivers”, ***International Journal of Heat and Mass Transfer***, 55(4), p. 556-564, 2012.

BOOKS AND BOOK CHAPTERS

1. A. Lenert, Y. Nam, E.N. Wang, “Heat Transfer Fluids”, Ch. 7, p. 93-129, in ***Annual Review of Heat Transfer*** (Vol. 15): Solar Thermal Challenges (Editors: G. Chen, V. Prasad, Y. Jaluria, & J. Karni), 2012.

CONFERENCE PROCEEDINGS (REFEREED)

1. B. Bhatia, D. J. Preston, D.M. Bierman, N. Miljkovic, A. Lenert, R. Enright, Y. Nam, K. Lopez, N. Dou, J. Sack, W.R. Chan, I. Celanović, M. Soljačić, E. N. Wang, “Nanoengineered Surfaces for

Thermal Energy Conversion", *PowerMEMS 2015*, Boston, MA, Dec. 1-4, 2015. Published in: Journal of Physics: Conference Series*,* 660, p. 012036, 2015

2. A. Lenert, V. Rinnerbauer, D. M. Bierman, Y. Nam, I. Celanović, M. Soljačić, E. N. Wang, "2D Photonic-Crystals for High Spectral Conversion Efficiency in Solar Thermophotovoltaics," *Proceedings of the 27th International Conference on Micro Electro Mechanical Systems (MEMS 2014)*, San Francisco, CA, Jan. 26-30, 2014.
3. D.M. Bierman, A. Lenert, E.N. Wang, "Improved thermal transfer efficiency for planar solar thermophotovoltaic devices", *Proceedings of the 4th Micro/Nanoscale Heat & Mass Transfer International Conference*, Hong Kong, China, Dec. 11-14, 2013.
4. Y. Nam, A. Lenert, Y.X. Yeng, P. Bermel, M. Soljačić, E. N. Wang, "Solar Thermophotovoltaic Energy Conversion Systems with Photonic Crystal Absorbers and Emitters," *Proceedings of Transducers*, Barcelona, Spain, Jun. 16-20, 2013.
5. A. Lenert, Y. Nam, M.W. Thoms, B.S. Yilbas, E.N. Wang, "Near-wall Focusing of Phase-Change Micro-Particles for Local Heat Transfer Enhancement," *Proceedings of the ASME International Mechanical Engineering Congress & Exposition*, Denver, CO, Nov. 11-17, 2011.
6. A. Lenert, Y.S. Perez Zuniga, E.N. Wang, "Nanofluid-Based Absorbers for High Temperature Direct Solar Collectors," *Proceedings of the International Heat Transfer Conference*, Washington, DC, Aug. 8-13, 2010.
7. Veeraragavan, A. Lenert, S. Al-Dini, E.N. Wang, "Design of Volumetric Solar Flow Receivers," *Proceedings of the 8th International Conference on Nanochannels, Microchannels, and Minichannels*, Montreal, Canada, Aug. 1-5, 2010.

CONFERENCE PRESENTATIONS/POSTERS (REFEREED)

1. A. Lenert, "Nanostructured materials for efficient thermophotovoltaic power generation", *ASME 2016 Heat Transfer Summer Conference* (HT2016), Washington, DC, July 10-14, 2016.
2. D.M. Bierman, A. Lenert, E.N. Wang, "Thermodynamic Considerations of Spectral Splitting and Spectral Conversion for High-Efficiency Solar Energy Conversion", *First Pacific Rim Thermal Engineering Conference (PRTEC 2016)*, Waikoloa Beach, HI, March 13-17, 2016.
3. B. Bhatia, D. J. Preston, D.M. Bierman, N. Miljkovic, A. Lenert, R. Enright, Y. Nam, K. Lopez, N. Dou, J. Sack, W.R. Chan, I. Celanović, M. Soljačić, E. N. Wang, "Nanoengineered Surfaces for Thermal Energy Conversion", *PowerMEMS 2015*, Boston, MA, Dec. 1-4, 2015.
4. A. Lenert, M.A. Kats, D.M. Bierman, S. Zhang, Y. Zhou, S. Ramanathan, F. Capasso, E. N. Wang, "Critical Radiative Heat Flux and Phase Change Phenomena driven by an Insulator-Metal Transition in Ultra-thin VO2," *Micro and Nanoscale Phase Change Heat Transfer (Gordon Research Conference)*, Galveston, TX, January 11-16, 2015.
5. A. Lenert, D.M. Bierman, W.R. Chan, V. Rinnerbauer, Y. Nam, I. Celanović, M. Soljačić, E.N. Wang, "Role of non-idealities in the design of solar thermophotovoltaics," *11th World Conference on Thermophotovoltaic Generation of Electricity (TPV-11)*, Amsterdam, NED, September 25, 2014.
6. D.M. Bierman, A. Lenert, E. Wang, "Investigation of Design Parameters in Planar Solar Thermophotovoltaic Devices," *15th International Heat Transfer Conference (IHTC-15)*, Kyoto, Japan, August 10-15, 2014.
7. D.M. Bierman, A. Lenert, E.N. Wang, "Improved Thermal Transfer Efficiency For Planar Solar Thermophotovoltaic Devices," *4th Micro-Nanoscale Heat and Mass Transfer International Conference*, Hong Kong, China, December 11-14, 2013.
8. A. Lenert, D.M. Bierman, E.N. Wang, "Optimizing Emitter-to-Absorber Area Ratio for Improved Efficiency in Planar Nanostructured Solar Thermophotovoltaics," *MRS Fall Meeting*, Boston, MA, December 1-6, 2013.
9. A. Lenert, D. M. Bierman, V. Rinnerbauer, N. Mijlković, I. Celanović, M. Soljačić & E. N. Wang, "Highly temperature-dependent radiative transfer and energy conversion in spectrally-engineered

