Curriculum Vitae

Steven J. Koester, Ph.D.

Academic Rank

Professor, Electrical & Computer Engineering
University of Minnesota-Twin Cities

Website

http://www.ece.umn.edu/users/skoester/

Education

1995-1997	Postdoctoral Researcher, IBM T. J. Watson Research Center, Yorktown Heights, New York
1991-1995	Ph.D., Electrical & Computer Engineering, University of California, Santa Barbara, California Dissertation: Quantized Conductance in InAs/AlSb Ballistic Constrictions, Dr. Evelyn L. Hu, Advisor Committee: Drs. Evelyn L. Hu, Herbert Kroemer, Nadir Dagli, James Allen
1989-1991	M.S.E.E., University of Notre Dame, Notre Dame, Indiana Thesis: Fabrication of Ultrasmall Single-Electron Tunnel Junctions by Electron-Beam Lithography, Dr. Gary H. Bernstein, Advisor
1985-1989	B.S.E.E., University of Notre Dame, Notre Dame, Indiana

Positions

2024-pres	Chief Semiconductor Officer, University of Minnesota-Twin Cities, Minneapolis, Minnesota
2021-pres	Director, Minnesota Nano Center, University of Minnesota-Twin Cities, Minneapolis, Minnesota
2020-2021	Director Designate, Minnesota Nano Center, University of Minnesota-Twin Cities, Minneapolis, Minnesota
2019-pres	Graduate Faculty, Mechanical Engineering, University of Minnesota-Twin Cities, Minneapolis, Minnesota
2012-pres	Graduate Faculty, Biomedical Engineering, University of Minnesota-Twin Cities, Minneapolis, Minnesota
2010-pres	Professor, Electrical and Computer Engineering, University of Minnesota-Twin Cities, Minneapolis, Minnesota
2006-2010	Manager, Exploratory Technology, IBM T. J. Watson Research Center, Yorktown Heights, New York
1997-2006	Research Staff Member, IBM T. J. Watson Research Center, Yorktown Heights, New York

1995-1997	Postdoctoral Researcher, IBM T. J. Watson Research Center, Yorktown Heights, New York
1991-1995	Graduate Student Researcher, QUEST Science and Technology Center, University of California, Santa Barbara, California
1989-1991	Graduate Student Fellow, Department of Electrical Engineering, University of Notre Dame, Notre Dame, Indiana

Memberships in Professional Organizations

- Institute of Electrical and Electronics Engineers (IEEE), Fellow; IEEE Electron Devices Society; IEEE Photonics Society; IEEE Microwave Theory and Techniques Society; IEEE Nuclear and Plasma Sciences Society; Materials Research Society (MRS); Optica (formerly OSA), Fellow; Tau Beta Pi

Honors and Awards

2024	Elected as a Fellow of the National Academy of Inventors (NAI)
2022	Elevated to Fellow of Optica (formerly OSA)
2021	Named Russell J. Penrose Professor in Nanotechnology
2019	Named Louis John Schnell Professor of Electrical and Computer Engineering
2017	Elevated to Fellow of the Institute of Electrical and Electronics Engineers (IEEE)
2010	George Abraham Outstanding Paper Award: S. J. Koester, I. Lauer, A. Majumdar, T. P. O'Regan, J. Cai, J. Sleight, and L. Chang, P. Tomasini, and S. G. Thomas, "Design and fabrication of planar Si/SiGe heterojunction tunneling transistors," Government Microcircuit Applications & Critical Technology Conference (GOMACTech), Orlando, FL, Mar. 16-19, 2009.
2009	Best Paper Award: D. Kim, Y. Lee, D. Sylvester, D. Blaauw, Y. Lee, J. Cai, I. Lauer, L. Chang and S. J. Koester, "Heterojunction tunneling transistor (HETT)-based extremely low power applications," International Symposium on Low Power Electronics and Design (ISLPED), San Francisco, CA, Aug. 19-21, 2009.
2006	IBM supplemental patent award (for a top 10% patent at IBM)
2001-2010	10 IBM Invention Plateau Awards
1995	UCSB Graduate Dissertation Fellowship
1993-1994	UCSB Vice-Chancellor's Fellowship for Advanced Research on Quantum Structures
1989-1991	Notre Dame Burn's Graduate Fellowship

Awards for Students Advised and/or Collaborators

2023	Student Prakash P. Sundaram, received best student paper award at 2023 CS MANTECH conference.

2021	Student Qun Su, co-author on best student poster award for session EN03 at 2021 Fall MRS Meeting.
2017	Student Qun Su, co-author on best student poster award at 2017 Fall MRS Meeting.
2016	Student Yao Zhang, finalist for best student paper award at 2016 IEEE Sensors Conference.
2016-2017	Student Nazila Haratipour, awarded Ph.D. Doctoral Dissertation Fellowship.
2015	Student Yulong Li, finalist for best student paper award at IEEE Nuclear and Space Radiation Effects Conference (NSREC).
2015-2016	Student, Yulong Li, awarded Interdisciplinary Doctoral Fellowship
2014	Student Yulong Li, finalist for best student paper award at IEEE Nuclear and Space Radiation Effects Conference (NSREC).
2008	Co-Author on Best Student Paper Award: A. Madan, J.D. Cressler, and S. Koester, "Low-frequency noise in buried channel SiGe n-MODFETs," 4th International SiGe Technology and Devices Meeting (ISTDM 2008), Hsinchu, Taiwan, May 11-14, 2008.

