Venkat Selvamanickam

Education

University of Houston	Materials Eng.	Ph.D. (1992)
University of Houston	Mechanical Eng.	M.S. (1988)
National Institute of Technology, Tiruchirapalli	Mechanical Eng.	B.E. (Honors) (1986)

Professional Experience

UNIVERSITY OF HOUSTON

M.D. Anderson Chair Professor of Mechanical Engineering	2008 - present
Professor of Physics (joint appointment)	2010 - present
Professor of Chemical Engineering (joint appointment)	2012 - present
Professor of Materials Engineering (joint appointment)	2012 - present
Professor of Industrial Engineering (joint appointment)	2024 - present
Founder, Advanced Superconductor Manufacturing Institute (501c(3))	2014
Director, Advanced Manufacturing Institute (University Center)	2018 - present

AMPeers LLC

Founder and Chief Executive Officer	2008 - present

PHILIPS ELECTRONICS (formerly Intermagnetics)

Vice President & Chief Technology Officer of SuperPower	1994 – 2008
Chief Technology Advisor of SuperPower (now Furukawa Electric)	2008 – 2016

OAK RIDGE NATIONAL LABORATORY

Research Associate	1993 - 1994

Research Highlights

- Developed epitaxial thin film superconductor tapes with engineered nanoscale defects to quadruple performance to world record levels. This technology was successfully transferred to industry and commercialized in 2010. **(royalty-paying license agreement, R&D100 awards, ARPA-E $4 M award)**
- Developed a unique Metal Organic Chemical Vapor Deposition (MOCVD) process and equipment to manufacture thin film superconductor tapes with superior electrical performance including world-records for the highest critical currents (4x better than commercial superconductor tapes). Scaled up technology to 50-meter-lengths with novel in-line quality control methods. Augmented technology for double-sided, defect-tolerant superconductor tapes **(DOE Advanced Manufacturing Office $4.5M award, $2M ARPA-E award (2023) $1.5M ARPA-E award (2020), $200,000 CABLE Conductor Manufacturing Prize)**
- Demonstrated a technology to fabricate ultra-small diameter round superconductor wires with high current densities, using a new symmetric tape architecture that can be wound on 5x small diameter than state-of-the-art. Round superconductor wires implemented in magnets that are being developed for particle accelerators. Founded startup company to manufacture and commercialize this technology. (**$9.3M Small Business Innovation Research (SBIR) awards)**

- Developed single crystalline-like semiconductor films exhibiting high mobility (> 1100 cm^2/Vs) on metal substrates and flexible glass substrates. This technology is now used for low-cost, high-efficiency photovoltaics and high-performance flexible electronics devices (DOE $1.5M award).
- Developed new metrology technique based on 2D X-ray Diffraction for real-time quality control of metal additive manufacturing by Directed Energy Deposition (~$1M NIST award).
- Developed thin film processing techniques for hetero-epitaxial growth of complex oxide, nitride, silicide, metal and semiconductor materials on flexible metal substrates.
- Developed a novel crystal growth technique to produce large single-crystalline superconductors with a world-record critical current performance in bulk ceramics.

Research and Technology Management Highlights

- Management of several externally-funded programs on superconductors, photovoltaics, additive manufacturing, sponsored by DOE, ONR, NIST, ARL, NSF, 10 companies, and the state of Texas.
- Director of the Applied Research Hub of the Texas Center for Superconductivity at the University of Houston (TCSUH), established through a $3.5 M program from the Emerging Technology Fund (ETF) from the state of Texas. **One of only two ETF grants received by the University of Houston.**
- Founding Director of the Advanced Manufacturing Institute at the University of Houston.
- Created a new program on Roll-to-roll Manufacturing of High-Performance Semiconductors on Inexpensive, Flexible Substrates for Photovoltaics and Flexible Electronics.
- Established a new, state-of-the-art 13,000 sq. ft. Energy Device Fabrication Laboratory in Energy Research Park with cleanroom process area, device fabrication and metrology laboratories. Worlds' first roll-to-roll metal organic chemical vapor deposition (MOCVD) system for compound semiconductors established in the Laboratory.
- Created and led SuperPower's second-generation High Temperature Superconductor (HTS) program from 1995 onwards. Built and managed a team of 40+ high-performance personnel and led company to multiple word firsts and world records in thin film HTS tape.
- Led the completion of the world's first significant delivery (10,000 m) of thin film HTS tape to build a 30-meter-long cable for the DOE Flagship program of Albany Cable Project, which is the world's first demonstration of a thin film superconducting cable in the electric power grid.

