

Sean Lubner, Ph.D.

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Energy Storage & Distributed Resources, Lawrence Berkeley National Laboratory
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Research Interests

Experimentally and theoretically studying nano-to-macro physics of clean energy storage and conversion, with an emphasis on heat transfer and applications to devices.

Education

Postdoc *Lawrence Berkeley National Laboratory (LBNL)* Berkeley, CA
2016–2018 Energy Storage & Distributed Resources; Energy Technologies Area (ETA)
Advisor: Dr. Ravi Prasher

Ph.D. NSF Fellow – *University of California, Berkeley* Berkeley, CA
2011–2016 Mechanical Engineering
Major: Heat Transfer, Minors: Analysis, Solid State Physics
Thesis Advisor: Prof. Chris Dames

B.S. *Carnegie Mellon University* Pittsburgh, PA
2007–2011 Applied Physics, Mechanical Engineering, minor in Philosophy

Journal Publications & Book Chapters

1. **S. D. Lubner**, S. Kaur, Y. Fu, V. Battaglia, R. S. Prasher, “Identification and characterization of the dominant thermal resistance in lithium-ion batteries using *operando* 3-omega sensors,” *Journal of Applied Physics* **127**, 105104 (2020).
2. A. K. Menon*, I. Haechler*, S. Kaur, **S. D. Lubner**, R. S. Prasher, “Enhanced Solar Evaporation Using a Photo-Thermal Umbrella: Towards Zero Liquid Discharge Wastewater Management,” *Nature Sustainability* **3**, 144 (2020).
3. C. Fang, Z. Liu, J. Lau, M. Elzouka, G. Zhang, P. Khomein, **S. D. Lubner**, P. N. Ross, G. Liu, “Gradient Polarity Solvent Wash for Separation and Analysis of Electrolyte Decomposition Products on Electrode Surfaces,” *Journal of The Electrochemical Society* **167**, 020506 (2020).
4. M. I. Khan, **S. D. Lubner**, D. F. Ogletree, E. Wong, C. Dames, “Temperature dependence of secondary electron emission: A new route to nanoscale temperature measurement using scanning electron microscopy,” *Journal of Applied Physics* **124**, 195104 (2018).
5. H. Natesan, J. Choi, **S. D. Lubner**, C. Dames, and J. Bischof, “Multi-scale Thermal Conductivity Measurements for Cryobiological Applications,” in *Multiscale Technologies for Cryomedicine: Implementation from Nano to Macroscale*, Chapter 5, 125-171 (2016).
6. H. Natesan, W. Hodges., J. Choi., **S. D. Lubner.**, C. Dames, and J. Bischof, “A Micro-Thermal Sensor for Focal Therapy Applications,” *Scientific Reports* **6**, 21395 (2016).
7. **S. D. Lubner**, J. Choi, G. Wehmeyer, B. Waag, V. Mishra, H. Natesan, J. C. Bischof, and C. Dames, “Reusable Bi-Directional 3ω Sensor to Measure Thermal Conductivity of 100- μm Thick Biological Tissues,” *Review of Scientific Instruments* **86**, 014905 (2015).

In Preparation:

1. M. Elzouka, C. Yang, A. Albert, **S. D. Lubner***, R. S. Prasher*, “Interpretable inverse design of particle spectral emissivity using machine learning,” *arXiv preprint 2002.04223* (2020).
 - (* denotes co-corresponding authorship here)
2. **S. D. Lubner**, C. Monachon, D. F. Ogletree, M. I. Khan, C. Dames, “Controlling Spectral Phonon Mean Free Path Distributions Using Adversarial Effects Of Grain Boundary And Alloy Scattering.”

Other:

1. Z. Chen, C. Wong, **S. D. Lubner**, S. Yee, J. Miller, W. Jang, C. Hardin, A. Fong, J. Garay, and C. Dames, “A Photon Thermal Diode,” *Nature Communications* **5**, 5446 (2014).

Note: This paper has been retracted due to an error in the configuration of several key experiments, which left two of the three main claims insufficiently supported. The third claim remains.

