

# Kenneth E. Goodson (goodson@stanford.edu)

Spring 2025

Vice Provost for Graduate Education and Postdoctoral Affairs, Stanford University

Davies Family Provostial Professor

Professor of Mechanical Engineering and, by courtesy, of Materials Science and Engineering

<https://profiles.stanford.edu/kenneth-goodson>

<https://vpge.stanford.edu>

<https://nanoheat.stanford.edu>

## Overview

Ken Goodson specializes in heat transfer and energy conversion with applications to data centers, electric vehicles, and sustainable energy technologies. His 55+ PhD alumni include dozens of faculty at MIT, Stanford, Princeton, UC Berkeley, and other schools as well as senior leadership at ARPA-E, tech firms, and national labs.

## Education

1993 PhD Mechanical Engineering, MIT  
1991 MS Mechanical Engineering, MIT  
1989 BS Mechanical Engineering, MIT. Tau Beta Pi  
1989 BS Humanities, MIT. Phi Beta Kappa, Luis Sudler Prize in the Arts

## Employment

1994- Mechanical Engineering Professor, Stanford University  
2001-2003 Founder/CTO, Cooligy, supplied heat sinks to Apple, acquired by Emerson, 30 patents  
1993-1994 Visiting Scientist, Materials Research, Daimler-Benz AG, Germany

## Stanford Service

2025- Vice Provost for Graduate Education and Postdoctoral Affairs  
2019- Senior Associate Dean for Research & Faculty Affairs, Stanford School of Engineering  
2013-2019 Department Chair, Mechanical Engineering  
2008-2013 Department Vice Chair, Mechanical Engineering  
2015-2016 Presidential Search Committee  
2006-2014 Chair/CoChair of ME committees: Faculty search, strategic planning, grad admissions

## Awards & Honors

2020 Member, National Academy of Engineering  
2010-2019 Fellow: AAAS, IEEE, APS, ASME, National Academy of Inventors (NAI)  
2020 SRC Aristotle PhD Student Mentorship Award. SIA University Researcher Award.  
2017,2018 Richard Chu Achievement Award, IEEE. InterPACK Achievement Award, IEEE  
2016 Charles Russ Richards Memorial Award, ASME  
2015 Donald Q. Kern Heat Transfer Award, AIChE  
2014 Heat Transfer Memorial Award for Science, ASME. Technical Excellence Award, SRC  
2010- Many named lectures, e.g., Rohsenow (MIT), Hawkins (Purdue), Aisinjoro-Soo (UIUC)  
2010 Allan Kraus Thermal Management Medal, ASME  
1996-1999 ONR Young Investigator and NSF CAREER Awards  
1990,1991 Vocal Fellow, Tanglewood Music Festival, Boston Symphony Orchestra  
1989 Luis Sudler Prize for Arts Achievement, MIT  
1989 Tau Beta Pi, Phi Beta Kappa, Pi Tau Sigma. ONR Graduate Fellowship