Research Funding (>$10M for Koester group, >$17M as lead PI at Minnesota)

- Agency: Lockheed Martin
  Title: "Integrated GaN-CMOS Hybrid Power Converter"
  Investigators: Hanh-Phuc Le (PI), Chirag Gupta and Steven J. Koester (co-PIs)
  Amount: $225,000 [33%]
  Duration: 2024-2025

- Agency: National Science Foundation
  Title: "Workshop on Quantum Engineering Infrastructure II"
  Investigators: Steven J. Koester (PI)
  Amount: $20,000 [100%]
  Duration: 2024

- Agency: National Science Foundation
  Title: "FuSe: Collaborative Research: $GeSnO_2$ Alloys for Next-Generation Semiconductor Devices"
  Investigators: Steven Koester (PI), Bharat Jalan (co-PI), several others
  Amount: $734,244 [50%]
  Duration: 10/01/23-09/30/26

- Agency: Intel
  Title: Understanding Gate Dielectric Properties in 2D Material Nanosheet MOSFETs
  Investigators: Steven J. Koester (PI)
  Amount: $272,728 [100%]
  Duration: 06/01/23-05/31/25

- Agency: AFOSR

Title: Calcium-Based Stannate Perovskite Heterostructures for Multi-Functional Electronic Devices
Investigators: Steven J. Koester (PI), Bharat Jalan (co-PI)
Amount: $440,000 [45%]
Duration: 2023-2025

- Agency: National Science Foundation
  Title: “FuSe-TG: Co-Design of Germanium Oxide-based Semiconductors from Deposition to Devices”
  Investigators: Stephen May (PI), Steven Koester (senior investigator), several others
  Amount: $460,000 [5.9%]
  Duration: 04/01/23-03/31/25

- Agency: Georgia Institute of Technology
  Title: “Multiplexed POC Biosensing”
  Investigators: Steven J. Koester (PI), Michael McAlpine (co-PI)
  Amount: $66,250 [50%]
  Duration: 06/01/22-11/30/22

- Agency: Intel Corporation
  Title: “Center for 2D PMOSFETs with Ultimate Scalability”
  Investigators: Steven J. Koester (PI)
  Amount: $409,091 [100%]
  Duration: 09/01/22-08/31/25

- Agency: State of Minnesota - Legislative-Citizen Commission on Minnesota Resources
  Title: “Green Solar Cells from a Minnesota Natural Resource”
  Investigators: Chris Leighton (PI), Steven J. Koester, George Hudek, and Renee Frontiera (co-PIs)
  Amount: $756,000 [25%]
  Duration: 07/01/22-06/30/25

- Agency: Defense Advanced Research Projects Agency (DARPA)
  Title: “YETI: Cryogenic Energy-Efficient Computing”
  Investigators: Mingo Seok (PI), Steven J. Koester and Chris Kim (co-PIs)
  Amount: $901,170 [57%]
  Duration: 12/01/21-12/31/24

- Agency: National Science Foundation
  Title: “Workshop on Quantum Engineering Infrastructure”
  Investigators: Steven J. Koester (PI)
  Amount: $18,389 [100%]
  Duration: 2021

- Agency: Grip Molecular Technologies
  Title: “DEP-enhanced Multiplexed Graphene Sensors for Rapid Detection of Infectious Diseases”
  Investigators: Steven J. Koester (PI), Michael McAlpine and Sang-Hyun Oh (co-PIs)
  Amount: $689,139 [45%]

Duration: 10/01/20-03/31/23

- Agency: National Science Foundation
  Title: “Collaborative Research: AccelNet: Global Quantum Leap”
  Investigators: Steven J. Koester (PI), Vlad Pribiag and several others (co-PIs)
  Amount: $1,671,545 [5%]
  Duration: 10/01/2020-09/30/2025

- Agency: National Science Foundation
  Title: “NNCI: Enabling Nanotechnology Excellence in the Midwest Renewal”
  Investigators: Steven J. Koester (PI), several others (co-PIs)
  Amount: $5,000,000 [4%]
  Duration: 09/01/2020-08/31/2025

- Agency: Intel
  Title: “Ultimate Scaled Contact Solutions for Monolayer FETs
  Investigators: Steven J. Koester (PI)
  Amount: $327,267 [100%]
  Duration: 06/01/20-05/31/23

- Agency: National Science Foundation
  Title: “DMREF: Collaborative Research: Machine Learning Exploration of Atomic Heterostructures Towards Perfect Light Absorber and Giant Piezoelectricity”
  Investigators: Tony Low (PI), Steven J. Koester (co-PI), several other (co-PIs)
  Amount: $1,600,000 [24.9%]
  Duration: 09/01/19-08/31/23

- Agency: University of Minnesota
  Title: “Ultra-Efficient Wide-Bandgap Power Converters: Material, Device, Circuit, and System-level Challenges and Opportunities
  Investigators: Xiaojia Wang (PI), Steven J. Koester (co-PI), several other (co-PIs)
  Amount: $250,000 [22.5%]
  Duration: 07/01/19-06/30/22

- Agency: AFOSR
  Title: “Stannate Perovskite Semiconductor Materials for Novel High Power Devices”
  Investigators: Steven J. Koester (PI), Bharat Jalan (co-PI)
  Amount: $750,000 [50%]
  Duration: 05/15/19-09/14/22

- Agency: Seagate Corporation
  Title: “Development of Novel Neuromorphic Device Building Blocks”
  Investigators: Steven J. Koester (PI)
  Amount: $130,000 [100%]
  Duration: 07/01/18-12/31/20

- Agency: Army Research Office
  Title: “Sensing with Antimicrobial Peptides: Multiplexed Graphene Sensors for High-Throughput Detection of and Discrimination between Various LPS Containing Bacteria”

Investigators: Michael McAlpine (PI), Steven J. Koester (co-PI)
Amount: $117,484 [40%]
Duration: 2018-2019

- Agency: Minnesota's Discovery, Research, and InnoVation Economy (MnDRIVE)
  Title: "Novel Approaches to Realize Multiplexed Graphene Sensors for Point of Care Detection"
  Investigators: Steven J. Koester (PI), Michael McAlpine (co-PI)
  Amount: $75,000 [50%]
  Duration: 2017-2018

- Agency: TheoremDx
  Title: "Multiplexed Graphene Sensors for Point of Care Zika Virus Detection"
  Investigators: Steven J. Koester (PI), Michael McAlpine (co-PI)
  Amount: $285,000 [52%]
  Duration: 2017-2018

- Agency: National Science Foundation
  Program: ECCS / CCSS
  Title: "GOALI: Transparent Beam Steering Antennas Enabled by Graphene Quantum Capacitance Varactors"
  Investigators: Steven J. Koester (PI), James Schaffner (co-PI)
  Amount: $330,000 [100%]
  Duration: 2017-2021

- Agency: National Science Foundation
  Program: ECCS / EPMD
  Title: "Negative Capacitance Phosphorene Tunneling Field Effect Transistors"
  Investigators: Steven J. Koester (PI)
  Amount: $370,000 [100%]
  Duration: 2017-2021

