

Academy Professor and Professor Emeritus
 Chair (2016-2020) Emeritus
 Department of Mechanical & Aerospace Engineering
 The Ohio State University Emeritus Academy
 Professor Emeritus, Chemical Physics Program



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U.S. Citizen, Permanent Resident of Canada

Research Interests

- Interaction of low-frequency (< 500 kHz) electromagnetic waves with tissues and cells
- Biophysics
- Plasma & Laser Processes, and Non-Equilibrium Phenomena

Summary

Total Externally Funded Research Grants	\$ 9,692,498
Total OSU Funded Research Grants (Direct Cost)	\$ 208,914
Students	
Undergraduate Honors Theses	19 (17 completed)
M.S.	29 (29 completed)
Ph.D.	12 (9 completed)
Post-Doctoral Researchers, Research Scientists, and Visiting Scholars	3
Publications in Refereed Journals & Conferences	100
Books	3
Book Chapters (peer reviewed)	1
Patents	16 (8 issued)
Invention Disclosures	22
Number of Different Courses Taught	
Undergraduate	17
Graduate	8
New Courses Developed	
Undergraduate	3
Graduate	3

Awards and Honors

Research

Overseas Fellow (invited) of the Royal Society of Medicine, London	2017
IBM Faculty Award	2014
Visiting Scholar Award Wright Center of Innovation in Biomedical Structural, Functional, and Molecular Imaging College of Medicine, The Ohio State University	2009
Harrison Faculty Award for Excellence in Engineering Education, College of Engineering, The Ohio State University	1995
Lumley Research Award, College of Engineering, The Ohio State University	1992
National Science Foundation Presidential Young Investigator (PYI) Award	1991 – 1996
DuPont Assistant Professor, The Ohio State University	1989 – 1990
University Postdoctoral Fellow, The Ohio State University	1987 - 1988

Teaching and Mentoring

Distinguished Graduate Faculty Award Department of Mechanical and Aerospace Engineering	2020
Pi Tau Sigma Above and Beyond Teacher of the Year Voted by the students in the Department of Mechanical Engineering	2002-2003
Sphinx Senior Honorary Faculty Recognition Students recognizing outstanding faculty, The Ohio State University	1996 & 2016
Award for Excellence in Teaching, Industrial Advisory Board, Department of Mechanical Engineering, The Ohio State University	1992 & 1998
Charles E. MacQuigg Outstanding Teaching Award, College of Engineering, The Ohio State University	1992 & 2006

Education

The Ohio State University
University Post-Doctoral Fellow

January 1987 - July 1988

- o *Teaching experience included a junior level course in Fluid Mechanics during Winter Quarter 1987, and a senior level course in Heat Transfer during Spring Quarter 1987*
- o *Performed research on gas laser kinetics. The goal of this research was to optimize single line operation of the CO laser, to develop new schemes of obtaining lasing on other transitions, and to develop more powerful transfer lasers using gas dynamic expansions*

Carnegie-Mellon University
Ph.D., Mechanical Engineering

1986

- o *Doctoral dissertation was entitled, "On the Phenomenon of Onset in Magnetoplasmadynamic Thrusters." The aim of this research was to understand and quantify the life-limiting onset phenomenon in MPD thrusters, which may be used for space rocket propulsion. The major accomplishments of this research include the development of a new theory of onset, the establishment of the importance of non-equilibrium ionization and recombination on boundary layer growth and onset, and the first study of an electrode-adjacent boundary layer in MPD flow. This work provides the basis for a systematic calculation of thruster lifetimes*

Columbia University
M.S., Mechanical Engineering

1981

- o *Specialized in thermal sciences and combustion*
- o *Masters research in combustion; involved the development of an analytical model of a countercurrent char gasifier*

Columbia University
B.S., Mechanical Engineering

1979

- o *Course work included applied physics and mechanical engineering core courses*

Work Experience

Program co-Director, Center for Clinical and Translational Science Pilot Program
Wexner Medical Center **The Ohio State University**
2018 – 2020

Responsibilities included:

- o Develop vision enabling translation of laboratory scientific discoveries to clinical practice
- o Develop research program that catalyzes transfer of highly innovative scientific laboratory discoveries to clinical diagnosis and treatment
- o Oversee process for setting the Pilot Program RFA (Request For Applications), review of proposals, and selection of awardees

Chair of Department of Mechanical & Aerospace Engineering, **The Ohio State University**
2016 – 2020

Responsibilities included:

- o Management and oversight of the largest department in the College of Engineering at OSU, including two (one of them the largest) undergraduate programs in Mechanical Engineering, and Aeronautical & Astronautical Engineering, and three graduate programs in Mechanical Engineering, Aerospace Engineering, and Nuclear Engineering, comprising 1720 undergraduate students, nearly 324 M.S. and Ph.D. students, and 111 faculty and staff (not counting research scientists, post-doctoral scholars, research engineers, etc.)
- o Developing the strategic vision for the department
- o Managing research expenditures of the department totally approximately \$25M per year (largest in the College of Engineering) and an overall department budget of nearly \$35M per year
- o Managing personnel (faculty and staff) issues, cultivating and growing donor relations, developing emergency response and crises management

Accomplishments include:

- o Introducing a new administrative structure that eliminated siloed programs and brought all three graduate and both undergraduate programs into a collaborative structure with unified goals
- o Developing innovative new program entitled Future Academic Scholars Training (FAST) to identify and mentor exceptional Ph.D. students and post-doctoral researchers for careers in top ranking academic institutions, leading to higher national program rankings and synergistically increasing number of underrepresented students
- o Increasing representation of women faculty from 13% to 19% (from 7 to 15), and diversity in underrepresented groups among faculty members from 7% to 8% (from 4 to 5) over 4 years
- o Increasing faculty size from 60 to 80 over 4 years
- o Facilitating promotion and/or tenure of 20 faculty members over 4 years
- o Creating a unique position called Faculty Director of Alumni Relations and Advancement to foster close ties with alumni and donors; Oversaw on average \$1M annually in gift giving directly to our department from alumni and donors

Professor, The Ohio State University **1988 – 2020**

Department of Mechanical Engineering (previously Associate Professor with tenure, 1993-1999; Assistant Professor, 1988-1993);

Faculty Member, Chemical Physics Program; Member, Spectroscopy Institute, Member; Molecular Biology and Cancer Genetics, The James Comprehensive Cancer Center, The Ohio State University.

Current activities include:

- o *Controlling migration of metastatic breast cancer cells using induced electric fields (with Ramesh Ganju, Ph.D., and Jonathan Song, Ph.D., Comprehensive Cancer Center)*
- o *Non-invasive, continuous detection of Malaria using an electromagnetic method (with Mark Drew, Ph.D., Infectious Diseases, OSU Wexner Medical Center)*

Curriculum Vitae

Vish Subramaniam

- o *Detection and imaging of cancer using eddy current methods (with Edward Martin, Jr., M.D., Stephen Povoski, M.D., and Charles Hitchcock, M.D., Ph.D, Comprehensive Cancer Center, Shaurya Prakash, Ph.D.)*
- o *Photoelectrochemical energy conversion and regeneration of co-factors (NADPH and NADH) (with Venkat Gopalan, Ph.D., Biochemistry & Chemistry)*
- o *Electroceutical interventions for accelerating wound healing (with Shaurya Prakash, Ph.D.)*
- o *Electroceutical interventions for mitigating bacterial biofilms (with Daniel Wozniak, Ph.D., and Paul Stoodley, Ph.D., Wexner Medical Center)*

Visiting Professor, The Ohio State University College of Medicine

2008 - 2009

Wright Center of Innovation in Biomedical Structural, Functional, and Molecular Imaging

Developed a new electromagnetic (EM) method using eddy currents to distinguish between cancer and normal tissue in specimens excised during cancer surgery for assessment of margins.

Invited Professor (Professeur Invite), Ecole Centrale Paris

Summer 1991

Performed research on non-equilibrium vibrational kinetics of CO at high translational mode temperatures (>1500 K). The goal of this research was to demonstrate the importance of vibration-vibration transfer collisions even at high temperatures, where vibration-translation processes are expected to dominate.

Consultant, Westinghouse Electric Corporation

January 1986 - May 1986

Research and Development

Served as consultant for the development of a theoretical model for plasma armatures in electromagnetic launchers. The aim of this research was to explain the phenomenon of arc restrike which limits the maximum attainable projectile velocity.

