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[Last Update: Oct. 2018]

EDUCATION

08/2010 – 03/2016	Ph.D. in Mechanical Engineering, MIT Thesis Advisor: Prof. Gang Chen
08/2006 – 07/2010	B.E. in Microelectronics, Tsinghua University, Beijing, China

PROFESSIONAL APPOINTMENT

07/2017 - present	Assistant Professor, Department of Mechanical Engineering University of California, Santa Barbara
05/2016 - 06/2017	Kavli Nanoscience Institute Prize Postdoctoral Fellow California Institute of Technology Host: Prof. Ahmed H. Zewail

HONORS AND AWARDS

- DOE Early Career Research Program, 2018
- Regents Junior Faculty Fellowship, UCSB, 2018
- Kavli Prize Postdoctoral Fellowship in Nanoscience, Caltech, 2016.
- Wunsch Foundation Silent Hoist and Crane Award – Outstanding Thesis, Department of Mechanical Engineering, MIT, Spring 2016.
- Keck travel award in thermal sciences, Department of Mechanical Engineering, MIT, Fall 2015.
- The Chinese government award for outstanding students abroad, 2014.
- 3rd place in MIT Mechanical Engineering de Florez award competition, graduate division, 2013.
- Best student poster award in thermoelectric symposium, Material Research Society 2012 fall meeting, Boston, 2012.
- Outstanding graduates of Tsinghua University, 2010, Tsinghua University
- The 2nd place (of over 500,000 peers) in the National College Entrance Exam in Sichuan Province, China, 2006
- First Prize in National Physics Competition, 2005, Chinese Physical Society

PUBLICATIONS (Group Member in Bold)

1. **S.-Y. Yue**, L. Cheng, **B. L. Liao** and M. Hu, Electron-phonon interaction and superconductivity in the high-pressure *cI*16 phase of lithium from first-principles, *Physical Chemistry Chemical Physics*, accepted, 2018.
2. D.-S. Yang, **B. L. Liao** and O. F. Mohammed, Scanning ultrafast electron microscopy: four-dimensional imaging of materials dynamics in space and time, *MRS Bulletin*, **43**, 491, 2018.
3. J. W. Zhou, H. T. Zhu, T.-H. Liu, Q. C. Song, R. He, J. Mao, Z. H. Liu, W. Y. Ren, **B. L. Liao**, D. J. Singh, Z. F. Ren and G. Chen, Large thermoelectric power factor from crystal symmetry-protected non-bonding orbital in half-Heuslers, *Nature Communications*, **9**, 1721, 2018.
4. T.-H. Liu, J. W. Zhou, M. D. Li, Z. W. Ding, Q. C. Song, **B. L. Liao**, L. Fu and G. Chen, Electron mean-free-path filtering in Dirac materials for improved thermoelectric performance, *Proceedings of National Academy of Sciences USA*, **115**, 879, 2018.
5. E. Najafi, **B. L. Liao**, Timothy Scarborough, A. H. Zewail, Imaging surface acoustic waves on the surface of a semiconducting polymer by scanning ultrafast electron microscopy, *Ultramicroscopy*, **184**, 46, 2017.
6. L. Sun, **B. L. Liao**, D. Sheberla, D. Kraemer, J. W. Zhou, R. Jones, E. Stach, D. Zakharov, D. Nypypanchuk, A. Akey, V. Stavila, A. A. Talin, M. Allendorf, G. Chen, F. Léonard and M. Dincă, A

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microporous and naturally nanostructured thermoelectric metal-organic framework with ultralow thermal conductivity, *Joule*, **1**, 168, 2017.