- Agency: University of Minnesota
  Program: Institute of Engineering in Medicine (IEM) Group Program Grant
  Title: "Development of low-cost, functional MRI systems with multi-modal integrated sensors"
  Investigators: Steven J. Koester (co-PI), several other (co-PIs)
  Amount: $75,000 [17%]
  Duration: 2017

- Agency: National Science Foundation
  Title: "EAGER: Understanding Carrier Multiplication in Black Phosphorus for High-Gain MWIR Avalanche Photodiodes"
  Investigators: Steven J. Koester (PI), Mo Li (co-PI)
  Amount: $125,000 [50%]
  Duration: 2016-2018

- Agency: Seagate Corporation

Title: “Graphene Non-Local Spin Valves for High-Sensitivity and Compact Hard Drive Read Heads”
Investigators: Steven J. Koester (PI)
Amount: $135,000 [100%]
Duration: 2016-2018

- Agency: National Science Foundation
  Title: “NNCI: Midwest Nano Infrastructure Corridor (MINIC)”
  Investigators: Stephen Campbell (PI), Steven J. Koester and others (co-PIs)
  Amount: $4,500,000 [2%]
  Duration: 2015-2020

- Agency: Minnesota Partnership for Biotechnology and Medical Genomics
  Title: “Development of ultrasmall wireless radiation sensors for *in vivo* dosimetry in cancer therapy”
  Investigator: Steven J. Koester (PI), Bruce J. Gerbi (co-PI), Margaret Reynolds (co-I), Michael Grams (co-I), Sean Park (co-I)
  Amount: $71,619 [80%]
  Duration: 2016

- Gift: Honeywell Corporation
  Title: “Black phosphorus research fund”
  Investigator: Steven J. Koester, Mo Li, Stephen A. Campbell
  Amount: $50,000 [48%]

- Agency: Boston Scientific Corporation
  Title: “Biosensors for Early Disease Detection”
  Investigators: Arthur Erdman (PI), Steven J. Koester and others (co-PIs)
  Amount: $3,663,488 [23.2%]
  Duration: 2015-2020

- Agency: University of Minnesota
  Program: Institute of Engineering in Medicine (IEM) Working Group Grant
  Title: “Biomedical Sensor Technology Working Group”
  Investigators: Steven J. Koester (co-PI), Bruce J. Gerbi (co-PI)
  Amount: $6,000 [100%]
  Duration: 2015-2016

- Agency: University of Minnesota
  Program: Institute of Engineering in Medicine (IEM) Seed Grant
  Title: “Radiation Dosimeters for Cancer Therapy with Enhanced Sensitivity and Reliability Using Two-Dimensional Materials”
  Investigators: Steven J. Koester (co-PI), Bruce J. Gerbi (co-PI)
  Amount: $25,000 [50%]
  Duration: 2015

- Agency: National Science Foundation
  Program: Division of Materials Research (DMR)
  Title: Materials Research Science and Engineering Center (MRSEC)

Investigators: Timothy Lodge (PI), and others
Amount: $17,800,000 [4%]
Duration: 2014-2020

- Agency: Air Force Office of Scientific Research
  Program: Basic Research Initiative: 2D Materials and Devices Beyond Graphene
  Title: "2D Heterostructures for Integrated Nano-Optoelectronics"
  Investigators: Xiaodong Xu (PI), Steven J. Koester (co-PI), Mo Li (co-PI), Fengnian Xia (co-PI), Di Xiao (co-PI), David Cobden (co-PI), David Cohen (co-PI), Robert Moore (co-PI), Zhi-Xun Shen (co-PI)
  Amount: $ 3,000,000 [14%]
  Duration: 2014-2017

- Agency: Defense Threat Reduction Agency
  Program: Basic Research for Combating Weapons of Mass Destruction (C-WMD)
  Title: "Radiation Effects in Two-Dimensional Material / High-K Dielectric Interfaces"
  Investigators: Steven J. Koester (PI), Chris H. Kim (co-PI), Michael Alles (co-PI), Ronald Schrimpf (co-PI), Daniel Fleetwood (co-PI), Robert Reed (co-PI), Enxia Zhang (co-PI)
  Amount: $ 1,400,000 [37%]
  Duration: 2014-2018

- Agency: National Institutes of Health
  Program: National Institute of Diabetes and Digestive and Kidney Disease (NIDDK)
  Title: "Glucose Monitor with Graphene-Based Disposable Wireless Sensors"
  Investigators: Gary Havey (PI) and Steven J. Koester (co-PI)
  Amount: $ 69,402 [100%] – University of Minnesota subcontract funding.
  Duration: 2013-2015

- Agency: National Institutes of Health
  Program: National Cancer Institute (NCI)
  Title: "Ultrasmall Wireless Dosimeters for *in vivo* Radiation Dosimetry"
  Investigators: Steven J. Koester (PI), Bruce J. Gerbi (co-PI), Margaret Reynolds (co-I)
  Amount: $330,038 [61%]
  Duration: 2013-2015

- Agency: Minnesota Partnership for Biotechnology and Medical Genomics
  Program: Decade of Discovery in Diabetes
  Title: "A Revolutionary Multiple-Input Sensor Platform for Realizing the Artificial Pancreas"
  Investigators: Steven J. Koester (co-PI), Yogish Kudva (co-PI), Ananda Basu (co-I)
  Amount: $500,000 [80%]
  Duration: 2013-2015

- Agency: SRC/DARPA
  Program: STARnet
  Title: "Center for Spintronic Materials, Interfaces and Novel Architectures (C-SPIN)"
  Investigators: Jianping Wang (director), Steven J. Koester (co-director), P. M. Crowell (co-director), 28 other co-PIs.
  Amount: $29,654,508 [3.5%]

Duration: 2013-2017

- Agency: Minnesota Partnership for Biotechnology and Medical Genomics
  Program: Decade of Discovery in Diabetes
  Title: "Graphene-Based Wireless Glucose Sensing for the Artificial Pancreas"
  Investigators: Steven J. Koester (co-PI), Yogish Kudva (co-PI), Ananda Basu (co-I)
  Amount: $500,000 [71%]
  Duration: 2012-2013