Engineer, Westinghouse Electric Corporation

March 1981 - May 1983

Nuclear Technology Division

Performed thermal, stress, and linear elastic fracture mechanics analyses of Pressurized Water Reactor components. Performed and directed the analytical formulation and solution of pressurized thermal shock problems.

Patents and Invention Disclosures

1. "Induced Electric Field (iEF) Therapy for Treatment of Solid Cancers", (with D. Ahirwar, T. Jones, K. Kaul, J. Song, R. Ganju, and V. Subramaniam), Invention disclosure Tech ID: T2022-058 on September 13, 2021. Provisional application 63/248,694 filed on September 27, 2021 (patent pending).
2. "Electromagnetic Implants for Treatment of Solid Cancers", (with J. D. West), Invention disclosure Tech ID: T2021-127 on November 24, 2020. Provisional application 63/132,066 filed on December 30, 2020, PCT application PCT/2021/065634 filed on December 30, 2021 (patent pending).
3. "Novel Electrode for Cofactor Regeneration", (with J. Kadowaki, T. Jones, A. Sengupta, V. Gopalan), Invention disclosure Tech ID: T2020-167 on November 20, 2019; PCT application PCT/US2021/043962 filed on July 30, 2021 (patent pending).
4. "Methods and Apparatus for making a determination about a presence or an absence of a parasite in blood smears", (with M. Drew, J. Kadowaki, T. Jones, J. D. West, S. Prakash, and M. Yotebieng), Invention disclosure Tech ID: T2019-267, U.S. Provisional Application 62/854100 filed May 29, 2019.
5. "Inductive Electric Fields Directionally Hinder EGF-gradient Promoted Breast Cancer Motility in Biomimetic Microtracks", (with A. Garg, S. Bushman, J. Ferree, T. Jones, J. Song, and D.

- Subramaniam), U.S. Provisional Application No. 62/573,908 filed on October 18, 2017; PCT/US2018/056502 filed on October 18, 2018.
6. "Energy Harvesting from Fabric Electrochemistry", (with S. Prakash, C. Sen, A. Kiourti, S. Steiner, and P. Ghatak, Invention disclosure Tech ID: T2017-121, MCC Ref: 10336-299WO1, filed March 3, 2017.
 7. "Antimicrobial Wound Care Dressing", (with S. Prakash, M. Bennett, T. Jones, C. Sen, J. West, S. Roy, P. D. Ghatak, and S. Matthew), U.S. Provisional Application No. 62/411,089 filed on October 21, 2016; PCT/US2017/057597 filed on October 20, 2017.
 8. "Non-invasive Method for Detecting a Deadly Form of Malaria: *Plasmodium Falciparum*", (with M. Drew, B. Smith, and J. D. West), U.S. Provisional Application No. 62/252,779 filed on November 9, 2015; PCT/WO US2017/083317 A1, published May 18, 2017, **Application 15/774,657 filed on May 9, 2018, allowed for issuance of U.S. patent.**
 9. "Eddy Current Water Heater", (with J. D. West, and P. Worley), Tech ID #T2015-245 disclosed on April 22, 2015.
 10. "A Galvanotaxis Assay for Quantitative Assessment of the Metastatic Potential of Cancer Cells", (with R. K. Ganju, E. Alkandry, T. H. Jones, J. D. West, M. W. Nasser, and D. Ahirwar), Tech ID 2013-204 disclosed on January 22, 2013, **U.S. Patent 9,809,810 issued September 7, 2017; U.S. Patent 9,885,031 issued on February 6, 2018; U.S. Patent 10,550,383 issued on February 4, 2020, and U.S. Patent 10,655,121 issued May 19, 2020.**
 11. "A Non-Contact Method for Accelerating Wound Healing", (with S. Roy, C. K. Sen, J. D. West, E. K. Sequin, and P. D. Ghatak), Tech ID 2013-205 disclosed on January 22, 2013. **U. S. Patent 9,777,265 issued October 3, 2017.**
 12. "Electromagnetic System and Method", (with J. D. West, J. L. McFerran, E. K. Sequin, D. Sun, P. Zou, and T. H. Jones), Tech ID#09005 disclosed on July 1, 2008. **U.S. Patent 9,844,347 issued December 19, 2017.**
 13. "Detection and Localized Imaging of Cancer Using X-ray Fluorescence of Gold Nanoparticle/Preferential Locator Conjugates", (with M. O. Thurston), Provisional patent US61/029,402 filed on February 18, 2008, utility patent filed on February 5, 2009. U.S. Patent No. 2009/0208417 A1, published August 20, 2009.
 14. "Intraoperative Fluorescence Immuno Navigation and Detection (IFIND) System for Breast Cancer", (with E. W. Martin, Jr., R. X. Xu, D. Sun, S. P. Povoski, J. P. Heremans, and R. Lee), Provisional patent US61/020,345 filed on January 10, 2008. "Fluorescence Detection System", (with E. W. Martin, Jr., R. X. Xu, D. Sun, S. P. Povoski, J. P. Heremans, R. Lee, and C. Turro), U.S. Patent No. 2009/0234225 A1, published September 17, 2009.
 15. "Remote Controlled Patterning of Watering Area by Retrofitting Sprinkler Heads", (with J. D. West, and S. Subramaniam), Tech ID# 05007 disclosed on July 22, 2004.
 16. "Synthesis Method for Producing Carbon Clusters and Structured Carbon Clusters Produced Thereby", (with J. W. Rich, E. C. Ploenjes, and W. R. Lempert), disclosed on May 2, 2000, **U.S. Patent No. 6,855,301, issued February 15, 2005.**
 17. "Plasma-enhanced sensor and analytic method", 93ID47F disclosed on April 15, 1997, filed on May 4, 1997, university chose not to file.

18. "Plasma-enhanced catalytic removal of NO_x, CO, and hydrocarbons in automotive exhausts", G96-014, 93ID47F disclosed on April 16, 1996, filed on May 4, 1997, university chose not to file.
19. "External Electrode-Assisted Variable Polarity Plasma Arc Welding", 96ID48F disclosed on April 17, 1996, university chose not to file.
20. "Synthesis of Diamond-Coated Garnet Abrasives", disclosed on July 24, 1995, university chose not to file.
21. "A Manganin/Diamond Transducer for Measurement of Contact Pressures", 94-ID29F, disclosed on November 29, 1993, university chose not to file.
22. "Laser-Excited Synthesis of Carbon Films from Carbon Monoxide - Containing Gas Mixtures," **U.S. Patent No. 5,094,915, issued March 10, 1992.**

Publications

Books & Book Chapters

- o A. Gilat, and V. V. Subramaniam, *Numerical Methods for Engineers and Scientists: An Introduction with Applications Using MATLAB*, John Wiley & Sons Inc., New York, ISBN: 978-0-471-73440-6, 2007 (1st Ed.); ISBN: 978-0-470-56515-5, 2010 (2nd Ed.); ISBN 978-1-118-55493-7, 2014 (3rd Ed.).
- o V. V. Subramaniam, and S. M. Aithal, Chapter 9, "Laser-Assisted and Optical Pumping Techniques for Diamond Synthesis," pp. 325-423, in *Diamond Films Handbook*, edited by J. Asmussen, and D. Reinhard, ISBN 0-8247-9577-6, Marcel Dekker, Inc., New York, 2002.

Journal Papers

- (1) T. H. Jones, K. Kaul, M. Charan, J. Crowley, J. Song, R. Ganju, and V. V. Subramaniam, "Induced Electric Fields Selectively Impede Oxidative Phosphorylation in Breast Cancer Cells" (in preparation).
- (2) R. Heald, S. Salyer, K. Ham, T. Wilgus, V. V. Subramaniam, and S. Prakash, "Electroceutical Treatment of Infected Chronic Wounds in a Dog and a Cat", *Veterinary Surgery*, Short Case Series, pp. 1-8, 2022.
- (3) T. H. Jones, A. A. Garg, K. Kaul, J. W. Song, R. K. Ganju, and V. V. Subramaniam, "Directional Migration of Breast Cancer Cells Hindered by Induced Electric Fields may be due to Accompanying Alteration of Metabolic Activity", *Bioelectricity*, Vol. 3, No. 1, pp. 92-100, 2021.
- (4) J. Kadowaki, T. H. Jones, A. Sengupta, V. Gopalan, and V. V. Subramaniam, "Copper Oxide Based Cathodes for Direct NADPH Regeneration", *Nature Scientific Reports*, **11** (1), pp. 1-12, 2021. <https://doi.org/10.1038/s41598-020-79761-6>.
- (5) R. Heald, M. Bennett, V. V. Subramaniam, D. Dusane, V. Lochab, P. Mohanasundaram, S. Salyer, J. D. West, P. Stoodley, and S. Prakash, "Printed Electroceutical Dressings for the Inhibition of Biofilms and Treatment of Chronic Wounds", *IEEE Journal of Microelectromechanical Systems*, Vol. 29, Issue 5, pp. 918-923, October 2020.

