Sean Lubner, Ph.D.
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Appointments & Experience

Assistant Professor 2022–Present	*Boston University (BU)* Mechanical Engineering, Materials Science & Engineering
Research Scientist 2021–2022	*Massachusetts Institute of Technology (MIT)* Research Laboratory of Electronics (RLE)
Research Scientist 2018–2021	*Lawrence Berkeley National Laboratory (LBNL)* (Seaborg Research Fellow) Energy Storage & Distributed Resources; Energy Technologies Area (ETA)
Postdoc 2016–2018	*Lawrence Berkeley National Laboratory (LBNL)* Energy Storage & Distributed Resources; Energy Technologies Area (ETA) Advisor: Dr. Ravi Prasher

Education

Ph.D. 2011–2016	*University of California, Berkeley* (NSF Fellow) Mechanical Engineering Major: Heat Transfer, Minors: Analysis, Solid State Physics Thesis Advisor: Prof. Chris Dames
B.S. 2007–2011	*Carnegie Mellon University* Applied Physics, Mechanical Engineering, minor in Philosophy

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

1. L. Grbčić, M. Park, M. Elzouka, R.S. Prasher, J. Müller, C.P. Grigoropoulos, **S.D. Lubner***, V. Zorba*, W.A. de Jong*, "Inverse design of photonic surfaces via multi fidelity ensemble framework and femtosecond laser processing," *npj Computational Materials* **11** 35 (2025).

2. Y. Lin, P. Peng, N. Weger, S. Mills, C. Messeri, A.K. Menon, S. Zeltmann, F. Babbe, Q. Zheng, C. Dun, C. Zhang, J.J. Urban, A.M. Minor, R.S. Prasher*, H. Breunig*, **S.D. Lubner***, "Self-Heating Conductive Ceramic Composites for High Temperature Thermal Energy Storage," *ACS Energy Letters*, **10** 1002 (2025).

3. S.P. Gleason*, J.C. Dahl, M. Elzouka, X. Wang, D.O. Byrne, H. Cho, M. Gababa, R.S. Prasher, **S.D. Lubner**, E.M. Chan, A.P. Alivisatos*, "Automated Gold Nanorod Spectral Morphology Analysis Pipeline," *ACS nano*, **18** 34646 (2024).

4. M. Park, L. Grbčić, P. Motameni, S. Song, A. Singh, D. Malagrino, M. Elzouka, P.H. Vahabi, A. Todeschini, W.A. de Jong, R. S. Prasher*, V. Zorba*, **S.D. Lubner***, "Inverse Design of Photonic Surfaces via High throughput Femtosecond Laser Processing and Tandem Neural Networks," *Advanced Science* 2401951 (2024).

5. Y. Zeng, *et al.*, "Nonintrusive thermal-wave sensor for operando quantification of degradation in commercial batteries," *Nature Communications* **14** 8203 (2023).

6. Y. Zeng, B. Zhang, Y. Fu, F. Shen, Q. Zheng, D. Chalise, R. Miao, S. Kaur, **S.D. Lubner**, M. Tucker, V. Battaglia, C. Dames, and R.S. Prasher, "Extreme fast charging of commercial Li-ion batteries via combined thermal switching and self-heating approaches," *Nature Communications* **14** 3229 (2023).

7. D. Chalise, A. Saxon, Y. Zeng, V. Srinivasan, **S.D. Lubner**, M. Keyser, and R.S. Prasher, "Non-invasive accurate time resolved inverse battery calorimetry," *Energy Storage Materials* **60** 102810 (2023).

8. D. Chalise, R. Jonson, J, Schaadt, P, Barai, Y. Zeng, S. Kaur, **S.D. Lubner**, V. Srinivasan, M. Tucker, and R. S. Prasher, "Using Thermal Interface Resistance for Noninvasive Operando Mapping of Buried Interfacial Lithium Morphology in Solid-State Batteries," *ACS Applied Materials & Interfaces* 15, **13** (2023).