Selected Awards & Honors

2018	Early Career LDRD research grant recipient, LBNL (1 of 6 out of ~100 applicants)
2016	The Institution of Engineering and Technology PATW Winner (1 st place winner out of ~350+; multi-round international technical presenting & public speaking competition)
2014	Outstanding TA Award, UC Berkeley (top 9% of 2,000+)
2012	NSF GRFP – National Science Foundation Fellowship (top 10% of 20,000+)
2012	Hertz Fellowship Finalist (top 8% of 600+)
2009–2011	Awards & Honors from Carnegie Mellon University: Rowing Team Captain, Forstall Award for Excellence in Mech. Eng. (top 3% of 100+), Mech. Eng. Departmental Research Honors, Senior Leadership Recognition Award, University Honors, Boeing Scholarship, Undergraduate Teaching Fellow
2010	Apple, Inc. Intern Presentation Honors (top 15%)

Selected Patents

1. Sumanjeet Kaur, Ravi S. Prasher, and **Sean D. Lubner**, “Novel nanoparticle composites useful as insulation, and methods of making thereof” U.S. Provisional Patent 62/825,663. March 2019.
2. **Lubner, Sean D.**, et al. “System and method for determining a spatial thermal property profile of a sample” U.S. Patent 9,851,316. Dec. 2017.
3. Multiple patents (and follow-on patents) awarded for work done while at Apple on iPad, iPad accessories, and Mac desktop accessories. Individual patent numbers:
8,264,310 | 8,390,411 | 8,143,982 | 8,143,983 | 8,344,836 | 8,390,413 | 8,576,031 |
8,395,465 | 8,253,518 | 8,138,869 | 8,884,730 | 8,390,412 | 8,242,868 | 8,665,044 |
8,514,042 | 8,665,045 | 8,648,679 | 8,928,437 | 9,329,630 | 10,236,106 | 9,568,954 |
9,851,316 | 10,580,556 | 8,289,114

Conference Papers, Presentations, & Invited Talks (* indicates presenter)

1. “Controlling Photons and Phonons for Energy Storage and Thermal Design,” Carnegie Mellon University, Pittsburgh, PA (February 2020).
2. “Engineering Heat for Clean Energy Technologies,” University of Washington, Seattle, WA (December 2019).

3. **S. D. Lubner***, S. Kaur, Y. Fu, V. Battaglia, R. Prasher, “Operando Measurements of the Dominant Thermal Resistance in Li-Ion Batteries,” *ASME International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems (InterPACK)*, Anaheim, CA, 2019.
 - Session co-chair
4. **S. D. Lubner**, S. Kaur*, R. S. Prasher, “New and emerging applications of nanoscale thermal science and engineering,” *Proceedings of the 16th International Heat Transfer Conference (IHTC)*, Beijing, China, 2018.
5. **S. D. Lubner***, S. Kaur, Y. Fu, V. Battaglia, R. Prasher, “In-Operando Thermal Diagnostics of Lithium-Ion Batteries,” *ASME International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems (InterPACK)*, San Francisco, CA, 2018.
6. **S. D. Lubner***, S. Kaur, K. Shah, Y. Fu, A. Jain, V. Battaglia, R. Prasher, “In-Situ Thermal Characterization of Lithium-Ion Batteries,” *ASME International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems (InterPACK)*, San Francisco, CA, 2017.
7. **S. D. Lubner***, S. Kaur, K. Shah, Y. Fu, V. Battaglia, R. Prasher, “Characterizing and Engineering Nanoscale Thermal Interfaces for Advanced Thermal Insulation and Lithium-Ion Batteries,” *9th US-Japan Joint Seminar on Nanoscale Transport Phenomena*, Tokyo, Japan, 2017.
8. **S. D. Lubner***, M. I. Khan, C. Dames, “Measurements Of The Effects Of Grain Boundary And Alloy Scattering On Spectral Phonon Mean Free Path Distributions,” *American Physical Society (APS) March Meeting*, New Orleans, LA, March 2017.
9. **S. D. Lubner***, S. Kaur, J. Franklin, K. Shah, Y. Fu, V. Battaglia, D. F. Ogletree, R. Prasher, “Nanometer-Scale Measurements of Battery Cathode Interfacial Thermal Transport Physics,” *Lawrence Berkeley National Lab (LBNL) Molecular Foundry User Meeting*, Berkeley, CA, 2017.
10. **S. D. Lubner***, J. Choi, B. Waag, H. Natesan, J. C. Bischof and C. Dames, “A New Technique for Measuring Thermal Conductivity of Sub-Millimeter Biological Tissues,” *ASME NanoEngineering for Medicine and Biology (NEMB)*, San Francisco, CA, February 2014.
 - One of 18 out of 88 poster presenters chosen as a finalist to give a “lightning round” oral presentation; 2nd place winner of lightning round
11. M. I. Khan*, **S. D. Lubner**, C. Dames, “Temperature Mapping Using Scanning Electron Microscopy,” *Materials Research Society (MRS) Spring Meeting*, San Francisco, CA, April 2015.
12. J. Choi*, **S. D. Lubner**, et al. “Thermal conductivity measurements of thin biological tissues using a microfabricated 3-omega sensor,” *Journal of Medical Devices* 7.2 (2013): 020944.
13. **S. D. Lubner***, “Nano/Micro-Scale Heat Transfer for Energy Efficiency,” *Undergraduate Energy Engineering Seminar*, UC Berkeley, Invited Talk, 2013.
14. **S. D. Lubner***, J. Choi, Y. Hasegawa, A. Fong, J. C. Bischof and C. Dames, “Measurements of the Thermal Conductivity of Sub-Millimeter Biological Tissues,” *ASME International Mechanical Engineering Congress and Exposition (IMECE)*, Houston, TX, November 2012.