- (6) V. Lochab, T. H. Jones, E. Alkandry, J. D. West, M. Abdel-Rahman, V. V. Subramaniam, and S. Prakash, "Evaluation of Electrical Properties of *ex vivo* Human Hepatic Tissue with Metastatic Colorectal Cancer", Physiological Measurement, Vol. 41, No. 8, p. 085005, September 4, 2020.
- (7) V. Lochab, T. H. Jones, D. H. Dusane, C. W. Peters, P. Stoodley, D. J. Wozniak, V. V. Subramaniam, and S. Prakash, "Ultrastructure Imaging of *Pseudomonas aeruginosa* Lawn Biofilms and Eradication of the Tobramycin-resistant Variants under *in vitro* Electroceutical Treatment", Nature Scientific Reports, **10** (1) pp. 1-12, 2020.
- (8) J. A. Spitz, A. H. Chao, D. M. Peterson, V. Subramaniam, S. Prakash, and R. J. Skoracki, "Bioimpedance Spectroscopy is not Associated with a Clinical Diagnosis of Breast-Cancer Related Lymphedema", Lymphology **52**, pp. 134-142, 2019.
- (9) A. A. Garg, T. H. Jones, S. Bushman, S. Mishra, K. Kaul, D. K. Ahirwar, J. Ferree, P. Kumar, D. Subramaniam, R. K. Ganju, V. V. Subramaniam, and J. W. Song, "Electromagnetic Fields Alter the Motility of Metastatic Breast Cancer Cells", Nature Communications Biology **2**:303, 2019.
- (10) S. Roy, S. Prakash, S. S. Mathew-Steiner, P. D. Ghatak, V. Lochab, T. H. Jones, P. Mohanasundaram, G. M. Gordillo, V. V. Subramaniam, and C. K. Sen, "Disposable Patterned Electroceutical Dressing (PED-10) is Safe for Treatment of Open Clinical Chronic Wounds", Advances in Wound Care Vol. 8, No. 4, 2019.
- (11) D. H. Dusane, V. Lochab, T. H. Jones, C. W. Peters, D. Sindeldecker, A. Das, S. Roy, C. K. Sen, V. V. Subramaniam, D. J. Wozniak, S. Prakash, and P. Stoodley, "Electroceutical Treatment of *Pseudomonas aeruginosa* Biofilms", Nature Scientific Reports **9**, p. 2008, 2019.
- (12) T. H. Jones, J. Javor, E. K. Sequin, J. D. West, S. Prakash, and V. V. Subramaniam, "Design and Characterization of an Electromagnetic Probe for Distinguishing Morphological Differences in Soft Tissues", Review of Scientific Instruments **89** p. 084382, August 8, 2018.
- (13) D. K. Ahirwar, M. W. Nasser, T. H. Jones, E. K. Sequin, J. D. West, T. L. Henthorne, J. Javor, A. M. Kaushik, R. K. Ganju, and V. V. Subramaniam, "Non-contact method for directing electrotaxis," Nature Scientific Reports, **5** 11005, June 9, 2015.
- (14) A. Samin, and V. V. Subramaniam, "Analytical Solutions to the Steady State Poisson-Nernst-Planck Equations in Electrobiochemical Systems", Applied Physics Research, Vol. 7, No. 2, pp. 40-48, 2015.
- (15) S. Prakash, M. Karnes, E. Sequin, J. West, C. Hitchcock, S. Nichols, P. M. Bloomston, S. A. Sherif, C. Schmidt, E. W. Martin, Jr., S. P. Povoski, and V. V. Subramaniam, "Ex vivo electrical impedance measurements on excised hepatic tissue from human patients with metastatic colorectal cancer", Physiological Measurement **36**, pp. 315-328, 2015.
- (16) J. Banerjee, P. D. Ghatak, S. Roy, S. Khanna, E. K. Sequin, K. Bellman, B. C. Dickinson, P. Suri, V. V. Subramaniam, C. J. Chang, and C. K. Sen, "Improvement of Human Keratinocyte Migration by a Redox Active Bioelectric Dressing", PLoS One, Vol. 9, No. 3, p. e89239, March 2014.
- (17) E. W. Martin, Jr., G. J. Chapman, V. V. Subramaniam, and S. P. Povoski, "Intraoperative Detection of Gamma Emissions using K-alpha X-ray Fluorescence", Expert Review of Medical Devices, Vol. 7, No. 4, pp. 431-434, 2010.
- (18) P. Zou, S. Xu, S. P. Povoski, A. Wang, M. A. Johnson, E. W. Martin, Jr., V. Subramaniam, R. Xu, and D. Sun, "Near-Infrared Fluorescence Labeled Anti-TAG-72 Monoclonal Antibodies for Tumor

- Imaging in Colorectal Cancer Xenograft Mice”, Molecular Pharmaceutics, Vol. 6, No. 2, pp. 428-440, February 17, 2009.
- (19) W. Zhou, R. P. Tiwari, R. Annamalai, R. Sooryakumar, V. V. Subramaniam, and D. Stroud, “Sound Propagation in Light-Modulated Carbon Nanosponge Suspensions”, Physical Review B 79, p. 104204, 2009.
- (20) J. McFerran, J. West, V. V. Subramaniam, and A. Kahraman, “Response of an Isolated Particulate subjected to Lateral Electric Fields in a DC Glow Discharge”, IEEE Transactions on Plasma Science, Vol. 36, No. 5, pp. 2838-2850, October 2008.
- (21) R. Annamalai, J. D. West, A. Luscher, and V. V. Subramaniam, “Electrophoretic Drawing of Continuous Fibers of Single-Walled Carbon Nanotubes”, Journal of Applied Physics, Vol. 98, No. 10, pp. 114307, November 15 2005. Also selected for publication in Virtual Journal of Nanoscale Science & Technology, December 19, 2005 issue.
- (22) M. S. Detrick, G. N. Washington, and V. V. Subramaniam, “Control of Polishing of Diamond Films using Microactuation and an Atmospheric Pressure Plasma”, ASME/IEEE Transactions on Mechatronics, Vol. 8, No. 1, pp.45-55, March 2003.
- (23) A. R. White, P. Palm, E. Ploenjes, V. V. Subramaniam, and I. V. Adamovich, “Effect of Electron Density on Shock Wave Propagation in Optically Pumped Plasmas”, Journal of Applied Physics, Vol. 91, No. 5, pp. 2604 – 2610, March 1, 2002.
- (24) E. Ploenjes, P. Palm, G. B. Viswanathan, V. V. Subramaniam, I. V. Adamovich, W. R. Lempert, H. L. Fraser, and J. W. Rich, “Synthesis of Single-Walled Carbon Nanotubes in Vibrationally Nonequilibrium Carbon Monoxide”, Chemical Physics Letters 352, pp. 342-347, February 6, 2002.
- (25) J. L. Lilly, and V. V. Subramaniam, “A Cold Thermionically-Emitting Dusty Air Plasma Formed by Radiative Heating of Graphite Particulates”, IEEE Transactions on Plasma Science, Vol. 29, No. 6, pp. 927 – 934, December 2001.
- (26) A. R. White, and V. V. Subramaniam, “Shock Propagation through a Low Pressure Glow Discharge in Argon”, Journal of Thermophysics and Heat Transfer, Vol. 15, No. 4, pp. 491-496, October-December 2001.
- (27) A. R. White, and V. V. Subramaniam, “Effect of Wall Shear on the Propagation of a Weak Spark-Generated Shock Wave in Argon”, Physics of Fluids, Vol. 13, No. 8, pp. 2441-2444, August 2001.
- (28) P. Palm, E. Ploenjes, M. Buoni, V. V. Subramaniam, and I.V. Adamovich, "Electron Density and Recombination Rate Measurements in CO-Seeded Optically Pumped Plasmas", Journal of Applied Physics, Vol. 89, No. 11, pp. 5903-5910, June 1, 2001.
- (29) R. Yano, V. Contini, E. Ploenjes, P. Palm, S. Merriman, S. M. Aithal, I. Adamovich, W. Lempert, V. V. Subramaniam, and J. W. Rich, “Supersonic Nonequilibrium Plasma Wind-Tunnel Measurements of Shock Modification and Flow Visualization”, AIAA Journal, Vol. 38, No. 10, pp. 1879-1888, October 2000.
- (30) S. M. Aithal, and V. V. Subramaniam, “On the Characteristics of a Spark Generated Shock Wave”, Physics of Fluids, Vol. 12, No. 4, pp. 924-934, April 2000.
- (31) S. M. Aithal, V. V. Subramaniam, and V. Babu, “Numerical Model of Direct Current Plasma Flows”, Plasma Chemistry & Plasma Processing, Vol. 19, No. 4, pp. 487-504, 1999.