solar thermophotovoltaics," *ASME International Mechanical Engineering Congress & Exposition*, San Diego, CA, November 15-21, 2013.

10. A. Lenert, D.M. Bierman, W.R. Chan, V. Rinnerbauer, Y. Nam, I. Celanović, M. Soljačić, E. N. Wang, "Modeling and Characterization of Solar Thermophotovoltaic Devices with High-Temperature Photonic Crystal Emitters," *DOE EFRC PI Meeting*, Washington, DC, July 18-19, 2013.
11. A. Lenert, D.M. Bierman, Y. Nam, E.N. Wang, "Characterization and Optimization of Solar Thermophotovoltaic Devices," *ASME Summer Heat Transfer Conference*, Minneapolis, MN, July 14-19, 2013.
12. A. Lenert, D.M. Bierman, W.R. Chan, V. Rinnerbauer, Y. Nam, I. Celanović, M. Soljačić, E. N. Wang, "Solar Thermophotovoltaic Energy Conversion with High-Temperature Photonic Crystal Emitters," *ASME Summer Heat Transfer Conference*, Minneapolis, MN, July 14-19, 2013.
13. Y. Nam, A. Lenert, Y.X. Yeng, P. Bermel, M. Soljacic, E.N. Wang, "Solar Thermophotovoltaic Energy Conversion Systems with Photonic Crystal Absorbers and Emitters," *Transducers*, Barcelona, Spain, June 16-20, 2013.
14. A. Lenert, W.R. Chan, Y. Nam, I. Celanović, M. Soljačić, E. N. Wang, "Characterization of Thermophotovoltaic Devices with 1D Si/SiO2 High-temperature Photonic Crystal Emitters," *MRS Spring Meeting*, San Francisco, CA, April 1-5, 2013.
15. A. Lenert, Y. Nam, M.W. Thoms, B.S. Yilbas, E.N. Wang, "Near-wall Focusing of Phase-Change Micro-Particles for Local Heat Transfer Enhancement," *ASME International Mechanical Engineering Congress & Exposition*, Denver, CO, November 11-17, 2011.
16. A. Lenert, Y.S. Perez Zuniga, E.N. Wang, "Nanofluid-Based Absorbers for High Temperature Direct Solar Collectors," *International Heat Transfer Conference*, Washington, DC, August 8-13, 2010.
17. A. Veeraragavan, A. Lenert, S. Al-Dini, E.N. Wang, "Design of Volumetric Solar Flow Receivers," *International Conference on Nanochannels, Microchannels, and Minichannels*, Montreal, Canada, August 1-5, 2010.

PATENTS (GRANTED AND APPLICATIONS)

1. A. Lenert, D. M. Bierman, W.R. Chan, I. Celanović, M. Soljačić, Y. Nam, E. N. Wang, K. McEnaney, D. Kraemer, G. Chen, *Spectrally-Engineered Solar Thermal Photovoltaic Devices*, **US 20160164451**, Filling date: 08/22/2013, Publication Date: 06/09/2016.
2. S.V. Boriskina, K. McEnaney, H. Ghasemi, S. Yerci, A. Lenert, N. Miljkovic, S.Yang, E. N. Wang, G. Chen*, Internally-Heated Thermal and Externally-Cool Photovoltaic Cascade Solar System For The Full Solar Spectrum Utilization*, U.S. Application No.: **US 14/464103**, Filling date: 8/20/2014.