## **Selected Ph.D. Graduates of Goodson Group (from 55 total)**

### **Alumni in Academia (partial list)**

1. Katsuo Kurabayashi, Ph.D. MSE 1998, Professor of Mechanical Engineering, University of Michigan
2. Y. Sungtaek Ju, Ph.D. ME 1999, Professor, Mechanical & Aerospace Engineering Department, UCLA
3. Daniel A. Fletcher, Ph.D. ME 2001, Purnendu Chatterjee Professor, Bioengineering, UC Berkeley
4. William P. King, Ph.D. ME 2002, Ralph Andersen Professor, Mechanical Science & Engineering Department, University of Illinois at Urbana-Champaign (co-advised with Prof. Kenny, Stanford ME)
5. Ankur Jain, Ph.D. ME 2004, Associate Professor, Mechanical Engineering, U. of Texas, Arlington
6. Eric Pop, Ph.D. EE 2005, Pease-Yi Professor, Electrical Engineering Department, Stanford University (Eric was co-advised with Prof. Bob Dutton, Stanford EE)
7. Sanjiv Sinha, Ph.D. ME 2005, Associate Professor, Mechanical Science and Engineering Department, University of Illinois at Urbana-Champaign
8. Xuejiao Hu, Ph.D. ME 2005, Professor, Power and Mechanical Engineering, Wuhan University, China.
9. Evelyn Wang, Ph.D. ME 2006, Professor and Department Head, Mechanical Engineering Department, Massachusetts Institute of Technology (Evelyn was co-advised with Prof. Tom Kenny, Stanford ME).
10. Amy Marconnet, Ph.D. ME 2012, Associate Professor, Mechanical Engineering, Purdue University
11. Saniya Leblanc, Ph.D. ME 2012, Assistant Professor, Mechanical and Aerospace Engineering, George Washington University
12. Xuejiao Hu, Ph.D. ME 2005, Professor, Power and Mechanical Engineering, Wuhan University, China.
13. Sarah Parikh, Ph.D. ME 2011, Associate Professor, Engineering and Physics Department, Foothill College, CA (Sarah was co-advised with Prof. Sheri Sheppard, Stanford ME)
14. Eon Soo Lee, Ph.D. ME 2007, Assistant Professor, Mechanical and Industrial Engineering Department, New Jersey Institute of Technology (Co-advised with Prof. John Eaton, Stanford ME).
15. Yoon-Jin Won, Ph.D. 2010, Assistant Professor, Mechanical Engineering, UC Irvine (Yoon-Jin was co-Advised with Prof. Tom Kenny, Stanford ME)
16. Jae-Ho Lee, Ph.D. ME 2012, Assistant Professor, Mechanical Engineering, UC Irvine
17. Jungwan Cho, Ph.D. ME 2015, Assistant Professor, Kyung Hee University, South Korea
18. Woosung Park, Ph.D. ME 2017, Assistant Professor, Sogang University, South Korea
19. Aditya Sood, Ph.D. MSE 2017, Assistant Professor, Mechanical & Aerospace Eng., Princeton University

### **Alumni with Industry or at National Laboratories (partial list)**

1. Maxat Touzelbaev, Ph.D. ME 1999, Apple, Mountain View
2. Patricia Gharagozloo, Ph.D., ME 2009, Member of Technical Staff, Sandia National Laboratories, Livermore, California.
3. Kevin Ness, Ph.D. ME 2007, Member of Technical Staff, Lawrence Livermore National Laboratories
4. Chen Fang, Ph.D. ME 2009, Senior Research Engineer, ExxonMobil, Houston TX
5. Milnes David, Ph.D. ME 2010, IBM Corporation, Poughkeepsie, NY
6. Jeremy Rowlette Ph.D. EE 2010, Senior Electro-Optics Engineer, Daylight Solutions, San Diego, CA
7. Yuan Gao, Ph.D. 2012, Member of Technical Staff, Apple, Mountain View, CA
8. Elah Bozorg-Grayeli, PhD. 2012, Senior Process Engineer, Intel Corporation, Chandler, AZ
9. Shilpi Roi Panzer, PhD. ME 2013, Member of Technical Staff, Exponent Inc., Oakland, CA
10. Michael Barako PhD. ME 2015, Member of Technical Staff, Northrop Grumman, Los Angeles, CA
11. Marc Dunham, Ph.D. ME 2016, Member of Technical Staff, Analog Devices, Santa Clara, CA
12. Ki Wook Jung, Ph.D. ME 2019, Member of Technical Staff, Samsung, South Korea
13. Joseph Katz, Ph.D. EE 2019, Exponent, CA
14. Tanya Liu, Ph.D. 2020, Google, Mountain View, CA
15. Farid Saroush, Ph.D. ME 2022, Apple, Mountain View, CA
16. Chris Perez, Ph.D. ME 2023, Apple, Mountain View, CA

## **Research, Scholarship, & Invention**

Ken Goodson has served as PI for dozens of grants from DARPA, DOE, ARPA-E, NSF, ONR, AFOSR, SRC, & SEMATECH, and contracts with many IC & transportation companies. He has co-authored 280 archival journal articles, 330 conference papers, 13 book chapters, two books, and 35 US patents. In Google Scholar, his work has 48000 citations (h=105). In Web of Knowledge, his work has 25000 citations (h=76).

### **Selected Archival Papers (from 250 total). PhD Students in Bold**

**Kwon, Khan, Perez, Asheghi, Pop**, Goodson, 2021 “Uncovering Thermal and Electrical Properties of Sb<sub>2</sub>Te<sub>3</sub>/GeTe Superlattice Films,” *Nano Letters*, Vol. 21, 5984.

**Sood**, Xiong, Chen, Wang, Selli, Zhang, McClellan, Sun, Donadio, Cui, Pop, Goodson, 2018, "An Electrochemical Thermal Transistor," *Nature Communications*, Vol. 9, 4510.