- (32) S. M. Aithal, V. V. Subramaniam, J. Pagan, and R. Richardson, "Numerical Model of a Transferred Plasma Arc", Journal of Applied Physics, Vol. 84, No. 7, pp. 1-12, October 1, 1998.
- (33) I. V. Adamovich, V. V. Subramaniam, J. W. Rich, and S. O. Macheret, "Phenomenological Analysis of Shock Wave Propagation in Weakly Ionized Plasmas", AIAA Journal, Vol. 36, No. 5, pp. 816 – 823, May 1998.
- (34) V. Babu, S. M. Aithal, and V. V. Subramaniam, "Numerical Simulation of a Hydrogen Arcjet", AIAA Journal of Propulsion & Power, Vol. 12, No. 6, pp. 1114-1122, November-December 1996.
- (35) C. C. Hung, G. J. Valco, S. M. Aithal, and V. V. Subramaniam, "Electrical Characteristics of Diamond Films Synthesized from Methane/Hydrogen and Acetone/Hydrogen Mixtures", Journal of Applied Physics 78 (11), 1 December 1995.
- (36) V. Babu, and V. V. Subramaniam, "Numerical Solutions to Nozzle Flows with Vibrational Non-Equilibrium", J. Thermophysics and Heat Transfer, Vol. 9, No. 2, pp. 227-232, April-June 1995.
- (37) J. H. D. Rebello, and V. V. Subramaniam, "Diamond Synthesis at Low Temperatures", Journal of Materials, pp. 60-63, July 1994.
- (38) B. Bhushan, V. V. Subramaniam, and B. K. Gupta, "Polishing of Diamond Films", Diamond Films & Technology, Vol. 4, No. 2, pp. 71-97, 1994. (INVITED PAPER).
- (39) E. A. Frey, A. Tamhane, J. H. D. Rebello, S. A. Dregia, and V. V. Subramaniam, "Morphological Variations in Flame Deposited Diamond", Journal of Materials Research, Vol. 9, No. 3, pp. 625-630, March 1994.
- (40) B. K. Gupta, A. P. Malshe, B. Bhushan, and V. V. Subramaniam, "Friction and Wear Properties of Chemomechanically Polished Diamond Films", Transactions of the ASME Journal of Tribology, Vol. 116, pp. 445-453, July 1994.
- (41) B. Bhushan, V. V. Subramaniam, A. P. Malshe, B. K. Gupta, and J. Ruan, "Tribological Properties of Polished Diamond Films", Journal of Applied Physics 74 (6), pp. 4174-4180, September 15, 1993.
- (42) J. H. D. Rebello, V. V. Subramaniam, and T. S. Sudarshan, "Diamond Growth by Laser-Driven Reactions in a CO/H₂ Mixture", Applied Physics Letters 62 (8), pp. 899-901, 22 February, 1993.
- (43) A. C. de Gavelle de Roany, C. Flament, J. W. Rich, V. V. Subramaniam, and W. R. Warren, "Strong Vibrational Non-Equilibrium in Supersonic Nozzle Flows," AIAA Journal, Vol. 31, No. 1, pp. 119-128, January 1993.
- (44) J. H. D. Rebello, D. L. Straub, and V. V. Subramaniam, "Diamond Growth from a CO/CH₄ Mixture by Laser Excitation of CO: Laser Excited Chemical Vapor Deposition", Journal of Applied Physics 72 (3), pp. 1133-1136, 1 August 1992.
- (45) C. Flament, T. George, K. A. Meister, J. C. Tufts, J. W. Rich, V. V. Subramaniam, J. P. Martin, B. Piar, and M. Y. Perrin, "Nonequilibrium Vibrational Kinetics of Carbon Monoxide at High Translational Mode Temperatures", Chemical Physics 163, No. 2, pp. 241-262, 15 June 1992.
- (46) J. H. D. Rebello, D. Straub, V. V. Subramaniam, E. K. Tan, S. A. Dregia, B. Preppernau, and T. A. Miller, "On the Effects of Physical Abrasion on Nucleation and Growth of Diamond on Silicon using Hot-Filament Chemical Vapor Deposition," Materials and Manufacturing Processes, Vol. 6, No. 3, pp. 501-520, 1991.

- (47) V. V. Subramaniam, K. S. Hoyer, and J. L. Lawless, "Limits on Steady Diffuse Mode Operation of the Cathode in MPD Thrusters," AIAA Journal of Propulsion and Power, Vol. 7, No. 4, pp. 565-572, July-August 1991.
- (48) V. V. Subramaniam and J. L. Lawless, "Thermal Instabilities of the Anode in an MPD Thruster," AIAA Journal of Propulsion and Power, Vol. 6, No. 2, pp. 221-224, March-April 1990.
- (49) W. Urban, J. X. Lin, V. V. Subramaniam, M. Havenith, and J. W. Rich, "Treanor Pumping of CO Initiated by CO Laser Excitation," Chemical Physics 130, pp. 389-399, 1989.
- (50) V. V. Subramaniam and J. L. Lawless, "Electrode-Adjacent Boundary Layer Flow in Magnetoplasmadynamic Thrusters," Physics of Fluids 31 (1), pp. 201-209, January 1988.
- (51) V. V. Subramaniam and J. L. Lawless, "An Integral Method for Two-Temperature Ionizing Laminar Boundary Layers," Physics of Fluids 31 (1), pp. 193-200, January 1988.
- (52) V. V. Subramaniam and J. L. Lawless, "Onset in Magnetoplasmadynamic Thrusters with Finite Rate Ionization," AIAA Journal of Propulsion and Power, Vol. 4, No. 6, pp. 526-532, November-December 1988.
- (53) J. L. Lawless and V. V. Subramaniam, "Theory of Onset in Magnetoplasmadynamic Thrusters," AIAA Journal of Propulsion and Power, Vol. 3, No. 2, pp. 121-127, March-April 1987.
- (54) V. V. Subramaniam and W. F. Hughes, "A Macroscopic Interpretation of Landau Damping," J. Plasma Physics, Vol. 36, Part 1, pp. 127-133, August 1986.

Refereed Conference Papers

- (1) A. A. Garg, T. H. Jones, S. Bushman, S. A. Mishra, J. Ferree, P. Kumar, D. K. Ahirwar, R. Ganju, V. V. Subramaniam, and J. Song, "Non-Contact Electric Fields Potently Hinder EGF Promoted Breast Cancer Motility by Downregulating EGFR Phosphorylation", Abstract No. 677.21 presented at the 2018 Experimental Biology meeting, *FASEB Journal* **32**(1) *Supplement*, April 2018.
- (2) S. A. Salyer, V. V. Subramaniam, S. Prakash, V. Lochab, P. Mohanasundaram, T. H. Jones, and K. Ham, "Use of Wireless Electroceutical Wound Dressing in Biofilm Disruption – Case Summary", presented at the 17th Annual Scientific Meeting of the Society of Veterinary Soft Tissue Surgery, Charleston, South Carolina, June 4-16, 2018.
- (3) Garg, A. A., Jones, T. H., Bushman, S., Shuman, J., Enders, J., Subramaniam, V., & Song, J. W. Inductive Electric Fields Directionally Hinder EGF-Gradient Promoted Breast Cancer Motility in Biomimetic Microtracks. In *The 21st International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS 2017)*. Accepted for Platform Presentation (10% acceptance rate). October 22, 2017.
- (4) A. A. Garg, T. H. Jones, S. M. Bushman, J. Shuman, J. Enders, V. Subramaniam; and J. W. Song, "Inductive Electric Fields Hinder EGF Gradient Promoted Breast Cancer Cell Motility", presented at the Summer Biomechanics, Bioengineering, and Biotransport Conference. Tucson, Arizona, June 2017.