15. **S. D. Lubner***, J. Sierra, C. F. Higgs III, “Numerical Modeling of the Soft Elastohydrodynamic Tribosystems,” *Carnegie Mellon University’s Meeting Of The Minds Symposium*, Pittsburgh, PA, May 2011.

Service, Teaching, and Outreach

Reviewed Journal Papers For:

Nature Communications
 Applied Physics Letters (APL)
 PLOS ONE (Public Library of Science)
 Nano Letters
 Journal of Physics D: Applied Physics
 Journal of The Electrochemical Society (JES)
 Electrochemical Society (ECS) Journal of Solid State Science and Technology
 Nanoscale and Microscale Thermophysical Engineering
 Europhysics Letters (EPL)
 International Journal of Thermal Sciences (IJTS)

Conference and Workshop Organization:

- Track co-chair for ASME International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems (InterPACK), 2020
- Session co-chair for ASME International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems (InterPACK), 2019
- LBL Instrumentation colloquium co-organizer, 2019
- LBL Computing Sciences + Energy Technologies inter-area Energy Probe workshop session co-organizer, 2019

Teaching:

2014	Graduate Student Instructor (TA) <ul style="list-style-type: none"> • Undergraduate course: Advanced Heat Transfer • Overall student rating: 4.6 / 5.0 (92%) 	<i>UC Berkeley</i>
2013	Graduate Student Instructor (TA) <ul style="list-style-type: none"> • Graduate course: Microscale Thermophysics and Heat Transfer • (Official student rating feedback not collected – high praise anecdotally) 	<i>UC Berkeley</i>
2009–2010	Undergraduate Teaching Fellow <ul style="list-style-type: none"> • Undergraduate course: Introduction to Mechanical Engineering 	<i>Carnegie Mellon University</i>
2008–2009	Undergraduate Teaching Assistant <ul style="list-style-type: none"> • Undergraduate course: Experimental Physics 	<i>Carnegie Mellon University</i>

Outreach:

2012–2016	Elementary School Science Mentor Volunteer <ul style="list-style-type: none"> • Club President: 2013-2014 • Design, build, and teach interactive and hands-on science lessons at La Escuelita Elementary School in Oakland, CA 	<i>UC Berkeley</i>
2015	Invited Demo & Presentation: “The Micro World”	<i>California Academy of Sciences</i>