- Agency: National Science Foundation
  Program: Grant Opportunities for Academic Liaison with Industry (GOALI)
  Title: "GOALI: Nanowire broken-gap tunneling field-effect transistors for high-performance, ultra-low-power logic applications"
  Investigators: Steven J. Koester (PI) and Wilfried E. Haensch (co-PI, IBM)
  Amount: $330,000 [100%]
  Duration: 2011-2015

- Agency: University of Minnesota
  Program: Institute of Engineering in Medicine Seed Grant (IEM)
  Title: "Novel radiation-sensitive varactors to enable ultrasmall wireless dosimeters for radiation cancer therapy"
  Investigators: Steven J. Koester (co-PI), Bruce J. Gerbi (co-PI)
  Amount: $39,796 [53%]
  Duration: 2011

- Agency: University of Minnesota
  Program: Grant-in-Aid
  Title: "Nanowire devices fabricated using block copolymer lithography"
  Investigator: Steven J. Koester (PI)
  Amount: $33,516 [100%]
  Duration: 2010-2012

- Agency: National Science Foundation
  Program: ECCS / EPMD
  Title: "Scalable perpendicular all-spin non-volatile logic devices and circuits with hybrid interconnection"
  Investigators: Jianping Wang (PI), Steven J. Koester (co-PI), Paul M. Crowell (co-PI), Chris Kim (co-PI)
  Amount: $1,300,000 [25%]
  Duration: 2011-2015

- Agency: Semiconductor Research Corporation
  Program: Nanoelectronics Research Initiative
  Title: "Scalable perpendicular all-spin non-volatile logic devices and circuits with hybrid interconnection"
  Investigators: Jianping Wang (PI), Steven J. Koester (co-PI), Paul M. Crowell (co-PI), Chris Kim (co-PI)
  Amount: $200,000 [25%]
  Duration: 2011-2015

- Gift: Alice M. O'Brien Foundation
  Title: "Artificial pancreas research fund"
  Investigator: Steven J. Koester
  Amount: $133,500 [100%]

- Agency: National Science Foundation
  Program: Division of Materials Research (DMR)
  Title: Materials Research Science and Engineering Center (MRSEC) Seed Project – "Ultrasmooth graphene nanoribbon formation using templated nanoparticle crystallographic etching"
  Investigators: Steven J. Koester (PI) of seed program
  Amount: $100,000 [100%]
  Duration: 2010-2012

- Agency: DARPA (MTO)
  Program: Steep-subthreshold-slope transistors for electronics with extremely-low power (STEEP)
  Title: "Strained Si/SiGe/Ge HEterojunction Tunneling Transistor (HETT) Technology with Steep Subthreshold Slope for Extremely Low Power Electronics"
  Investigators: Steven J. Koester (PI), J. Sturm (co-PI), S. Chou (co-PI), D. Sylvester (co-PI), and S. Thomas (co-PI)
  Duration: 2008-2009

- Agency: DARPA (MTO)
  Program: Technology for Efficient, Agile Mixed Signal Microsystems (TEAM)
  Title: "Si/SiGe strained-layer FET technology"
  Investigator: Steven J. Koester (PI)
  Duration: 2000-2005

Publications and Presentations as of 5/10/2025 (Citations = 16053, H = 63 (Google Scholar), Citations = 9479, H = 50 (Scopus))

- 7 volumes edited, 4 book chapters, 151 peer-reviewed journal articles, 18 peer-reviewed published conference proceedings, 184 conference abstracts, and 80 U.S. patents.

Volumes Edited (7)

[V1] S. J. Koester, T.-J. King Liu, J.-M. Hartmann, R. Loo, Y.-C. Yeo, and M. S. Carroll, "Selected papers from the 6th International SiGe Technology and Device Meeting (Berkeley, California, USA, 4-6 June 2012) (ISTDM 2012)," *Solid State Electron*. **83**, (2013).

[V2] C. S. Tan, K.-N. Chen, and S. J. Koester, editors, "3D Integration for VLSI Systems," Pan Stanford, ISBN 978-981-4303-81-1, 2011.

[V3] D. Harame, J. Boquet, M. Östling, Y. Yeo, G. Masini, M. Caymax, T. Krishnamohan, B. Tillack, S. Bedell, S. Miyazaki, A. Reznicek, and S. Koester, editors, "SiGe, Ge, and Related Compounds 4: Materials, Processing, and Devices," *Electrochemical Society Transactions*, vol. 33, no. 6, Proceedings of the Electrochemical Society Meeting, Las Vegas, NV, Oct. 10-15, 2010.

[V4] D. Harame, J. Boquet, M. Caymax, J. Cressler, S. Koester, G. Masini, S. Miyazaki, A. Reznicek, K. Rim, S. Takagi, and B. Tillack, editors, "SiGe, Ge, and Related Compounds 3: Materials, Processing, and Devices," *Electrochemical Society Transactions*, vol. 16, no. 10, Proceedings of the Electrochemical Society Meeting, Honolulu, HI, Oct. 12-17, 2008.

[V5] M. C. Öztürk, H. Iwai, D.-L. Kwong, P. J. Timans, E. P. Gusev, S. J. Koester, and F. Roozeboom, editors, "Advanced Gate Stack, Source/Drain and Channel Engineering for Si-Based CMOS 3: New Materials, Processes and Equipment," *Electrochemical Society Transactions*, vol. 6, no. 1, Proceedings of the Electrochemical Society Meeting, Chicago, IL, May 6-10, 2007.

[V6] D. Harame, J. Boquet, M. Caymax, J. Cressler, H. Iwai, S. Koester, G. Masini, J. Murota, A. Reznicek, K. Rim, B. Tillack, S. Zaima, editors, "SiGe & Ge: Materials, Processing, and Devices," *Electrochemical Society Transactions*, vol. 3, no. 7, Proceedings of the Electrochemical Society Meeting, Cancun, Mexico, Oct. 29-Nov. 3, 2006.

[V7] J. Sturm, E. Fitzgerald, S. Koester, J. Kolodzey, J. Murota, D. Paul, B. Tillack, S. Zaima, B. Ghyselen, and S. Takagi, editors, "Papers from the 3rd International SiGe Technology and Device Meeting (Princeton, New Jersey, USA, 15-17 May 2006) (ISTDM 2006))," *Semicond. Sci. Technol.* **22**, (2007).