- (5) E. K. Sequin, K. Bellman, S. Koch, J. D. West, S. Prakash, and V. V. Subramaniam, "Measurement of Electrical Impedance and Eddy Currents in Tissue Phantoms", Extended Abstract IMECE2013-65112 presented at the ASME 2013 International Mechanical Engineering Congress & Exposition, San Diego, California, November 15-21, 2013.
- (6) E. K. Sequin, J. D. West, and V. V. Subramaniam, "Motility of Keratinocytes under the Non-contact Application of Electric Fields", Extended Abstract IMECE2013-65144, presented at the ASME 2013 International Mechanical Engineering Congress & Exposition, San Diego, California, November 15-21, 2013.
- (7) E. K. Sequin, P. D. Ghatak, J. D. West, S. Roy, C. K. Sen, and V. V. Subramaniam, "Cellular Responses to Electric Fields", Poster paper at 6th Annual Translation to Clinical (T2C) Regenerative Medicine Wound Care Conference, The Ohio State University, Columbus, Ohio, March 14-16, 2013.
- (8) E. K. Sequin, P. D. Ghatak, J. D. West, S. Roy, and V. V. Subramaniam, "Motility of Cells in the presence of Eddy Currents, presented at session 5-3 at the ASME NanoEngineering for Medicine and Biology (NEMB) Conference, Boston, Massachusetts, February 6, 2013.
- (9) E. K. Sequin, J. D. West, and V. V. Subramaniam, *Eddy Current Measurement for Characterizing Soft Tissue*. IMECE Paper IMECE2012-86180, Proceedings of the ASME 2012 International Mechanical Engineering Congress & Exposition, Houston, Texas, November 9-15 (2012).
- (10) Z. Zou, S. Midlam-Mohler, R. Annamalai, Y. Guezennec, and V. V. Subramaniam, "Survey of On-Board Hydrogen Generation Methods for Diesel Powertrains", presented at the Global Powertrain Conference, Novi, Michigan, September 19-21, 2006.
- (11) A. Luscher, L. Rusli, V. V. Subramaniam, and D. Guenther, "The Capstone Course at The Ohio State University Department of Mechanical Engineering", presented at the North Central Section Conference of ASEE, Ohio Northern University, April 7 & 8, 2005.
- (12) M. Buoni, D. Dietz, K. Aslam, and V. V. Subramaniam, "Simulation of Compressible Gas Flow in a Micronozzle", Paper AIAA-2001-3073 presented at the 35th AIAA Thermophysics Conference, Anaheim, California, June 11-14, 2001.
- (13) A. R. White, P. Palm, E. Plönjes, V. V. Subramaniam, and I. V. Adamovich, "Effect of Electron Density on Shock Wave Propagation in Optically Pumped Plasmas", Paper AIAA-2001-3058 presented at the 32nd AIAA Plasmadynamics and Lasers Conference and 4th Weakly Ionized Gases Workshop, Anaheim, California, June 11-14, 2001.
- (14) P. Palm, E. Plönjes, I. V. Adamovich, V. V. Subramaniam, W. R. Lempert, and J. W. Rich "High Pressure Air Plasmas Sustained by an Electron Beam and Enhanced by Optical Pumping", Paper AIAA-2001-2937 presented at the 32nd AIAA Plasmadynamics and Lasers Conference, Anaheim, California, June 11-14, 2001.
- (15) E. Ploenges, P. Palm, I. V. Adamovich, V. V. Subramaniam, J. W. Rich, G. B. Viswanathan, and H. Fraser, "Carbon Nanotube Production in CO Laser Pumped Carbon Monoxide Plasmas", paper AIAA 2001-0651 presented at the 39th AIAA Aerospace Science Meeting and Exhibit, Reno, Nevada, January 8-11, 2001.
- (16) A. R. White, K. A. Essenhigh, I. V. Adamovich, W. Lempert, and V. V. Subramaniam, "Effects of Thermal Gradients and Ionization on the Propagation of Spark-Generated Shock Waves", Paper 99-4855 presented at the 9th AIAA International Space Planes and Hypersonic Systems and

Technologies Conference and 3rd Weakly Ionized Gases Workshop, Norfolk, Virginia, November 1-5, 1999.

- (17) A. R. White, W. C. Lee, I. V. Adamovich, V. V. Subramaniam, W. Lempert, and J. W. Rich, "Shock Propagation through a Thomson Discharge", Paper IWP4.34 presented at the 52nd Annual Gaseous Electronics Conference, Norfolk, Virginia, October 5-8, 1999.
- (18) S. M. Aithal, A. R. White, and V. V. Subramaniam, "Kinetic Modeling of an Ionization Sensor for Combustion Processes", paper AIAA-99-3606 presented at the 30th AIAA Plasmadynamics and Lasers Conference, Norfolk, Virginia, June 28-July 1, 1999.
- (19) A. R. White, S. M. Aithal, and V. V. Subramaniam, "Experimental Studies of Spark Generated Shock Waves", paper AIAA-99-3670 presented at the 30th AIAA Plasmadynamics and Lasers Conference, Norfolk, Virginia, June 28-July 1, 1999.
- (20) R. Yano, V. Contini, P. Palm, S. Merriman, S. M. Aithal, I. V. Adamovich, W. Lempert, V. V. Subramaniam, and J. W. Rich, "Experimental Characterization of Shock Dispersions in Weakly Ionized Nonequilibrium Plasmas", Paper 99-3671 presented at the 30th AIAA Plasmadynamics and Lasers Conference, Norfolk, Virginia, June 28-July 1, 1999.
- (21) R. Yano, V. Contini, E. Ploenjes, P. Palm, S. Merriman, S. M. Aithal, I. V. Adamovich, W. Lempert, V. V. Subramaniam, and J. W. Rich, "Flow Visualization in a Supersonic Nonequilibrium Plasma Wind Tunnel", Paper 99-3725 presented at the 30th AIAA Plasmadynamics and Lasers Conference, Norfolk, Virginia, June 28-July 1, 1999.
- (22) K. A. Essenhigh, E. Ploenjes, P. Palm, I. V. Adamovich, V. V. Subramaniam, and J. W. Rich, "Energy Transfer Studies in CO-Laser Pumped Gases and Liquids", paper GT12 presented at 51st Annual Gaseous Electronics Conference & 4th International Conference on Reactive Plasmas, Maui, Hawaii, October 1998.
- (23) I. V. Adamovich, S. M. Aithal, P. Palm, E. Ploenjes, V. V. Subramaniam, R. Yano, and J. W. Rich, "Modeling of Vibration-to-Vibration and Vibration-to-Electronic Energy Transfer Processes in Nonequilibrium Flows", paper AIAA-98-2750 presented at the 29th Plasmadynamics and Lasers Conference, Albuquerque, New Mexico, June 15-18, 1998.
- (24) E. Ploenjes, I. V. Adamovich, V. V. Subramaniam, and J. W. Rich, "Isotope Separation in Optically Pumped Thompson Discharges", paper AIAA-98-0993, presented at the 36th Aerospace Sciences Meeting & Exhibit, Reno, Nevada, January 12-15, 1998.
- (25) S. M. Aithal, and V. V. Subramaniam, "Modeling of Multidimensional Flows with Vibrational Non-Equilibrium", paper AIAA-97-2503, presented at the 32nd Thermophysics Conference, Atlanta, Georgia, June 23-25, 1997.
- (26) L. M. Abrams, I. Adamovich, K. Wodzisz, J. W. Rich, and V. V. Subramaniam, "Plasma-Enhanced Catalysis for Automotive Exhausts", SAE Paper 971719 presented at the International Spring Fuels & Lubricants Meeting, Dearborn, Michigan, May 5-8, 1997.
- (27) S. M. Aithal, V. V. Subramaniam, and V. Babu, "Effects of Arc Attachment on Arcjet Flows", Paper AIAA-96-3295 presented at the 32nd AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Lake Buena Vista, Florida, July 1-3, 1996.
- (28) S. M. Aithal, V. V. Subramaniam, and V. Babu, "Numerical Simulation of Plasma and Reacting Flows", (Invited) Paper AIAA-96-2024 presented at the 27th AIAA Fluid Dynamics Conference, New Orleans, Louisiana, June 17-20, 1996.