9. V. Baibakova, M. Elzouka, **S.D. Lubner**, R. Prasher, A. Jain, "Optical emissivity dataset of multi-material heterogeneous designs generated with automated figure extraction," *Scientific data* ***9***, (2022).

10. X. Huang, Y. Xie, M. Balooch, **S.D. Lubner**, Peter Hosemann, "Helium implantation in Si (100): Swelling, microstructure, and mechanical property changes," *Journal of Applied Physics* ***132***, 025106 (2022).

11. **S.D. Lubner*** and R.S. Prasher*, "Combined heat and electricity using thermal storage to decarbonize buildings and industries," *One Earth* **5** (2022).

12. Y. Zeng, D. Chalise, Y. Fu, J. Schaadt, S. Kaur, V. Battaglia, **S.D. Lubner***, R.S. Prasher*, "Operando spatial mapping of lithium concentration using thermal-wave sensing," *Joule* **5** 8 (2021).

13. D. Lilley, A. K. Menon, S. Kaur, **S.D. Lubner**, R.S. Prasher, "Phase Change Materials for Thermal Energy Storage: A Perspective on Linking Phonon Physics to Performance," *Journal of Applied Physics* **22**, 220903 (2021).
    - Front cover featured article & Editor's Pick. PR: https://phys.org/news/2021-12-phase-materials-thermal-energy-storage.html

14. Y. Zeng, D. Chalise, **S.D. Lubner**, S. Kaur, R. S. Prasher, "A review of thermal physics and management inside lithium-ion batteries for high energy density and fast charging." *Energy Storage Materials* **41**, 264 (2021).

15. 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," *Applied Energy* **301**, 117467 (2021).

16. 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*, **11**(17), 2100372 (2021).

17. 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).

18. **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).

19. 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).

20. 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).

21. 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).

22. 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).

23. 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).

24. **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).

25. 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).

Selected Awards & Honors

2024	American Society of Mechanical Engineers (ASME) Rising Star of Mechanical Engineering
2024	Faculty of the Year (Boston University, Mechanical Engineering teaching)
2024	Air Force Office of Scientific Research (AFOSR) Young Investigator Program (YIP) Awardee
2023	Dean's Catalyst Award (Boston University)
2018	Early Career LDRD research grant recipient, LBNL (1 of 6 out of ~100 applicants)
2016	The Institution of Engineering and Technology PATW Winner (1st 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

Filed Patents (full and provisional)

1. Blackbody emitters for thermal radiative energy transport. Application No. 63/623,424, filed Jan. 2024.
2. Passive carbon capture device using solar energy. Application No. WO2024112429A1, filed Nov. 8, 2023, published May 30, 2024.

3. Conductive ceramic composites for high temperature thermal energy storage. Application No. WO2024076539A2, filed Oct. 2, 2023, published April 11, 2024.
    - **Licensed by independent company**, Nov. 2023
4. Nanoparticle composites for use as an insulation and methods of making thereof. Application No. US20240199937A1, filed Nov. 27, 2023, published June 20, 2024.
    - **Licensed by independent company**, Jan. 2023
5. Prediction of battery failure through thermal signatures. Application No. US20250046891A1, filed July 31, 2023, published Feb. 6, 2025.
6. System and method for determining a spatial thermal property profile of a sample. Application No. US20150127294A1, filed Nov. 5, 2014, published Dec. 26, 2017.
7. Patents (and subsequent follow-on patents) awarded for work done at Apple on iPad, iPad accessories, and Mac desktop accessories. Individual patent numbers as of March 2020: 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

Invited Talks and Seminars

1. "Self-Heating Conductive Ceramic Composites for High Temperature Thermal Energy Storage," *International Materials Summit*, Boston, MA, Feb. 2025.

2. "Thermal Science for Sustainability," *MRS Special Symposium on Frontiers in Nano, Heat, and Energy*, Boston, MA, Dec. 2024.