Book Chapters (4)

[B1] J. Michel, S. J. Koester, J. Liu, X. Wang, M. W. Geis, S. J. Spector, M. E. Grein, J. U. Yoon, T. M. Lyszczarz, and N.-N. Feng, "Photodetectors," Handbook of Silicon Photonics (Series in Optics and Optoelectronics), L. Vivien and L. Pavesi, Eds., CRC Press, 2013.

[B2] F. Liu, R. R. Yu, A. M. Young, L. Shi, K. A. Jenkins, X. Gu, N. R. Klymko, S. Purushothaman, S. J. Koester and W. Haensch, "A 300-mm wafer-level three-dimensional integration scheme using tungsten through-silicon via and hybrid Cu-adhesive bonding," 3D Integration for VLSI Systems, C. S. Tan, K.-N. Chen and S. J. Koester, Eds., Pan Stanford, Singapore, 2011.

[B3] A. M. Young and S. J. Koester, "3D process technology considerations," Three-Dimensional Integrated Circuit Design EDA, Design and Microarchitectures, Y. Xie, J. Cong, and S. Sapatnekar, Eds., Springer, New York , 2010.

[B4] A. W. Topol, S. J. Koester, D. C. La Tulipe, and A. M. Young, "3-D fabrication options for high performance CMOS Technology," Wafer Level 3-D ICs Process Technology, C. S. Tan, R. J. Gutmann, and L. R. Rafael, Eds., Springer, New York, 2008.

Peer-Reviewed Journal Articles (151)

[J1] R. Li, J. J. P. M. Schulpen, R. Dawley, N. Hirshberg, M. Odlyzko, S. Lee, K. S. Hoque, T. Low, A. McLeod, A. A. Bol, and S. J. Koester, "Ultra-low-resistance contacts to heavily-doped p-type $Nb_xW_{1-x}S_y$ thin films grown by atomic layer deposition," *ACS Appl. Mater. & Interfac.* **17**, 10931-10941 (2025).

[J2] L. Jin, J. Wen, M. Odlyzko, N. Seaton, N. Haratipour, and S. J. Koester, "High-performance WS_2 MOSFETs with bilayer WS_2 contacts," *ACS Omega* **9**, 32159-32166 (2024).

[J3] J. J. P. M. Schulpen, C. H. X. Lam, R. A. Dawley, R. Li, L. Jin, T. Ma, W. M. M. Kessels, and S. J. Koester, and A. A. Bol, "Nb doping and alloying of 2D WS_2 by atomic layer deposition for 2D transition metal dichalcogenide transistors and HER electrocatalysts," *ACS Appl. Nano Mater*. **7**, 7395-7407 (2024).

[J4] S. Varshney, S. Choo, L. Thompson, Z. Yang, J. Shah, J. Wen, S. J. Koester, K. A. Mkhoyan, A. McLeod, and B. Jalan, "Hybrid molecular beam epitaxy for single-crystalline oxide membranes with binary oxide sacrificial layers," *ACS Nano* **18**, 6348-6358 (2024).

[J5] N. S. S. Capman, V. R. S. K. Chaganti, L. Simms, C. J. Hogan, Jr., and S. J. Koester, "Using machine learning to overcome interfering oxygen effects in a graphene volatile organic compound sensor," *ACS Appl. Mater. & Interfac*. **16**, 7554-7564 (2024).

[J6] F. Liu, P. Golani, T. Truttmann, I. Evangelista, M. Smeaton, D. Bugallo, J. Wen, A. Manjeshwar, S. May, L. Kourkoutis, A. Janotti, S. J. Koester, and B. Jalan, "Doping the undopable: Hybrid molecular beam epitaxy growth, n-type doping, and field-effect transistor using $CaSnO_3$," *ACS Nano* **17**, 16912-16922 (2023).

[J7] S. Lee, D. Seo, S. H. Park, N. Izquierdo, E. H. Lee, R. Younas, G. Zhou, M. Palei, A. J. Hoffmann, M. S. Jang, C. Hinkle, S. J. Koester, and T. Low, "Achieving near-perfect light absorption in atomically thin transition metal dichalcogenides through band nesting," *Nat. Commun.* **14**, 3889 (2023).

[J8] P. P. Sundaram, F. Liu, F. Alema, A. Osinsky, B. Jalan, and S. J. Koester, "Characterization of (001) β-Ga_2O_3 Schottky diodes with drift layer grown by MOCVD," *Appl. Phys. Lett*. **122**, 232105 (2023).

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Colloquia and Seminars

- "Harnessing the Unique Properties of 2D Materials for Novel Device Applications"
  Seminar
  Host: Ravitej Uppu
  University at Iowa, Iowa City, IA, Mar. 27, 2024.
- "Who Knew You Could Do So Much in 2D? A Perspective on Device Innovation with Two-Dimensional Materials"
  Seminar
  Host: Devinder Khar
  University at Toledo, Toledo, OH, Mar. 15, 2024.
- "From 2D to Wide Bandgap – A Perspective on Applications of Novel Materials"
  Seminar
  Host: Kelson Chabak
  Air Force Research Laboratory, Dayton, OH, Mar. 13, 2024.
- "Are Group-IV Oxides the Ultrawide Bandgap Semiconductors of the Future?"
  Seminar
  Host: Jonathan Bird
  University at Buffalo, Buffalo, NY, Oct. 2, 2023.
- "What's Next for 2D? Realizing the Untapped Potential of Two-Dimensional Materials"
  Seminar
  Host: Gregory Snider
  University of Notre Dame, Notre Dame, IN, Feb. 14, 2023.
- "Perspectives on Applications for 2D Materials in Future CMOS Nodes"
  Seminar