- (29) H. C. Noltmier, and V. V. Subramaniam, "Laboratory Chemical Vapor Deposition (CVD) Experiments Applied to the Geological Formation and Age of Natural Diamond", Poster Paper BTH-1 presented at Session 152 (Experimental Petrology) at the 1995 Geological Society of America Annual Meeting, New Orleans, Louisiana, November 9, 1995.
- (30) V. V. Subramaniam, and J. H. D. Rebello, "Laser-Based Synthesis of Diamond at Low Temperatures", Invited paper presented at the 187th Meeting of the Electrochemical Society, Reno, Nevada, May 21-26, 1995.
- (31) V. Babu, S. M. Aithal, and V. V. Subramaniam, "Propellant Internal Mode Dis-equilibrium and Frozen Flow Losses in Arcjets", paper AIAA-94-2655, presented at the 25th AIAA Plasmadynamics and Lasers Conference, Colorado Springs, Colorado, June 20-23, 1994.
- (32) G. E. Koester, L. A. Kennedy, and V. V. Subramaniam, "Low Temperature Wave Enhanced Combustion in Porous Systems", presented at the Central States Combustion Institute Meeting, Madison, Wisconsin, June 1994.
- (33) V. Babu, S. Aithal, and V. V. Subramaniam, "On the Effects of Swirl in Arcjet Thruster Flows", paper IEPC-93-183, presented at the 23rd International Electric Propulsion Conference, Seattle, Washington, September 13-17, 1993.
- (34) V. Babu, S. Aithal, and V. V. Subramaniam, "Vibrational Non-equilibrium in Arcjet Flows", paper IEPC-93-129, presented at the 23rd International Electric Propulsion Conference, Seattle, Washington, September 13-17, 1993.
- (35) G. Lefever-Button, and V. V. Subramaniam, "Quasi One-Dimensional MPD Flows", paper IEPC-91-061, presented at the AIDAA/AIAA/DGLR/JSASS 22nd International Electric Propulsion Conference, Viareggio, Italy, October 14-17, 1991.
- (36) J. L. Lawless, and V. V. Subramaniam, "A Review of the Theory of Self-Field MPD Thrusters", paper IEPC-91-019, presented at the AIDAA/AIAA/DGLR/JSASS 22nd International Electric Propulsion Conference, Viareggio, Italy, October 14-17, 1991.
- (37) V. V. Subramaniam, "Onset and Erosion in Self-Field MPD Thrusters", paper IEPC-91-021, presented at the AIDAA/AIAA/DGLR/JSASS 22nd International Electric Propulsion Conference, Viareggio, Italy, October 14-17, 1991.
- (38) E. A. Frey, J. H. D. Rebello and V. V. Subramaniam, "Flame Synthesis of Diamond on Silicon," presented at the 5th International Conference on Surface Modification Technologies, Birmingham, United Kingdom, September 2-4, 1991. Also appeared in the Proceedings of the Conference, pp. 343-356.
- (39) J. H. D. Rebello, D. Straub, V. V. Subramaniam, E. K. Tan, S. A. Dregia, B. Preppernau and T. A. Miller, "Nucleation and Growth of Diamond on Silicon Using Hot-Filament Chemical Vapor Deposition," presented at the 4th International Conference on Surface Modification Technologies, Paris, France, November 6-9, 1990. Also appeared in the Proceedings of the Conference, pp. 569-582.
- (40) V. V. Subramaniam, D. L. Straub, J. H. D. Rebello and K. A. Meister, "Laser-Excited Chemical Vapor Deposition (LECVD) of Carbon on Silicon," presented at the 4th International Conference on Surface Modification Technologies, Paris, France, November 6-9, 1990. Also appeared in the Proceedings of the Conference, pp. 543-562.

- (41) T. S. Sudarshan and V. V. Subramaniam, "Laser Deposition of Diamond and Hard Carbon Films - Current Status," presented at the 4th International Conference on Surface Modification Technologies, Paris, France, November 6-9, 1990. Also appeared in the Proceedings of the Conference, pp. 593-608.
- (42) A. C. de Gavelle de Roany, J. W. Rich, V. V. Subramaniam, and W. R. Warren, "Kinetic Modeling of Gas Dynamic Flows with Non-Equilibrium Vibrational Excitation," Paper AIAA-90-0252, presented at the AIAA 28th Aerosciences Meeting, Reno, Nevada, January 8-11, 1990.
- (43) K. S. Hoyer, V. V. Subramaniam, and J. L. Lawless, "Limits on Steady Diffuse Mode Operation of the Cathode in an MPD Thruster," Paper AIAA-89-2601, presented at the AIAA/ASME/SAE/ASEE 25th Joint Propulsion Conference, Monterey, California, July 10-12, 1989.
- (44) J. W. Rich, V. V. Subramaniam, and R. L. DeLeon, "Energy Transfer and Reaction in Vibration-Vibration Pumped Carbon Monoxide," presented at the 18th International Conference on Phenomena in Ionized Gases, Swansea, England, July 13-17, 1987.
- (45) V. V. Subramaniam and J. L. Lawless, "Onset in Magnetoplasmadynamic Thrusters with Finite Rate Ionization," Paper AIAA-87-1068, presented at the 19th International Electric Propulsion Conference, Colorado Springs, Colorado, May 1987.
- (46) J. L. Lawless and V. V. Subramaniam, "A Theory of Onset in Magnetoplasmadynamic Thrusters," Paper AIAA-85-2039, presented at the 18th International Electric Propulsion Conference, Alexandria, Virginia, September 1985.
- (47) V. V. Subramaniam and J. L. Lawless, "The Electrical Characteristics of MPD Thrusters," IEEE Paper # 2B-14, presented at the IEEE International Conference on Plasma Science, Pittsburgh, Pennsylvania, June 1985.
- (48) V. V. Subramaniam and Y. S. Lee, "Crack Initiation in a Cylinder Subjected to Circumferential Temperature Variation," ASME Paper # 83-PVP-91, presented at the Pressure Vessel & Piping Conference, Portland, Oregon, June 1983.

Research Grants

Externally Sponsored Grants				
Source	PI or co-PI	Title	Duration	Amount
Proctor & Gamble	Co-PI	Detection, Identification, and Quantification of Microbial Contamination in P&G Product Lines through Multi-Technique Probing informed by Machine Learning	7/31/2019-6/30/2022	\$270,000
CDMRP (Congressionally Directed Medical Research Program), Department of Defense	co-PI	Eddy Current Measurements: A Novel Noninvasive Tool for Detecting Early Lung Cancer	2017-2019	\$154,000
PHPID (Public Health Preparedness in Infectious Diseases) Pilot Award	co-PI	Biofilm Infections in Burn Wounds	2016-2018	\$100,000

Curriculum Vitae**Vish Subramaniam**

L-Pilot Award Phase II, CCTS, National Institute of Health	co-PI	Disposable Wireless Electroceutical Dressings to Treat Chronic Wound Biofilm Infections	2016-2017	\$100,000
L-Pilot Award Phase I, CCTS, National Institute of Health	co-PI	Disposable Wireless Electroceutical Dressings to Treat Chronic Wound Biofilm Infections	2015-2016	\$100,000
IBM Faculty Award	PI	Interaction of low-frequency electromagnetic waves with tissues and cells	2014	\$30,000
Samsung Electronics Co., Ltd.	PI	Electromagnetic Detection and Imaging of Liver Metastases from Colorectal Cancer	2012-2013	\$135,994
State of Ohio 3 rd Frontier Validation Fund, College of Engineering, Technology Licensing & Commercialization	PI	Electromagnetic Probe for Real-Time Identification of Surgical Margins during Removal of Solid Malignancies	2012-2013	\$100,000
Tenneco Automotive Corporation	co-PI	Reductant Generation for NOx Remediation	2005-2007	\$514,778
National Science Foundation	co-PI	Nanoscale Exploratory Research: Coulomb Crystals of Carbon Single-Walled Nanotubes (SWNTs); Manipulation, Separation, and Synthesis	2002-2003	\$95,000
National Science Foundation	co-PI	Microscopic and Macroscopic Perspective in Mechanical Engineering: Technology Enhanced Learning and Integration	2002-2003	\$87,538
Dayton Area Graduate Studies Institute	co-PI	Studies of Non-Thermal Ignition Phenomena for Aerospace Applications	2001-2003	\$200,000
NASA Glenn Research Center	co-PI	Computational Nonequilibrium Plasma Dynamics	2000-2001	\$100,000
Air Force Office of Scientific Research	co-PI	Experimental and Analytical Development of Kinetic Rate Data for Radiating Rocket Plume Species	1999-2000	\$100,000
Siebe Appliance Controls	co-PI	Attenuation of Spark Noise for Direct Spark Ignition Products	1998-1999	\$50,000
Air Force Office of Scientific Research	co-PI	Studies of Anomalous Shock Wave Propagation and Dispersion in Weakly Ionized Plasmas	1998-2001	\$525,000
Ohio Board of Regents Investment Fund	co-PI	Center for Advanced Plasma Engineering (CAPE)	1997	\$710,000
Air Force Office of Scientific Research Multidisciplinary University Research Initiative (MURI)	co-PI	Plasma Ramparts Using Metastable Molecules	1997-2002	\$4,500,000