7. **B. L. Liao** and E. Najafi, Scanning ultrafast electron microscopy: a novel technique to probe photocarrier dynamics with high spatial and temporal resolutions, *Materials Today Physics*, **2**, 46, 2017.
8. M. Kaplan, B.-K. Yoo, J. Tang, T. Karam, **B. L. Liao**, D. Majumdar, D. Baltimore, G. Jensen and A. H. Zewail, Photo-induced near-field electron microscopy (PINEM) of eukaryotic cells, *Angewandte Chemie International Edition*, **129**, 11656, 2017.
9. **B. L. Liao**, E. Najafi, H. Li, A. J. Minnich and A. H. Zewail, Photo-excited hot carrier dynamics in hydrogenated amorphous silicon imaged by 4D electron microscopy, *Nature Nanotechnology*, **12**, 871, 2017.
10. M. Th. Hassan, J. S. Baskin, **B. L. Liao** and A. H. Zewail, High-temporal-resolution electron microscopy for imaging ultrafast electron dynamics, *Nature Photonics*, **11**, 425, 2017.
11. **B. L. Liao***, H. Zhao*, E. Najafi, A. J. Minnich, H. Wang and A. H. Zewail, Spatial-temporal imaging of anisotropic photocarrier dynamics in black phosphorus, *Nano Letters*, **17**, 3675, 2017.
12. T.-H. Liu, J. W. Zhou, **B. L. Liao**, D. J. Singh and G. Chen, First-principles mode-by-mode analysis for electron-phonon scattering channels and mean free path spectra in GaAs, *Physical Review B*, **95**, 075206, 2017.
13. W.-C. Hsu, J. K. Tong, **B. L. Liao**, Y. Huang, S. V. Boriskina and G. Chen, Entropic and near-field improvements of thermoradiative cells, *Scientific Reports*, **6**, 34837, 2016.
14. **B. L. Liao**, A. A. Maznev, K. A. Nelson and G. Chen, Photo-excited charge carriers suppress sub-terahertz phonon mode in silicon at room temperature, *Nature Communications*, **7**, 13174, 2016. Highlighted in MIT News.
15. S. V. Boriskina, J. K. Tong, W.-C. Hsu, **B. L. Liao**, Y. Huang, V. Chiloyan and G. Chen, Heat meets light on the nanoscale, *Nanophotonics*, **5**, 134, 2016. **(*Invited Review*)**
16. J. W. Zhou, **B. L. Liao** and G. Chen, First-principles calculations of thermal, electrical and thermoelectric transport properties of semiconductors, *Semiconductor Science and Technology*, **31**, 043001, 2016. **(*Invited Review*)**
17. J. W. Zhou, **B. L. Liao**, B. Qiu, S. Huberman, K. Esfarjani, M. S. Dresselhaus and G. Chen, *Ab initio* optimization of phonon drag effect for lower-temperature thermoelectric energy conversion, *Proceedings of National Academy of Sciences USA*, **112**, 14777, 2015.
18. **B. L. Liao** and G. Chen, Nanocomposites for thermoelectrics and thermal engineering, *MRS Bulletin*, **40**, 746, 2015. **(*Invited Review*)**
19. **B. L. Liao**, J. W. Zhou, B. Qiu, M. S. Dresselhaus and G. Chen, *Ab initio* study of electron-phonon interaction in phosphorene, *Physical Review B*, **91**, 235419, 2015.
20. B. Qiu, Z. T. Tian, A. Vallabhaneni, **B. L. Liao**, J. M. Mendoza, O. D. Restrepo, X. L. Ruan and G. Chen, First-principles simulation of electron mean-free-path spectra and thermoelectric properties in silicon, *Europhysics Letters*, **109**, 57006, 2015.
21. **B. L. Liao**, B. Qiu, J. W. Zhou, S. Huberman, K. Esfarjani and G. Chen, Significant reduction of lattice thermal conductivity by electron-phonon interaction in silicon with high carrier concentrations: a first-principles study, *Physical Review Letters*, **114**, 115901, 2015.
22. W. Q. Shen, T. Tian, **B. L. Liao** and M. Zebarjadi, Combinatorial approach to identify electronically cloaked hollow nanoparticles, *Physical Review B*, **90**, 075301, 2014.
23. **B. L. Liao**, J. W. Zhou and G. Chen, Generalized two-temperature model for coupled phonon-magnon diffusion, *Physical Review Letters*, **113**, 025902, 2014. Highlighted in MIT News.
24. **B. L. Liao**, S. Lee, K. Esfarjani and G. Chen, First-principles study of thermal transport in $FeSb_2$, *Physical Review B*, **89**, 035108, 2014.
25. **B. L. Liao**, M. Zebarjadi, K. Esfarjani, G. Chen, Isotropic and energy-selective electron cloaks on graphene, *Physical Review B*, **88**, 155432, 2013.