INVITED TALKS AND SEMINARS

1. Seminar Series, Chemical Engineering, University of Michigan, Ann Arbor, MI, Mar. 2016
2. Colloquium Series, Mechanical and Aerospace Engineering, Cornell Univ., Ithaca, NY, Mar. 2016
3. Nano-Optics Group, University of Colorado, Boulder, CO, Sept. 2015
4. Mechanical / Electrical Engineering, University of British Columbia, Vancouver, BC, May 11, 2014
5. Nanoscale Transport Group, University of Michigan, Ann Arbor, MI, Apr. 27, 2014
6. NanoEngineering, University of California, San Diego, CA, Apr. 8, 2014
7. Mechanical Engineering, University of Texas, Austin, TX, Apr. 3, 2014
8. Mechanical Engineering and Mechanics, Drexel University, Philadelphia, PA, Mar. 19, 2014
9. Mechanical Engineering, Virginia Tech, Blacksburg, VA, Mar. 3, 2014
10. Mechanical and Aerospace Engineering, North Carolina State Univ., Raleigh, NC, Feb. 24, 2014
11. Mechanical and Aerospace Engineering, University of California, Los Angeles, CA, Feb.14, 2014
12. Fan Group, Stanford University, Stanford, CA, Jan. 31, 2014

13. S3TEC Student Seminar Series, MIT, Cambridge, MA, May 2013
14. Women in Technology Program Research Workshop, MIT, Cambridge, MA, July 2012
15. Women in Technology Program Research Workshop, MIT, Cambridge, MA, July 2011
16. Industrial Liaison Program, OCP Group Visit, MIT, Cambridge, MA, Jan. 2011
17. Industrial Liaison Program, Siemens Visit, MIT, Cambridge, MA, Jun. 2010
18. Tsinghua University Delegation Visit, MIT, Cambridge, MA, Apr. 2010
19. Micro-Nano Seminar, MIT, Cambridge, MA, Dec. 2009

TEACHING EXPERIENCE

Postdoctoral Short-course on College Science Teaching (U. of Mich.) 2016 (Winter)

Advanced Heat and Mass Transfer (MIT) 2014 (Spring)
Guest lecture*:* Advanced topics in radiative transfer

Intermediate Heat and Mass Transfer (MIT) 2011 (Fall)
Teaching Assistant

Thermodynamics II (U. of Iowa) 2008 (Spring)
Teaching Assistant

GRANT EXPERIENCE

ARPA-E (FOCUS) 06/2014-06/2017
*"Stacked Hybrid Solar Converter"***,** $3,420,000
Gang Chen (PI), Evelyn N. Wang (Co-PI), Svetlana Boriskina (Co-PI)
Contributions: concept (white paper), solar thermal design, preliminary optimization, feasibility analysis, cost analysis, and methods.

ARPA-E (HEATS) 12/2011-12/2014
*"*Advanced Thermo-Adsorptive Battery Climate Control System", $2,700,000
Evelyn N. Wang (PI)
Contributions: concept paper, preliminary design.

ENTREPRENEURSHIP EXPERIENCE

ZeoSol LLC 2011 – 2012
Co-founder and CEO
Semi-finalist and Audience Choice Award, MIT Clean Energy Prize (2011)
Designed an adsorption-based portable solar-powered vaccine chiller for delivery in remote locations. Developed a business plan to bring the technology to market.

SERVICE

ASSOCIATION MEMBERSHIPS

American Institute of Chemical Engineers (AIChE), American Society of Mechanical Engineers (ASME), Materials Research Society (MRS), American Physical Society (APS), Tau Beta Pi

JOURNAL REFEREE

Science, Nano Letters, Microsystems & Nanoengineering, Solar Energy Materials and Solar Cells, Solar Energy, International Journal of Heat and Mass Transfer, Applied Energy, Optica, Journal of Applied Physics, Journal of Photonics for Energy, Journal of Renewable and Sustainable Energy, Annual Review of Heat Transfer

ON-CAMPUS ORGANIZATIONS

M-HEAL Team Advisor, Solar Fridge Project, University of Michigan	2015 –
Graduate Resident Tutor, MIT Burton-Conner Dormitory	2012 – 2014
Resident Assistant/Orientation Chair, MIT Warehouse Graduate Student Dormitory	2009 – 2011
Student Lead, MIT Solar Air-Conditioning Project	2009 – 2010
Life Skills Chair, Iowa Student Athlete Advisory Committee	2006 – 2008