Curriculum Vitae

Vish Subramaniam

Air Force Office of Scientific Research	co-PI	Mechanisms for Production of Excited States in Non-Equilibrium Rocket Nozzle Flows	1996-1999	\$300,000
Ford Motor Company University Research Program	co-PI	Low-Power Plasma Enhanced Catalytic Removal of NOx, HC, and CO	1996-1999	\$150,000
Ohio Board of Regents Investment Fund	PI	Spectroscopic Instrumentation for Advanced Manufacturing Processes	1995	\$250,000
NASA Marshall Space Flight Center	co-PI	Variable Polarity Plasma Arc torch Performance and Design Analysis	1993-1995	\$192,779
National Science Foundation	PI	Presidential Young Investigator Award	1991-1996	\$312,500
Texas National Research Laboratory Commission/Department of Energy	co-PI	Diamond Radiation Detectors for the Superconducting Super-Collider (SSC)	1991	\$300,000
National Science Foundation	PI	Laser Assisted deposition of Diamond	1991	\$50,000
Air Force Office of Scientific Research	PI	Recovery of Frozen Flow Losses from Arcjets	1991-1995	\$318,433
Air Force Office of Scientific Research	PI	Transport of Resonance Radiation and its Effect on Excited State Populations Near Electrode-Adjacent Sheaths	1990-1991	\$31,201
Air Force Office of Scientific Research	PI	Fundamental Research on Erosion In Magnetoplasmadynamic Thrusters	1987-1990	\$185,275
Internally Sponsored Grants				
Pelotonia Intramural Research Program, Center for Cancer Engineering	Co-I	Development of Alternating Electromagnetic Fields as an Effective and Non-Invasive Anti-Metastasis Therapy	1/1/2022-1/1/2024	\$200,000
The Ohio State University College of Medicine Center for Clinical and Translational Science	PI	A New Method for Detection of Cancer and Accurate Assessment of Surgical Margins	2009-2010	\$29,914
The Ohio State University Honors & Scholars Office	PI	Direct Energy Conversion: Proposal for a new interdisciplinary upper-division honors course	2006-2007	\$15,000
The Ohio State University	co-PI	Seed Grant: <i>Novel Chemical Synthesis by Optical Pumping of Liquids</i>	1994-1995	\$35,000
The Ohio State University Center for Teaching Excellence	co-PI	Instructional Enhancement Grant: <i>Integrated Learning through Cross-Disciplinary Projects</i>	1992-1994	\$9,500

Curriculum Vitae**Vish Subramaniam**

The Ohio State University	co-PI	Electronic Properties of Diamond	1991-1992	\$27,000
The Ohio State University	co-PI	Low Pressure Synthesis of Diamond Thin Films	1990-1991	\$52,500
DuPont Young Faculty Award	PI	Plasma-Assisted and Laser-Excited Deposition of Diamond Films	1989-1990	\$25,000
The Ohio State University	PI	Electrode Surface Temperature Measurements in High Current Density Arcs	1989-1990	\$15,000

Presentations

- (1) "Bioelectric Effects in Tissues and Cells", Invited seminar, Department of Mechanical Engineering, The University of Michigan, Ann Arbor, October 24, 2017.
- (2) "Eddy Current Detection and Imaging of Cancer", Invited presentation at the 2015 Engineering-Health care Summit, November 12, 2015.
- (3) "Electromagnetic Technologies for Healthcare", Invited presentation at Big Ideas for Health Series, College of Medicine, April 11, 2014, won Spring Semester competition and selected as Finalist for Final round on May 30, 2014.
- (4) "Electromagnetics for Healthcare", Presentation to Venture Capital Groups at Nationwide Children's Hospital, One of three speakers selected from OSU, March 20, 2014.
- (5) "Electromagnetics for Healthcare: Portfolio Review and Commercialization", Presentation to Technology Licensing and Commercialization Office, February 11, 2014.
- (6) "Electromagnetics for Healthcare", Presentation to executives from Wong International USA, March 7, 2014.
- (7) "Procellera: A Redox Active Bioelectric Dressing", 7th Annual Translational to Clinical Conference on Regenerative Medicine, The Ohio State University, Columbus, Ohio, March 14, 2014.
- (8) "Electromagnetics for Healthcare", Presentation to Venture Capital Groups at Nationwide Children's Hospital, One of three speakers selected from OSU, March 20, 2014.
- (9) "Electromagnetic Technologies for Healthcare", Invited presentation at Big Ideas for Health Series, College of Medicine, April 11, 2014, won Spring competition and selected for Final round on May 30, 2014.
- (10) "Cellular Responses to Electric Fields", Invited Talk, Center for Regenerative Medicine and Cell-based Therapies Scientific Retreat TED Talks, March 14, 2013.
- (11) "Eddy Current Measurement for Biomedical Applications", Department of Biomedical Engineering, The Ohio State University, February 16, 2012.
- (12) "Eddy Current Measurement: A Novel Tool for Detecting Cancer", Poster Presentation at Workshop on Cancer Detection and Diagnostics Technologies for Global Health, National Institute of Health, Bethesda, Maryland, August 22-23, 2011.

- (13) "An Electromagnetic Method for Cancer Detection", Sarcoma Committee, The Ohio State University College of Medicine, June 14, 2010.
- (14) "An Electromagnetic Method for Cancer Detection", Grand Rounds in Pathology, The Ohio State University College of Medicine, May 25, 2010.
- (15) "Non-equilibrium Plasmas and Combustion", National Energy Technology Laboratory, U.S. Department of Energy, Morgantown, West Virginia, August 5, 2005.
- (16) "Engineering: From Watt to Now", The Ohio State University Honors Day, November 1, 2002.
- (17) "Coulomb Solids in Plasmas", Seminar at Department of Aerospace Engineering and Aviation, The Ohio State University, December 5, 2002.
- (18) "Organization of Particulates in Dusty Plasmas", Seminar at Department of Chemical Engineering, The Ohio State University, April 18, 2002.
- (19) "Coulomb Crystals in Dusty Plasmas", Invited Seminar, Center for Materials Research, The Ohio State University, April 18, 2002.
- (20) "Low-Temperature Synthesis of Diamond", Seminar at Department of Chemical Engineering, University of Louisville, October 24, 1997.
- (21) "Virtual Integrated Prototyping of Diamond and Diamond-like Carbon Films", NSF Site-Visit, Case-Western Reserve University, November 7, 1996.
- (22) "Modeling of Plasma and Reacting Flows", Applied Mathematics and Statistics Seminar, Case-Western Reserve University, October 25, 1996.
- (23) "Current Applications Requiring On-line Sensing and On-line Monitoring", Invited Presentation at Instruments-SA (SPEX/Jobin-Yvon/Dilor), Edison, New Jersey, May 2, 1996.
- (24) "Synthesis of Diamond at Low Temperatures", Seminar at Department of Mechanical Engineering, The University of Michigan, Ann Arbor, Michigan, May 4, 1995.
- (25) "Non-Equilibrium Chemically Reacting and Plasma Flows - from Materials and Manufacturing Processes to Aerospace Applications", USA-Brazil Joint Workshop on Thermal Sciences Research, sponsored by NSF, and COPPE, December 11-17, 1994.
- (26) "Efficient-Computing of Non-Equilibrium Reacting Flows including State-Specific Kinetics", Invited speaker at AFOSR Workshop on Radiation Signature Prediction and Ultra-violet Kinetics, April 26-27, 1994.
- (27) "Chemical Vapor Deposited Diamond Films", Seminar at Instruments-SA (SPEX/Jobin-Yvon), Edison, New Jersey, April 1, 1994.
- (28) "On the Role of Service", invited speaker, Tau Beta Pi Initiation Banquet, April 10, 1993.
- (29) "Recent Developments in CVD Diamond Films for Wear Resistance Applications", Seminar at Westinghouse Science & Technology Center, Pittsburgh, Pennsylvania, March 1993.
- (30) "Diamond Growth from Laser-Irradiated Mixtures", invited presentation at the Workshop on Experimental Methods for Understanding Fundamental Aspects of Diamond CVD, sponsored by the Army Research Office, SRI International, Menlo Park, California, November 10, 1992.