**Kodama**, Ohnishi, Park, Shiga, Park, Shimada, Shinohara, Shiomi, Goodson, 2017, “Modulation of Thermal and Thermoelectric Transport in Individual Carbon Nanotubes by Fullerene Encapsulation,” *Nature Materials*, Vol. 16, pp. 892-897.

**Palko, Lee, Zhang, Dusseault, Maitra, Won, Agonafer, Moss, Houshmand, Rong, Wilbur**, Rockosi, Mykyta, Resler, Altman, Asheghi, Santiago, Goodson, 2017, “Extreme Two-Phase Cooling from Laser-Etched Diamond and Conformal, Template-Fabricated Microporous Copper,” *Advanced Functional Materials* 27, 1703265.

**Marconnet, Panzer**, and Goodson, K.E., 2013, "Thermal Conduction Phenomena in Carbon Nanotubes and Related Nanostructured Materials," *Reviews of Modern Physics*, Vol. 85, pp. 1295-1326.

**Rowlette**, Kekatpure, **Panzer**, Brongersma, Goodson, 2009, "Nonradiative Recombination in Strongly Interacting Silicon Nanocrystals Embedded in Amorphous Silicon-Oxide Films," *Physical Review B*, Vol. 80, 045314.

**Pop**, Sinha, Goodson, 2006, "Heat Generation and Transport in Nanometer Scale Transistors," *Proceedings of the IEEE*, Vol. 94, pp. 1587-1601.

**Jiang**, Mikkelsen, **Koo**, Huber, Yao, **Zhang, Zhou**, Maveety, Prasher, Santiago, Kenny, Goodson, 2002, "Closed-Loop Electroosmotic Cooling System for VLSI Circuits," *IEEE Proc. Components, Packaging, & Manufacturing Technology* 25, 347. Basis of US patents 6942018, 6991024, 7131486, 7185697, 7334630.

**Ju**, and Goodson, 1999, "Phonon Scattering in Silicon Films of Thickness Below 100 nm," *Applied Physics Letters*, Vol. 74, pp. 3005-3007.

### **Selected Patents (from 35 total)**

US5,843,224, 1998. “Composite structure comprising a semiconductor layer arranged on a diamond or diamond-like layer and process for its production,” Zachai, Gutheit, Goodson (DaimlerBenz AG)

US6,942,018, 2005. “Electroosmotic Microchannel Cooling System”, Goodson, Huber, Jiang, Kenny, Koo, Mikkelsen, Santiago, Wang, Zheng, Zhang, Laser, Chen (Stanford, licensed to Emerson)

US10,784,115, 2020. “Method of Etching Microelectronic Mechanical System Features in a Silicon Wafer,” Zhou, Jung, Dede, Asheghi, Goodson (Stanford & Toyota)



## Narrative Bio Sketch

Ken Goodson specializes in heat transfer and energy conversion with applications to electric vehicles, data centers, and portable electronic devices. He has mentored 55+ Stanford graduate students to their doctoral degrees in Mechanical Engineering, Electrical Engineering, and Materials Science, including dozens who are now professors at institutions including MIT, Princeton, and Stanford. Under the DARPA ICECool Programs, his students developed a world-record heat sink for power conversion.

While serving as Mechanical Engineering Chair & Vice Chair (2008-2019), Goodson led two strategic plans and recruited 15 faculty who transformed the department's scholarship and diversity. Before starting as Stanford's Vice Provost for Graduate Education and Postdoctoral Affairs in 2025, he served as Senior Associate Dean for Research & Faculty Affairs in the School of Engineering.

Goodson is a member of the National Academy of Engineering and received the Aristotle Award for graduate student mentorship from the Semiconductor Research Corporation. He has 35 patents and is a Fellow with the National Academy of Inventors. He co-founded Cooligy, which built heat sinks for Apple and was acquired by Emerson. Goodson is a Fellow with AAAS, ASME, IEEE, and APS. He received the ASME Kraus Medal and Memorial Award, the IEEE Richard Chu Award, and the AIChE Kern Award.

Goodson moonlights as a baritone oratorio soloist with appearances at Davies Symphony Hall and the Bing Concert Hall. He held voice fellowships at the Tanglewood Music Festival and received the Sudler Prize for Arts Achievement. His wife, Laura Dahl, is a concert pianist with the Stanford music faculty.

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Research Group: <https://nanoheat.stanford.edu>

Web of Science <https://www.webofscience.com/wos/author/record/1265334>

Google Scholar: <https://scholar.google.com/citations?user=oUhOkhUAAA&hl=en>