Publications and Presentations

- 324 publications. 201 publications since joining UH during Jan. 2009-present.
    - 157 papers with UH students as co-authors.
- Editor of a book on "Flux Pinning and ac Losses"
- 321 conference presentations and external seminars since joining UH including 153 invited presentations/seminars and seven plenary/keynote presentations.

Patents, Technology Transfer and Commercialization

- 65 issued U.S. patents, Over 100 issued international patents.
- License Agreement executed with industrial partner with royalty payments.
- Founder and CEO of startup, AMPeers LLC. Received $9.3M in Small Business Innovation Research (SBIR) awards to scale up new technology on round superconductor wires to manufacturing. Innovative technologies on defect-tolerant superconductor wires, neutron-irradiation-tolerant superconductors being developed in collaboration with University of Houston.
- Attracted industrial partner, SuperPower, to establish operations at the UH Energy Research Park.

Awards & Recognition

- Fellow of the *Institute of Electrical and Electronic Engineers (IEEE)* in 2018.
- Fellow of the U.S. *National Academy of Inventors* (NAI) in 2014. Inventors inducted to the NAI have demonstrated a *highly prolific spirit of innovation in creating or facilitating outstanding inventions that have made a tangible impact on quality of life, economic development, and the welfare of society.*
- Received the *Presidential Early Career Achievement for Scientists and Engineers (PECASE) Award* from the White House in 1996. This award is the highest honor bestowed by the U.S. Government on outstanding scientists and engineers beginning their independent careers.
- *IEEE Dr. James Wong Award* in 2014 for Continuing and Significant Contributions to Applied Superconductivity Materials Technology.
- Named as *Superconductor Industry Person of Year* for 2004 by Superconductor Week. This award is given for achievement in science & technology, advocacy in institutions, government, or industry, leadership/vision that assisted others in the advancement and promotion of the technology.
- *R&D 100* awards in 2007, 2010 and 2012 in collaboration with Oak Ridge National Laboratory for development of innovative superconductor wire architectures to achieve superior performance.

- *CABLE Conductor Manufacturing Prize* ($200,000 cash prize) in 2023 from the U.S. Department of Energy for Improved Conductors that Support Widespread Electrification.
- Two *Federal Laboratory Consortium (FLC) awards* in 2008 in collaboration with Los Alamos and Oak Ridge National Laboratories.
- Named as one of *New York Capital Region's top forty business leaders* under the age of forty in 2004 by the Business Review magazine (in a competitive selection process).
- *Wire and Cable Technology International Award* in 2009 for the development and *transition to manufacturing* of thin film (second-generation) HTS wire technology.
- *Fluor-Daniel Award,* Highest award given by the Cullen College of Engineering, University of Houston in 2015.
- *Career Innovator Award,* Cullen College of Engineering, University of Houston in 2019.
- *Distinguished Alumni Award,* National Institute of Technology, Tiruchirapalli, India, 2014.
- *Excellence in Research and Scholarship Award, Professor Level,* University of Houston, 2014.
- *Entrepreneur/Innovation Award* of the Cullen College of Engineering, University of Houston in 2013. *This award recognizes alumni who have accepted a high level of risk to pursue an opportunity in an enterprise or venture to introduce new technologies into the workplace that increased efficiency and productivity in the generation of new products.*
- *Dukler Distinguished Faculty Award* from the Engineering Alumni Association, 2016.
- *Senior Researcher Award* in College of Engineering, University of Houston, 2012.
- Led organization to a ranking of #1 or #2 for nine years since 2002 among all technology developers in the U.S. by an independent Peer review panel under the auspices of the U.S. DOE Office of Electricity Delivery. #1 ranking in final two Peer reviews (2010 and 2009) among 14 contenders.
- Chosen by Houston Chronicle as one of "11 of the greater Houston area's top scientific minds" to author articles on 11 promising technologies for the coming years