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26. Q. Zhang, **B. L. Liao**, Y.C. Lan, K. Lucas, W. S. Liu, K. Esfarjani, C. Opeil, D. Broido, G. Chen and Z. F. Ren, High thermoelectric performance by resonant dopant indium in nanostructured SnTe, *Proceedings of National Academy of Sciences USA*, **110**, 13261, 2013.

27. M. Zebarjadi*, **B. L. Liao***, K.Esfarjani, M. S. Dresselhaus and G. Chen, Enhancing the thermoelectric power factor by using invisible dopants, *Advanced Materials*, **25**, 1577, 2013. Highlighted in MIT News.

28. W. -C. Hsu, J. K. Tong, **B. L. Liao**, B. R. Burg and G. Chen, Direct and quantitative broadband absorptance spectroscopy on small objects using Fourier transform infrared spectrometer and bilayer cantilever probes, *Applied Physics Letters*, **102**, 051901, 2013.

29. **B. L. Liao***, M. Zebarjadi*, K. Esfarjani and G. Chen, Cloaking core-shell nanoparticles from conducting electrons in solids, *Physical Review Letters*, **109**, 126806, 2012. Highlighted by Physics Synopsis and Nature Nanotechnology. Media coverage includes MIT news (MIT website cover story on Oct. 15, 2012) and PhysicsWorld.com.

30. H. Z. Zhao, M. Pokharel, S. Chen, **B. L. Liao**, K. Lukas, C. Opeil, G. Chen and Z. F. Ren, Figure of merit enhancement in nanostructured $FeSb_{2-x}Ag_x$ with $Ag_{1-y}Sb_y$ nanoinclusions, *Nanotechnology*, **23**, 505402, 2012.

US PATENTS

1. W.-C. Hsu, J. K. Tong, **B. L. Liao**, B. Burg and G. Chen, Direct and quantitative broadband absorptance spectroscopy with multilayer cantilever probes, US 9,012,849 B2, filed Jul. 9, 2013, issued Apr. 21, 2015.
2. M. Zebarjadi, **B. L. Liao**, K. Esfarjani and G. Chen, Solid state cloaking for electrical charge carrier mobility control, US 9,076,712 B2, filed Sep. 4, 2013, issued Jul. 7, 2015.

INVITED TALKS AND SEMINARS

1. B. L. Liao, "Development of computational and experimental tools to understand transport and interaction of microscopic energy carriers", invited seminar at Sandia National Lab, Livermore, CA, Oct. 18, 2018.
2. B. L. Liao, "Scanning ultrafast electron microscopy: four-dimensional imaging of materials dynamics in space and time", invited webinar for MRS, Aug. 8, 2018.
3. B. L. Liao, "Understanding transport and interaction of microscopic energy carriers at the single mode level: computation and experiment", invited seminar at:
   School of Energy and Power Engineering, Huazhong University of Science and Technology, Wuhan, China, Jun. 15, 2018
   Institute of Technological Sciences, Wuhan University, Wuhan, China, Jun. 14, 2018
   Department of Physics, University of Houston, Sep. 12, 2017
   Department of Electrical and Computer Engineering, University of Virginia, Sep. 8, 2017
   Invited seminar (Zhou Huijiu Forum) at Xi'an Jiaotong University, Xi'an, China, Aug. 17, 2017
   University of Electronic Science and Technology of China, Chengdu, China, Aug. 15, 2017
   Department of Mechanical Engineering, University of California, Berkeley, Mar. 7, 2017
   Department of Materials Science and Engineering, Massachusetts Institute of Technology, Feb. 28, 2017
   Department of Materials Science and Engineering, University of Wisconsin, Madison, Feb. 23, 2017
   Department of Mechanical Engineering, University of California, Santa Barbara, Jan. 31, 2017
   Department of Mechanical Engineering and Materials Science, Yale University, Jan. 23, 2017
   Department of Mechanical Science and Engineering, UIUC, Dec. 15, 2016
4. B. L. Liao, J. W. Zhou, T.-H. Liu and G. Chen, Understanding electron-phonon interaction at the single-mode level: simulation and experiment, presented at Society of Engineering Science 53rd Annual Technical Meeting, session A2-6-3, at University of Maryland, College Park, MD, Oct. 2 - Oct. 5, 2016. (Invited)

