

Sean Lubner, Ph.D.

Seaborg Research Fellow, Research Scientist
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

Ph.D. 2011–2016	NSF Fellow – <i>University of California, Berkeley</i> Mechanical Engineering Major: Heat Transfer, Minors: Analysis, Solid State Physics Thesis Advisor: Prof. Chris Dames	Berkeley, CA
B.S. 2007–2011	<i>Carnegie Mellon University</i> Applied Physics, Mechanical Engineering, minor in Philosophy	Pittsburgh, PA

Appointments & Experience

Research Scientist 2018–present	Seaborg Research Fellow – <i>Lawrence Berkeley National Laboratory (LBNL)</i> Energy Storage & Distributed Resources; Energy Technologies Area (ETA)	
Postdoc 2016–2018	<i>Lawrence Berkeley National Laboratory (LBNL)</i> Energy Storage & Distributed Resources; Energy Technologies Area (ETA) Advisor: Dr. Ravi Prasher	Berkeley, CA

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%)

Journal Publications & Book Chapters (* denotes co-corresponding authors)

1. P. Paul *et al.*, “A Review of Existing and Emerging Methods for Lithium Detection and Characterization in Li-Ion and Li-Metal Batteries,” *Advanced Energy Materials*, (accepted) (2021).
2. M. Elzouka, C. Yang, A. Albert, R. S. Prasher*, **S. D. Lubner***, “Interpretable Forward and Inverse Design of Particle Spectral Emissivity Using Common Machine-Learning Models,” *Matter (Cell Reports Physical Science)*, **1** (12), 100259 (2020).
3. **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).

4. 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).
5. 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).
6. 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).
7. 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).
8. 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).
9. **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).
10. J. Choi, **S. D. Lubner**, H. Natesan, Y. Hasegawa, A. Fong, C. Dames, and J. C. Bischof, “Thermal Conductivity Measurements of Thin Biological Tissues Using a Microfabricated 3-Omega Sensor,” *Journal of Medical Devices*, **7.2** (2013).

In Preparation:

1. Y. Zeng, D. Chalise, Y. Fu, J. Schaadt, S. Kaur, V. Battaglia, **S. D. Lubner***, R. S. Prasher*, “A Non-Invasive Sensor for Operando Measurements of the Cross-Plane Lithium Spatial Distribution in Graphite Anodes.”
2. Y. Zeng, D. Chalise, S. Kaur, **S. D. Lubner**, R. S. Prasher, “Thermal Considerations for Li-Ion Batteries Towards High Energy Density and Fast Charging.”
3. Y. Gao, Q. Zheng, J. C. Jonsson, **S. D. Lubner**, C. Curcija, L. Fernandes, S. Kaur, C. Kohler, “Parametric study of solid-solid translucent phase change materials in building windows.”

Patents

1. **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.
2. 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. Invited internet talk show interview: **S. D. Lubner***, “Why Renewable Energy Needs Better Energy Storage to Succeed,” *ThinksWithTwitch* (2020). Available online: <https://youtu.be/SYBHHER75OY>
2. Invited virtual seminar: **S. D. Lubner***, Lilia Xie*, “Energy Storage Solutions for a Clean Energy Future,” *Midday Science Cafe* (2020). Available online: <https://youtu.be/xX0EouD-nao>
3. Invited departmental seminar: **S. D. Lubner***, “Controlling Photons and Phonons for Energy Storage and Thermal Design,” Carnegie Mellon University, Pittsburgh, PA (February 2020).
4. Invited seminar: **S. D. Lubner***, “Engineering Heat for Clean Energy Technologies,” University of Washington, Seattle, WA (December 2019).
5. **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.
6. **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.
7. **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.
8. **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.
9. **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.
10. **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.
11. **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,” *Molecular Foundry User Meeting*, Berkeley, CA, 2017.
12. **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

13. 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.
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	Nanoscale and Microscale Thermophysical Engineering
Applied Physics Letters (APL)	Europhysics Letters (EPL)
PLOS ONE (Public Library of Science)	International Journal of Thermal Sciences (IJTS)
Nano Letters	Engineered Science (ES) Energy and Environment
Journal of Physics D: Applied Physics	
Journal of The Electrochemical Society (JES)	
Electrochemical Society (ECS) Journal of Solid State Science and Technology	

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

Outreach:

2012–2016	Elementary School Science Mentor Volunteer	<i>UC Berkeley</i>
	<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 	
2015	Invited Demo & Presentation: “The Micro World”	<i>California Academy of Sciences</i>