Student Mentorship

- Graduated 36 graduate students since Fall 2008 (24 Ph.D. students, 12 M.S. students with thesis). Currently mentoring a group of 21 graduate students (9 Ph.D.). Supported a total of 92 graduate students as Research Assistants (including non-thesis Masters students).
- Ph.D. students in group have received several awards and recognitions including:
    - International-level *IEEE Council on Superconductivity Graduate Study Fellowship* in 2016 and 2017 (only five awarded worldwide)
    - Encouragement Award (one of 5 awardees) for best Oral presentation at 2021 International Symposium on Superconductivity, Tokyo, Japan.

- International-level *best student paper award at the 2016 Applied Superconductivity Conference.*
- International-level best student poster awards for two students at the *2023 International Workshop on Coated Conductors for Applications.*
- National-level *Golden Key scholar award*.
- Two students were invited as one of only 100 students nationwide to attend the 2014 and 2016 ARPA-E Innovation Summit.
- One student delivered a *Young Scientist Plenary lecture* at the 2018 Applied Superconductivity Conference.
- Another student delivered a *Young Scientist Plenary lecture* at the 2019 Magnet Technology Conference.
- Students served on the student board of Applied Superconductivity Conference, Honolulu, HI, 2022; Salt Lake City, UT, 2024.
- Student received *ASM International* Scholarship, 2024.
- Three different students served as the President of the University of Houston Materials Research Society chapter.
- Ph.D. students received the *2019 best Ph.D. dissertation award* and *2017 best Ph.D. dissertation award* in the Cullen College of Engineering.
- Student recognized as *Chevron Energy Fellow*, 2023; one of only eight University wide. Another recognized as *UH Energy Fellow*, 2024.

- Hired six former graduate students of Mechanical Engineering department at University of Houston as engineers and scientists at AMPeers LLC (own company).
- Mentored 22 undergraduate students since June 2009, all funded by research projects. One undergraduate student won best research poster award in Emerging Researchers National Conference in STEM, Washington D.C. in 2017 and best research poster award in Undergraduates Research Day 2016 and Ford Foundation Award in 2018.
- Mentored several high school students on research on photovoltaics and superconductors.

<u>Sponsored Research Programs at University of Houston (since Sep. 2008)</u>

- *Acquired funding over $40.4M at UH since September 2008 with $34M credited to self.*
  - *$17.7M funding in projects with industrial partners.*
  - *$8.1M funding directly from industry through sponsored research or subcontract in federal programs.*
  - $4.5M from DOE Advanced Manufacturing Office for Next Generation Electric Machines (NGEM2).
  - $4M from ARPA-E in Rare-Earth Critical Technologies (REACT) program.
  - $2M from ARPA-E for Low-cost, High-throughput Superconductor Manufacturing.

- $1.5M from DOE-EERE in Next Gen Photovoltaics program.
- $1.5M from ARPA-E and DOE Fusion Energy Sciences for Galvanizing Advances in Market-Aligned Fusion for an Overabundance of Watts (GAMOW).
- $1.89M from DOE Office of High Energy Physics for High Performance High-Field Superconducting Wires for Next Generation Accelerators.
- $3.5M program from the Emerging Technology Fund (ETF) from the state of Texas for Research Superiority status