Host: Cesar Javier Lockhart de la Rosa
IMEC, Leuven, Belgium, Nov. 10, 2022

- "Perspectives on Establishing a Quantum-Ready Fabrication Facility"
  Seminar
  Host: Thomas Schäpers
  Forschungszentrum Jülich, Jülich, Germany, Nov. 2, 2022
- "Are TMDCs an End-of-Roadmap Solution for MOSFET Scaling?"
  Seminar
  Host: Heike Riel
  IBM Zurich, Rüschlikon, Switzerland, Oct. 28, 2022
- "Are TMDCs an End-of-Roadmap Solution for MOSFET Scaling?"
  Seminar
  Host: Mathieu Luisier
  ETH Zurich, Zurich, Switzerland, Oct. 27, 2022
- "Enhancing Biosensor Response with Graphene "Lighting-Rods"
  31th Aachen Graphene-Center Seminar & Theodore-von-Kármán-Fellow Presentation
  Host: Max Lemme
  RWTH Aachen, Aachen, Germany, Oct. 11, 2022
- "Emerging Device Applications of 2D Materials"
  3M Tech Forum
  Host: Essam Elnashar
  3M, Woodbury, MN, May 24, 2022
- "A Novel Sensing Platform Enabled by Graphene Varactors"
  3M Technology Seminar Series
  Host: Aloka Khanna
  3M, Woodbury, MN, Jan. 23, 2020
- "Novel Graphene-Based Sensor Platforms"
  CESTA Workshop on Novel Sensing Technologies
  University of Minnesota, Minneapolis, MN, Oct. 24, 2019
- "2D Materials for a New Generation of Multi-Functional Devices"
  Seminar
  Host: Lifeng Dong
  Hamline University, St. Paul, MN, Oct. 4, 2019
- "Healthcare Innovations Enabled by Two-Dimensional Nanomaterials"
  UMN CSE 50th Alumni Reunion
  Host: Joelle Larson
  University of Minnesota, Minneapolis, MN, May 9, 2019
- "Novel Biosensor Platforms Enabled by Graphene"
  Seminar
  Host: Chris Hogan
  University of Minnesota, Minneapolis, MN, Mar. 13, 2019
- "Novel electronic and photonic devices enabled by back phosphorus"

Seminar
Host: Han Wang
University of Southern California, Los Angeles, CA, Oct. 18, 2018

- "Progress in graphene non-local spin valves and prospects for use in hard drive read heads"
  Seminar
  Host: Mark Kief
  Seagate Technology, Edina, MN, Jun. 13, 2018
- "Varactors, tweezers and spin. Finding new applications for graphene in unexpected places"
  Seminar
  Host: Kaustav Banerjee and Clint Schow
  University of California, Santa Barbara, CA, May 16, 2018
- "Varactors, tweezers and spin, oh my!' Finding new applications for graphene in unexpected places"
  Seminar
  Host: Ethan Wang
  University of California, Los Angeles, CA, May 14, 2018
- "Designing a revolutionary wireless sensor for the artificial pancreas"
  39th Annual District 5M4 Lions Club Midwinter Convention
  Host: Leslie Palmieri
  Willmar Convention Center, Willmar, MN, Jan. 29, 2017
- "Progress in understanding transport in graphene non-local spin valves and prospects for use in hard drive read heads"
  Seminar
  Host: David Deen
  Seagate Technology, Edina, MN, Jul. 26, 2016
- "Spintronics as an Enabler for a New Paradigm in Computational Technology"
  NSCI seminar
  Host: Daniel Gopman
  NIST, Gaithersburg, MD, Jul. 19, 2016
- "A Novel Wireless Platform for Biosensing Enabled by Graphene"
  Seminar
  Host: Federica Sgolastra
  3M, Woodbury, MN, Apr. 13, 2016
- "Is Black Phosphorus the 2D Material We've Been Waiting For?"
  Seminar
  Host: Terrance O'Regan
  Army Research Laboratory, Adelphi, MD, Dec. 7, 2015
- "Graphene Non-Local Spin Valves for Ultra-Compact Hard Drive Readers"
  Seminar
  Host: David Deen
  Seagate Technology, Edina, MN, Sep. 3, 2015
- "Designing a revolutionary wireless sensor for the artificial pancreas"
  Lunch seminar

Host: Jean Gorrel
University of Minnesota, Minneapolis, MN, Apr. 10, 2015

- "Practical Applications of Graphene (and other 2D Materials)"
  Seminar
  Host: Luigi Colombo
  Texas Instruments, Dallas, TX, Feb. 18, 2015
- "Practical Applications of Graphene (and other 2D Materials)"
  3M Innovation Tech Forum
  Host: Stephen Willett
  3M, Woodbury, MN, Nov. 21, 2014
- "Quantum Capacitance in Graphene – What is it Really Good For?"
  Special Physical Sciences Seminar
  Host: Fengnian Xia
  IBM T. J. Watson Research Center, Yorktown Heights, NY, Apr. 22, 2013
- "Quantum Capacitance in Graphene – What is it Really Good For?"
  Columbia University MURI Special Seminar
  Host: Prof. Ioannis Kymissis
  Columbia University, New York, NY, Apr. 19, 2013
- "Graphene Quantum Capacitance Devices"
  Seminar
  Host: Prof. Jeong-Sun Moon
  HRL Laboratories, Malibu, CA, Oct. 9, 2012
- "Graphene Quantum Capacitance Devices"
  UCLA Electrical Engineering Seminar Series
  Host: Prof. Bahram Jalali
  UCLA, Westwood, CA, Oct. 8, 2012
- "Graphene Quantum Capacitance Devices"
  UCLA Materials Science and Engineering Seminar Series
  Host: Prof. Ya-Hong Xie
  UCLA, Westwood, CA, Jun. 1, 2012
- "New device concepts for wireless biomedical sensing"
  University of Minnesota ECE Spring 2012 Alumni Lunch & Learn Seminar Series
  Host: Prof. David Lilja
  University of Minnesota, Minneapolis, MN, Apr. 22, 2012
- "Graphene Quantum Capacitance Devices"
  Center for Nanostructure Applications (CNA) Seminar
  Organizer: Prof. Chris Leighton
  University of Minnesota, MN, Apr. 2, 2012
- "Ultrasmall Wireless Dosimeters for Radiation Therapy"
  Radiation Oncology Seminar
  Host: Dr. Robert Miller
  Mayo Clinic, Rochester, MN, Sep. 9, 2011