CONFERENCE PRESENTATIONS

1. B. L. Liao, Visualizing photocarrier dynamics in space and time with scanning ultrafast electron

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microscopy, presented at SPIE LASE, session 10522-18, at San Francisco, CA, Jan. 28, 2018.

2. B. L. Liao, Visualizing photocarrier dynamics in space and time with scanning ultrafast electron microscopy, presented at ASME IMECE 2017, session 10-4-3, at Tampa, FL, Nov. 7, 2017.
3. B. L. Liao, A. A. Maznev, K. A. Nelson and G. Chen, Photo-excited charge carriers suppress sub-THz phonon mode in silicon at room temperature, presented at APS March Meeting 2017, session B28.00009, at New Orleans, LA, Mar. 13, 2017.
4. B. L. Liao, A. A. Maznev, K. A. Nelson and G. Chen, Photo-excited charge carriers suppress sub-THz phonon mode in silicon at room temperature, poster presented at MRS Fall Meeting 2016, session TC2.12.14, at Boston, MA, Dec. 1, 2016.
5. B. L. Liao, B. Qiu, J. W. Zhou, S. Huberman, K. Esfarjani and G. Chen, Significant effect of electron-phonon interaction on lattice thermal conductivity of heavily-doped semiconductors, presented at ASME IMECE 2015, session 10-13-5, at Houston, TX, Nov. 13 - Nov. 19, 2015.
6. B. L. Liao, B. Qiu, J. W. Zhou, T.-H. Liu, M. S. Dresselhaus and G. Chen, Understanding electron transport in thermoelectrics from first-principles, presented at DOE EFRC PI Meeting, at Washington DC, Oct. 25 - Oct. 27, 2015.
7. B. L. Liao, J. W. Zhou, B. Qiu, M. S. Dresselhaus and G. Chen, Ab initio study of electron-phonon interaction in phosphorene, presented at MRS Spring Meeting 2015, session O7.08, at San Francisco, CA, Apr. 6 - Apr. 10, 2015.
8. B. L. Liao, B. Qiu, J. W. Zhou, S. Huberman, K. Esfarjani and G. Chen, Significant reduction of lattice thermal conductivity by electron-phonon interaction in silicon with high carrier concentrations: a first-principles study, presented at MRS Spring Meeting 2015, session M10.02, at San Francisco, CA, Apr. 6 - Apr. 10, 2015.
9. B. L. Liao, J. W. Zhou and G. Chen, A magnetic analogue to thermoelectric effect: coupled phonon-magnon diffusion and magnon cooling effect, presented at MRS Fall Meeting 2014, session CC1.01, at Boston, MA, Nov. 30 - Dec. 5, 2014.
10. B. L. Liao, Simultaneous enhancements of thermoelectric properties with "invisible" dopants, presented at MIT Mechanical Engineering Micro/Nano Seminar, Feb. 27, 2013.
11. B. L. Liao, M. Zebarjadi, K. Esfarjani and G. Chen, Cloaking core-shell nanoparticles from conducting electrons in solids, poster presentation at MRS Fall Meeting 2012 at Boston, MA, Nov. 25-30, 2012 (B9.14). Winner of the Student Poster Award for Thermoelectric Symposium.
12. B. L. Liao, K. Esfarjani and G. Chen, First-principles study of thermal transport in FeSb2, presented at ASME International Mechanical Engineering Congress and Exposition, Session 6-18-2: Materials for Energy Applications", Houston, TX, Nov. 9-15, 2012. (IMECE2012-87018)