Professional Services

- Created and leading a consortium development effort to form the Advanced Superconductor Manufacturing Institute (ASMI). ASMI has been formed as a national 501c(3) non-profit entity.
  - Attracted 40 companies for the consortium building effort. Leading a steering committee of members from industry and national laboratories.
  - Acquired $500k funding from NIST for consortium building effort under the AMTech program – one of 16 recipients among 118 applicants.
  - Organized two workshops each with 50+ participants nationwide to develop roadmaps for commercialization of superconductors.
  - Led submission of a $70M proposal to NIST to fund ASMI. Attracted over $150M in cost share commitment mostly from industry. Proposal was selected as finalist by NIST.
- Created and led a roadmapping project Next Generation Electric Machines and Systems for Clean Emissions (Next Electric) funded by NIST. Established consortium of 40 institutions (including 24 companies) to develop the roadmap.
- Associate Editor of IEEE Transactions of Applied Superconductivity.
- Advisory Editorial Board member of *Superconductivity* – an Elsevier journal.
- Member of 2019, 2020, 2021, 2022, 2024 IEEE Fellow selection committee.
- Member of 2018, 2019, 2020, 2021, 2022, 2023, 2024 National Academy of Inventors Fellow Advisory Committee.
- Member of IEEE Special Awards Committee (2015, 2016, 2017, 2021, 2022, 2023, 2024); Chair of the committee in 2015, 2021, 2022.
- Member of ASM International Houston Student Affairs Committee (2021-2024).
- Chair and Host of the 2023 International Workshop on Coated Conductors for Applications.
- Member of Organizing/Steering Committee of the International workshop on Coated Conductor for Applications (2003 – 2025), International Symposium on Superconductivity (2016 – 2024), Applied Superconductivity Conference, MRS International Workshop on HTS, MS&T Conference, U.S. DOE Wire Development Workshops (2000 – 2007).

- Convener of the Superconductivity Global Initiative, 2023
- One of four panel members of Energy Braintrust forum at the 40th Annual Congressional Black Caucus Legislative Conference, Washington D.C., Sep. 2010. Other panel members included Dr. Kristina Johnson, Under Secretary of Energy, Department of Energy and Admiral Thad Allen, National Incident Commander for Deepwater Horizon.
- Served on multiple panel reviews of the National Science Foundation.
- One of nine international panelists to choose the 2005 & 2006 Superconductivity Industry Person of the year.

Academic Services

- Founding Director of the Advanced Manufacturing Institute (University center). 2018-present. The mission of AMI is to function as a central manufacturing research organization of the University of Houston with robust funding so that a wide range of technologies being developed by UH faculty can be scaled up to manufacturing and eventual commercialization.
- Director of the Applied Research Hub of the Texas Center for Superconductivity at the University of Houston (TCSUH). 2010-present.
- Chair of College Committee of Full Professors (College Promotion and Tenure committee), FY 2015.
- Member of College of Engineering Promotion and Tenure Committee, 2009-2013, 2015-2025.
- Member of College of Engineering Innovators Award Committee, 2021 – 2023.
- Member of University ASPIRE committee to create new University Center on sustainability (2020).
- Member of College of Engineering Dean Evaluation Committee, 2014, 2019.
- Member of the College of Engineering Research awards selection committee, 2009-2011.
- Served on College Dean's strategic vision 2020 Committee.
- Served on College Dean's Faculty Advisory Committee.
- Member of TCSUH Executive Committee, 2009-present.
- Member of College Technology Transfer Committee, 2011.
- Chair of one of four subcommittees in the University's Renewable Energy Technical Advisory Committee (2010).
- Member of TCSUH Research Committee, 2009-present.
- Member of committee to evaluate University's GEAR proposals (2019, 2020).
- Chair of search committees for four faculty positions sponsored by Emerging Technology Fund, 2010-2013.

- Member of search committees for VP of Research (2011, 2016), Chair of Mechanical Engineering (2010-2011), Faculty in Mechanical Engineering (2015, 2016, 2019 – 2024).
- Chair of Department of Mechanical Engineering Mid-tenure review committee (2014, 2015, 2016, 2017).
- Chair of Department of Mechanical Engineering Special committee on student grievance (2020, 2021).
- Chair of Department of Mechanical Engineering Ph.D. Qualifying Exam Reform Committee (2017).
- Member of Department of Mechanical Engineering Post-tenure review committee (2020 - 2024).
- Member of Department of Mechanical Engineering Best Ph.D. Dissertation Selection Committee (2015, 2016, 2017, 2019, 2021).
- Member of College of Engineering Best Ph.D. Dissertation Selection Committee (2016).