3. "Investigating Coupled Thermal, Mechanical, and Electrical Phenomena in High-Temperature Materials using Thermal Wave Sensors," *IMECE ASME Rising Stars of Mechanical Engineering Showcase*, Portland, OR, Nov. 2024.

4. Panelist for "AI-Driven Solutions for Sustainable Development," *Green AI Summit*, Boston, MA, Oct. 2024.

5. "High Temperature Thermal Energy for Long Duration Energy Storage and Complete Decarbonization," *Molecular Foundry Annual User Meeting*, Berkeley, CA, 2022.

6. "Forward and Inverse Design of Spectral Emissivity using Machine Learning Models," *Materials Research Society (MRS) Fall Meeting*, virtual, 2021.

7. "New Cooperative Adsorbents and Regeneration Methods for the Efficient Removal of CO_2 from Air," *Carbon Negative Initiative Forum*, virtual, 2021.

8. "Bespoke *Operando* Thermal Wave Sensors: Biological & Gas Signature Measurements and Failure Detection in Deployed Electrical Systems," *Defense Threat Reduction Agency (DTRA),* virtual, 2021.

9. "Designing Thermal Energy Storage Materials from 20°C to 2,000°C," *Beyond Lithium-Ion XIII Conference*, virtual, 2021.

10. Interviewed on "Why Renewable Energy Needs Better Energy Storage to Succeed," *ThinksWithTwitch*, 2020. Available online: https://youtu.be/SYBHHEr75OY

11. Seminar, "Energy Storage Solutions for a Clean Energy Future," *Midday Science Cafe* (2020). Available online: https://youtu.be/xX0EouD-nao

12. Seminar, "Controlling Photons and Phonons for Energy Storage and Thermal Design," Carnegie Mellon University, Pittsburgh, PA, 2020.

13. Seminar, "Engineering Heat for Clean Energy Technologies," University of Washington, Seattle, WA, 2019.

Conference Papers and Presentations (* indicates presenter)

1. **S. D. Lubner***, M. Elzouka, C. Yang, A. Singh, M. Park, C. Guo, A. Albert, V. Zorba, and R. S. Prasher, "*Forward and Inverse Design of Spectral Emissivity Using Common Machine-Learning Models*," *Summer Heat Transfer Conference (SHTC)*, Philadelphia, PA, 2022.

2. **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.

3. **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.

4. **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.

5. **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.

6. **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.

7. **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.

8. **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.

9. **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

10. 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.

11. **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.

12. **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)
Journal of Applied Physics (JAP)
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)
Engineered Science (ES) Energy and Environment
Energies
InterPACK
Applied Sciences
International Journal of Heat and Mass Transfer (JHMT)

Conference and Workshop Organization:

- Session co-chair for Materials Research Society (MRS) Fall Meeting 2021 virtual session.
- 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:

2022–Present Assistant Professor *Boston University*

Energy and Thermodynamics (ME304 – undergraduate course)		
Semester	# Responses	Overall student rating
Fall 2024	17	4.86 / 5.0 (97%)
Fall 2023	28	4.76 / 5.0 (95%)
Spring 2023	29	4.83 / 5.0 (97%)
Fall 2022	17	5.0 / 5.0 (100%)

2014 Graduate Student Instructor (TA) *UC Berkeley*

- Undergraduate course: Advanced Heat Transfer
- Overall student rating: 4.6 / 5.0 (92%)

2013 Graduate Student Instructor (TA) *UC Berkeley*

- Graduate course: Microscale Thermophysics and Heat Transfer
- (Official student rating feedback not collected – high praise anecdotally)

2009–2010 Undergraduate Teaching Fellow *Carnegie Mellon University*

- Undergraduate course: Introduction to Mechanical Engineering

2008–2009 Undergraduate Teaching Assistant *Carnegie Mellon University*

- Undergraduate course: Experimental Physics

Outreach:

2012–2016 Elementary School Science Mentor Volunteer *UC Berkeley*

- 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" *California Academy of Sciences*