

Venkat Selvamanickam

Education

University of Houston	Materials Eng.	Ph.D. (1992)
University of Houston	Mechanical Eng.	M.S. (1988)
Regional Eng. College (now NIT), Tiruchi	Mechanical Eng.	B.E. (Honors) (1986)

Professional Experience

UNIVERSITY OF HOUSTON

<i>M.D. Anderson Chair Professor of Mechanical Engineering</i>	9/2008 onwards
<i>Professor of Physics (joint appointment)</i>	9/2010 onwards
<i>Professor of Chemical Engineering (joint appointment)</i>	9/2012 onwards
<i>Professor of Materials Engineering (joint appointment)</i>	9/2012 onwards
<i>Founder, Advanced Superconductor Manufacturing Institute</i>	2014
<i>Director, Advanced Manufacturing Institute (University Center)</i>	2018 onwards

PHILIPS ELECTRONICS (formerly Intermagnetics)

<i>Vice President & Chief Technology Officer of SuperPower</i>	5/1994 – 8/2008
<i>Chief Technology Advisor of SuperPower (now Furukawa Electric)</i>	9/2008 – 8/2016

OAK RIDGE NATIONAL LABORATORY

<i>Research Associate</i>	5/1993 - 5/1994
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Research Highlights

- Developed thin film superconductor tapes with engineered nanoscale defects to quadruple performance to world record levels. This technology was successfully transferred to industry (**royalty-paying license agreement, R&D100 awards, ARPA-E \$4 M award**)
- Developed single crystalline-like semiconductor films exhibiting high mobility ($> 1100 \text{ cm}^2/\text{Vs}$) 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 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 (**DOE Advanced Manufacturing Office \$4.5M 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 technology to fabricate round superconductor wire using ultra-thin tapes. Founded startup company to manufacture and commercialize this technology (**\$1.3M Small Business Innovation Research (SBIR) awards**)
- 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, and thermoelectrics sponsored by DOE, ONR, NIST, ARL, NSF, four 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.
- 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, Flexible Electronics and Solid-State Lighting.
- 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. World's 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 world 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 m 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

- Published 268 papers. 145 papers published since joining UH during Jan. 2009-present.
 - 102 papers with UH students as co-authors.
 - Authored the most cited paper in superconductivity and the third-most cited in Physics during March-April 1990; more than 600 citations to date.
- Editor of a book on "Flux Pinning and ac Losses"
- 222 conference presentations and external seminars since joining UH including 101 invited presentations/seminars and four plenary presentations.

Patents and Technology Transfer

- **48 issued U.S. patents, 75 issued international patents and 15 pending U.S. patents.**
- **License Agreement executed with industrial partner with royalty payments.**

- **Founded startup, AMPeers LLC. Received \$1.3M in three Small Business Innovation Research (SBIR) awards to scale up UH technology to manufacturing and commercialization.**
- Attracted industrial partner, SuperPower, to establish operations at the UH Energy Research Park.

Awards & Recognition

- Elected as a Fellow of the Institute of Electrical and Electronic Engineers (IEEE) in 2018.
- Elected to be inducted into 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.
- 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 25 graduate students since Fall 2008 (six Ph.D. students graduated in 2019)
- Mentored 11 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
- Currently mentoring a group of 11 graduate students (10 Ph.D.).
- 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), international-level *best student paper award at the 2016 Applied Superconductivity Conference*, 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.
- Ph.D. students received the *2019 best Ph.D. dissertation award* and *2017 best Ph.D. dissertation award* in the Cullen College of Engineering

Sponsored Research Programs at University of Houston (since Sep. 2008)

- *Acquired funding over \$28.1M at UH since September 2008 with \$25M credited to self.*
 - *\$17.6M funding in projects with industrial partners*
 - *\$4.75M funding directly from industry through sponsored research or subcontract in federal programs*

- Received \$4.5M funding from DOE Advanced Manufacturing Office. Program duration May 2017 – April 2020
- Acquired \$4M funding from ARPA-E in Rare-Earth Critical Technologies program. Program duration Jan. 2012 – June 2015.
- Acquired \$1.5M funding from DOE-EERE in Next Gen Photovoltaics program.
- Acquired \$2.3M program on second-generation High Temperature Superconductors, funded by SuperPower and the U.S. Department of Energy.
- Awarded a \$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
- Associate Editor of IEEE Transactions of Applied Superconductivity
- Member of 2019 IEEE Fellows selection committee
- Member of 2018 and 2019 National Academy of Inventors Fellows selection committee
- Member of IEEE Special Awards Committee (2015, 2016, 2017); Chair of the committee in 2015.
- Member of Organizing Committee of the Materials Research Society Spring Meeting Symposium, San Francisco, 2010, Materials Research Society International Workshop on HTS, Gatlinburg, 2002, Materials Science & Technology (MS&T) Conference, Houston 2010, Cincinnati, 2006, Applied Superconductivity Conference, Houston, 2002, ISTE-MRS International Workshop on HTS, Honolulu, 2001, U.S. Department of Energy Wire Development Workshops, St. Petersburg, 2000 – 2007, U.S. Department of Energy Cable Workshop, Houston, 2010.
- Member of International Advisory Committee of International Symposium on Superconductivity Tokyo, 2016-2020; European Applied Superconductivity Conference

Leiden, 2011; International workshop on Coated Conductor for Applications, Moji 2020, Vienna 2018, Aspen 2016, Jeju 2014, Heidelberg 2012, Tsukuba 2010, Barcelona, 2009, Houston 2008, Dresden, Germany, 2006, Orta S. Giulio, Italy, 2003, CIMTEC 2020 15th Ceramics Congress, Montecatini Terme, Italy.

- 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
- 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, 2015-2020
- Member of College of Engineering Dean Evaluation Committee, 2014, 2019
- Member of the College of Engineering Research awards selection committee, 2009-2011.
- Serving on College Dean's strategic vision 2020 Committee
- Serving 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
- 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)
- Chair of Department of Mechanical Engineering Mid-tenure review committee (2014, 2015, 2016, 2017)

- Chair of Department of Mechanical Engineering Ph.D. Qualifying Exam Reform Committee (2017)
- Member of Department of Mechanical Engineering Best Ph.D. Dissertation Selection Committee (2015, 2016, 2017, 2019)
- Member of College of Engineering Best Ph.D. Dissertation Selection Committee (2016)
- Dissertation committee member for several Ph.D. students.