- "Ultrasmall Wireless Dosimeters for Radiation Therapy"
  Center for Advanced Radiotherapy Technologies (CART) Seminar Series
  Host: Dr. Kevin Murphy
  UCSD, La Jolla, CA, May 27, 2011
- "Tunneling Field-Effect Transistors: Are They a Solution to the Power Problem in Computational Systems?"
  Center for Nanostructure Applications (CNA) Seminar
  Organizer: Prof. Beth Stadler
  University of Minnesota, MN, Sep. 16, 2010
- "Tunneling Field-Effect Transistors: Can They Solve The Computational Power Problem?"
  Seminar
  Organizer: Dr. David Gundlach
  National Institute of Standards (NIST), Gaithersburg, MD, Aug. 4, 2010
- "Tunneling Field-Effect Transistors: Are They a Solution to the Power Problem in Computational Systems?"
  Center for Nanostructure Applications Seminar
  Organizer: Prof. Beth Stadler
  University of Minnesota, Minneapolis, MN, Feb. 22, 2010
- "Defining Electrical Characteristics of Tunneling Field-Effect Transistors, (or How Can you Tell A TFET from a MOSFET?)"
  Notre Dame Electrical Engineering Seminar Series
  Organizer: Prof. Alan Seabaugh
  University of Notre Dame, Notre Dame, IN, Jan. 21, 2010
- "Nano-scale or wafer-scale? At what dimension will we solve the power problem in computation?"
  Princeton University EMD/CE Seminar
  Host: Prof. James Sturm
  Princeton University, Princeton, NJ, Oct. 6, 2008
- "Nano-scale or wafer-scale? At what dimension will we solve the power problem in computation?"
  Seminar
  Organizer: Prof. Andy Knights
  McMaster University, Hamilton, Ontario, April, 2008
- "SiGe Heterostructures: One-Hit Wonder or the Next Rolling Stones?"
  Notre Dame Electrical Engineering Seminar Series
  Host: Prof. Alan Seabaugh
  University of Notre Dame, Notre Dame, IN, Feb. 28, 2006
- "Opportunities and Challenges for III-V/CMOS Integration"
  DARPA COSMOS Workshop
  Host: Prof. Dr. Mark Rosker
  Lake Tahoe, NV, Sep. 15, 2005
- "SiGe Heterostructure Devices: Overview and Outlook"
  Ohio State University Electrical Engineering Seminar

Host: Prof. Paul Berger
Ohio State University, Columbus, OH, Apr. 21, 2005

- Numerous other presentations while at IBM, both internally and at DARPA program reviews (1997–2005)

Teaching

Lecture and lab courses

- EE5173 – Microelectronic Fabrication Laboratory (Fall 2023)
- EE5171 – Microelectronic Fabrication (Fall 2023)
- EE8950 - Advanced Semiconductor Transistors (Spring 2015, Spring 2018, Spring 2019)
- EE5164 - Semiconductor Properties and Devices II (Spring 2011, Spring 2012, Spring 2013, Spring 2014)
- EE5163 - Semiconductor Properties and Devices I (Fall 2016, Fall 2018, Fall 2021)
- EE4951 - Senior Design (Spring 2012, Spring 2014, Spring 2015, Spring 2017, Spring 2018, Spring 2019)
- EE3161 - Semiconductor Devices (Fall 2010, Fall 2011, Fall 2013, Fall 2014, Fall 2015, Fall 2017, Spring 2020, Fall 2020, Spring 2025)
- EE3102 - Circuits and Electronics Laboratory II (Fall 2012)
- EE3101 - Circuits and Electronics Laboratory I (Fall 2012, Fall 2017, Spring 2019)

Discussion sections

- EE3161 - Semiconductor Devices (Spring 2010, Spring 2011, Spring 2012, Spring 2013, Fall 2013, Fall 2014, Fall 2015, Fall 2017, Fall 2018, Spring 2020, Fall 2020, Fall 2021, Spring 2025)

Advising and Mentoring

Undergraduate Students

- Directed Undergraduate Research Opportunities Program (UROP) projects for: Steve Brown (2010), He Shao (2011), Jake Odom (2015)
- Directed Senior Honors projects for: Yoska Anugrah (2011), Andrew Arnold (2012), Rui Ma (2014), Kothai Seelen (2021)
- Directed Research Experiences for Undergraduates (REU) projects for: Robert Jacobberger (2010), Nathaniel Sheehan (2011), Andrew Stephan (2013), Chad Auginash (2014), James Outlaw (2015), Matthew Stiller (2017), Ahmad El Shakoushy (2018)
- Other Undergraduate Research Mentoring: Huilong Zhang (2010), Ivan Roth (2011), James Mishra (2013), Qiyue Wang (2013–2014), Qun Su (2013–2015), Wei Liu (2016–2017), Abhishek Aravalli (2019), Alex LaValley (2020), Kothai Seelan (2021), Hari Chennavajula (2024–2025)

Masters Students

- Giridharan Vaidhyanathan (2010–2011), Moumita Maiti (2022–pres), Essam Elnashar (2023–pres)

Ph.D. Students (Former)

- Mona Ebrish (2010–2015) – currently with Vanderbilt University; Chaitanya Kshirsagar (2010–2016) – currently with Intel; Yoska Anugrah (2011–2016) – currently with Intel; Yulong Li (2011–2016) – currently with IBM; Nazila Haratipour (2011–2017) – currently with Intel; Yang Su (2011–2017) – currently with Intel; Yao Zhang (2013–2018) – currently with KLA Tencor; Jiaxi Hu (2013–2018) – currently with Apple; Matthew Robbins (2014–2019) – currently with Steel Perlot; Saran Kumar Chaganti (2015–2020) – currently with Intel; Rui Ma (2014–2020) – currently with Apple; Andrew Stephan (2015–2020) – currently with 3M; Qun Su (2015–2020) – currently with Micron Technology; Prafful Golani (2017–2022) – currently with Intel; Lun Jin (2019–2022) – currently with Micron Technology; Jiaxuan Wen (2019–2024) – currently with Intel; Prakash Palamedu Sundaram (2018–2024) – currently with Intel; Nyssa Capman (2018–2024) – currently with VOCxi Health; Fengdeng Liu (2018–2024) – currently a postdoc at Tsinghua University, Chin-Hsiang Liao (2019–pres) – currently a process engineer at Polar Semiconductor

Ph.D. Students (Current)

- Ruixue Li (2020–pres); Khondker Shihabul Hoque (2023–pres); Uddrity Mansur (2023–pres), Thushany Ramanathan (2024–pres)

Postdoctoral Researchers (Former)

- Brian Olmsted (2011–2012); David Deen (2012–2013); Eric Olson (2012–2014); Jing Li (2013–2015); Mahmoud Atalla (2016–2018); Sandhaya Koirala (2017–2018), Seon Namgung (2015–2019), Nezhueyotl Izquierdo (2020–2022), Dongjea Seo (2020–2024)

Postdoctoral Researchers (Current)

- Shivanshu Mishra (2023–pres), Anil Adhikari (2023–pres)

Ph.D. Final Committee

- Dongjin Lee (ME), Yu Chen (ECE), Ayan Paul (ECE), Forrest Johnson (ECE), Nathan Youngblood (ECE), Liyuan Zhang (ECE), Jongyeon Kim (ECE), Sha Shi (ECE), Gordon Stecklein (Physics), Patrick Quarterman (ECE), Tim Peterson (Physics), Saurabh Kumar (ECE), Ryan Wu (CEMS), Peng Xu (CEMS), Brian Benton (ECE), Nikolaos Memmos (CEMS), Brett Heischmidt (Physics), Xue Zhen (Chemistry), Che Chen (ECE), Justin Watts (CEMS), Yipeng Jiao (ECE), Dan Klemme (ECE), Abhinav Prakash (CEMS), Fazel Zare Bidoky (CEMS), Rizvi Ahmed (ECE), Hwanhui Yun (CEMS), Nakul Pande (ECE), Nezhueyotl Izquierdo (ECE), Javad Ghasemi Azadani (ECE), Christopher Ertsgaard (ECE), Yuhang Sun (ECE), Wei-Heng Hsu (ECE), Adam Weidling (ECE), Preston Donaldson (ECE), Brandon Zink (ECE), Neel Chatterjee (ECE), Tristan Truttmann (ECE), Abhimanyu Ravindranath (ECE), Mohit Gupta (Physics), HanZhao Yu (ECE), Siri Narla (ECE – GaTech), Eng Hock Lee (ECE)

M.S. Final Committee

- Sooho Choo (CEMS), Ziwei Yu (Chemistry), Aditi Goswami (ECE)

Service

Conference Organization

- NSF Workshop on Quantum Engineering Infrastructure II (WQEI2):
  - Organizer and Chair (2024)
- NSF Workshop on Nanotechnology Infrastructure of the Future:
  - Co-organizer (2023)
- NSF Workshop on Quantum Engineering Infrastructure (WQEI):
  - Organizer and Chair (2021)
- IEEE Nuclear and Space Radiation Effects Conference (NSREC):
  - Abstract Reviewer (2018)
- Compound Semiconductor Week (CSW):
  - Sub-Committee Chair (2025)
  - Sub-Committee Chair (2018)
- Optical Fiber Communication Conference (OFC):
  - Co-Organizer for Symposium on Future Photonic Devices and Materials for Optical Communications (2018)
- Electronic Materials Conference (EMC):
  - Symposium Organizer (2015)
- Materials Research Society Meeting (MRS):
  - Symposium Co-Organizer (2014)
- IEEE International Electron Devices Meeting (IEDM):
  - Technical Program Committee Member (2010–2011)
- Device Research Conference (DRC):
  - Technical Program Committee Member (2006–2009)
  - Technical Program Vice-Chair (2007)
  - Technical Program Chair (2008)
  - Conference General Chair (2009)
  - President, Board of Directors (2010–2018)
- Electrochemical Society Meeting: SiGe, Ge, and Related Compounds: Materials, Processing, and Devices Symposium:
  - Technical Program Committee Member (2006–2012, 2018, 2022)
  - Co-Organizer, Sub-Committee Chair (2006–2010)
  - Panel Session Co-Organizer (2008–2010)
- International SiGe Technology and Device Meeting (ISTDM):
  - Technical Program Committee Member (2006–2008, 2012–2019)
  - Technical Program Vice-Chair (2008)
  - Advisory Committee Member (2008–pres)
  - Technical Program Chair (2012)
  - Panel Session Co-Organizer (2006, 2012)
- Minnesota Nanotechnology Conference

  - Co-Organizer for Carbon-Based Devices Session (2010)
- International Group-IV Photonics Conference (GFP):
  - Technical Program Committee Member (2006–2008)
- International Symposium on Compound Semiconductors (ISCS):
  - Technical Program Committee Member (2007)
- European Materials Research Society Meeting (E-MRS):
  - Technical Program Committee Member (2006)
- European Solid-State Device Research Conference (ESSDERC):
  - Technical Program Committee Member (2005–2006)

Journals

- Associate Editor of *IEEE Electron Device Letters* (2012–2021)
- Reviewer for numerous IEEE, AIP, Nature, ACS, AAAS, and IBM journals (1995–pres)

Panels / Review Boards

- IEEE EDS Fellow Evaluator (2017–2019)
- Served on NSF proposal review panels (2011–2025)
- Member of Executive Committee for SRC NRI MIND Center (2008–2009)
- IBM Representative to SRC GRC Device Sciences Committee (2007–2009)
- Served on UCSB Faculty Advisory Board (2005)
- IBM Shared University Research Program (2003)
- IBM Faculty Partnership Review Board (2000)

University / Departmental Service

- Served on UMN National Security Institute (NSI) Task Force (2023)
- ECE Graduate Committee (2018–2019)
- Member of University Faculty Senate (2016–2018)
- Co-organizer of University of Minnesota Annual 2D Materials Summer School (2016-2019)
- Associate director of STARnet C-SPIN center (2013–2017)
- Program co-leader of IPRIME Electronic Materials and Devices Program (2013–2023)
- Member of Safety Committee (2012–2018, chair from 2014–2015)
- ECE Recruiting Committee (2016–2018, 2019–2020, chair from 2017–2018, 2021–2023)
- ECE Curriculum Committee (2014–2015)
- Member of ECE Consultative Committee (2012–2015)
- Member of External Relations Committee (2010–2014, 2023-pres, chair from 2011–2013)

Other Service

- Advising Microfabrication Club, a new student organization focused on do-it-yourself fabrication techniques for microelectronics (2024)
- Project Lead The Way (PLTW) advisor, South High School, Minneapolis (2015)

- Breakout session leader, IEEE Region 4 Student Leadership Conference, Oct. 5, 2013
- Volunteer at Science Museum of Minnesota ‘Nano Days’ Event, Apr. 5-6, 2013
- Guest lecturer at Columbia University Semiconductor Devices Class (2004–2009)