- (31) "Chemical Vapor Deposited Diamond", invited seminar in Physical Chemistry series, Department of Chemistry, The Ohio State University, Columbus, Ohio, May 11, 1992.
- (32) "Onset and Erosion in Magnetoplasmadynamic Thrusters," invited seminar, Center for Materials Research (CMR), The Ohio State University, Columbus, Ohio, May 1990.
- (33) "Onset and Erosion in Magnetoplasmadynamic Thrusters," presented at the Department of Aeronautics and Astronautics, The University of Michigan, Ann Arbor, February 1990.
- (34) "Limits on Steady Diffuse Mode Operation of the Cathode in an MPD Thruster," presented at the AIAA/ASME/SAE/ASEE 25th Joint Propulsion Conference, Monterey, California, July 1989.
- (35) "Current Research Issues in MPD Thruster Research," presented as invited speaker at the workshop on MPD modeling and diagnostics, AFOSR Contractors Meeting, Pasadena, California, June 1988. Also served as the organizer of the workshop, at the invitation of the Air Force Office of Scientific Research (AFOSR).
- (36) "Electrode-Adjacent Boundary Layer Flow in MPD Thrusters," presented at the Aerospace Corporation, El Segundo, California, June 1988.
- (37) "Electrode-Adjacent Boundary Layer Flow in MPD Thrusters," presented at the Department of Mechanical Engineering, The Ohio State University, Columbus, Ohio, February 1988.
- (38) "Electrode-Adjacent Boundary Layer Flow in MPD Thrusters," presented at the School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, Georgia, October 1987.
- (39) "On the Phenomenon of Onset in Magnetoplasmadynamic Thrusters," presented at the School of Aeronautics and Astronautics, Purdue University, West Lafayette, Indiana, May 1986.
- (40) "The Electrical Characteristics of MPD Thrusters," presented at the IEEE International Conference on Plasma Science Pittsburgh, Pennsylvania, June 1985.

Former students and post-doctoral researchers in faculty positions

- (1) Shannon Yee, tenure-track Assistant Professor of Mechanical Engineering at Georgia Institute of Technology (Georgia Tech), USA.
- (2) Jennifer McFerran, tenured Professor, Department of Mechanical Engineering, and Associate Dean for Academics, University of Alaska, Anchorage, USA.
- (3) Allen White, tenured Associate Professor of Mechanical Engineering and Chemistry, Rose-Hulman Institute of Technology, Indiana, USA.
- (4) Lisa M. Abrams, Associate Chair, Department of Engineering Education, The Ohio State University, USA.
- (5) V. Babu, Professor of Mechanical Engineering, Indian Institute of Technology Madras (IIT-Madras), Chennai, India.
- (6) A. P. Malshe, Distinguished Professor of Mechanical Engineering, Twenty-First Century Endowed Chair in Materials, Manufacturing, and Integrated Systems at University of Arkansas, Fayetteville, USA, Elected to the National Academy of Engineering (NAE) in 2018.

Students Advised

Undergraduate Honors Students and Theses

- (1) Daniel Roll, “Continuous Non-invasive Detection of Malaria using a Magnetic Field”, Autumn 2017, served as principal advisor. Presently with SpaceX.
- (2) Josh Javor, “Development of Eddy Current Microscopy for Analysis of Soft Tissue”, recipient of \$5,000 Scholarship from the College of Engineering and the Department’s first ever recipient of a \$12,000 Pelotonia Undergraduate Research Fellowship, Spring 2016, served as principal advisor, currently pursuing his Ph.D. at Boston University.
- (3) Peter Worley, “Direct Conversion of Mechanical Energy to Heat using Eddy Currents”, Undergraduate Research Scholar, recipient of \$3,000 Scholarship from College of Engineering, Spring 2015, served principal advisor, currently pursuing graduate studies at University of California at Berkeley.
- (4) Reid Relatores, “Detecting Electromagnetic Activity in Cerebral Organoids”, Undergraduate Research Scholar, recipient of \$5,000 Scholarship from College of Engineering, Autumn 2015, served as principal advisor.
- (5) Scott Koch, “Design of an Eddy Current Probe for Cancer Detection”, Undergraduate Research Scholar, recipient of \$5,500 Scholarship from College of Engineering, Spring 2014, placed 2nd in Engineering at the 2014 Denman Undergraduate Research Forum, served as principal advisor. Presently with GE Aviation.
- (6) Brad Smith, “A Non-invasive Method for Detecting a Deadly Form of Malaria: *Plasmodium Falciparum*”, Undergraduate Research Scholar, recipient of \$2,500 Scholarship from College of

Engineering, Spring 2014, placed 1st in Engineering at the 2014 Denman Undergraduate Research Forum, served as principal advisor. Presently with Exxon-Mobil.

- (7) Aniruddha Kaushik, "Modeling of Cell Migration Assays including Electrotaxis", Undergraduate Research Scholar, recipient of \$4,500 Scholarship from College of Engineering, Spring 2014, served as principal advisor. Presently pursuing Ph.D. at Johns Hopkins University.
- (8) Shannon Yee, "Design of a Scanning Tunneling Microscope", Undergraduate Research Scholar, recipient of \$8,000 scholarship, Spring 2007, placed 1st in Engineering at the 2007 Denman Undergraduate Research Forum, served as principal advisor; completed Ph.D. (Advisor: Prof. Arun Majumdar) at University of California – Berkeley; currently Assistant Professor, School of Mechanical Engineering, Georgia Institute of Technology.
- (9) David Hawn, "Measurement of the Charge on a Particulate Suspended in a Plasma", Undergraduate Honors Research, 2002-2005, served as principal advisor, released due to insufficient progress and student dropping out of Honors Thesis program.
- (10) Matthew Buoni, Undergraduate Research Associate & Barry Goldwater Scholar, 1999-2001. Research resulted in a journal paper and conference paper.
- (11) Jared Lilly, "The Production of a Volumetric Dusty Plasma at Atmospheric Conditions", Undergraduate Honors Thesis, August 1999, served as principal advisor. Presently with Lockheed Martin Corporation.
- (12) Per Sverdrup, "Measurement and Separation of Trace Oil Concentrations in Waste-Water for Offshore Applications", Undergraduate Honors Thesis, June 1996, served as principal advisor. Completed Ph.D. at Stanford University. Presently with Intel Corporation.
- (13) Sanjay Gupta, "Growth of Boron-Doped Diamond Films", Undergraduate Honors Thesis, June 1995, served as principal advisor.
- (14) Andrew Savage, "Control over Morphological Variations in Flame-Deposited Diamond", Undergraduate Honors Thesis, June 1995, served as principal advisor.
- (15) Jon Lewis, "Large-Area Deposition of Diamond by a Rastered Oxy-Acetylene Flame", Undergraduate Honors Thesis, June 1995, served as principal advisor. Joined NASA Goddard Space Flight Center.
- (16) Chien-Chang Lee, "Development of a Diamond-Coated Manganin Pressure Transducer for Contact Pressure Measurements", Undergraduate Honors Thesis, August 1993, served as principal advisor. Joined Caterpillar Corp., presently with Mathworks.
- (17) Daniel Kirby, "Design of an Arcjet Deposition System", Undergraduate Honors Thesis, June 1993, served as principal advisor. Presently with Ford Motor Company.
- (18) Edward A. Frey, "Combustion Synthesis of Diamond using an Inverse-Diffusion Flame", Undergraduate Honors Thesis, June 1991, served as principal advisor. Joined Robert Shaw Controls.
- (19) Glenn Lefever-Button, "Quasi One-Dimensional Ionizing Flow in MPD Thrusters", Undergraduate Honors Thesis, January 1991, served as principal advisor. Joined Luxel Corp, Friday Harbor, Washington.

Masters Theses

- (1) Jonathan Kadowaki, "Electrochemical Regeneration of NAD(P)H from NAD(P)⁺ using a Novel Ni/Cu₂O Electrode", M.S. Thesis, Spring 2019, served as principal advisor. Currently Data Scientist with Dick's Sporting Goods Headquarters, Pittsburgh.
- (2) Travis Jones, "Analysis and Optimization of Eddy Current Detection in Animal Tissue", M.S. Thesis, Summer 2014, served as principal advisor.
- (3) Dheeraj Chalasani, "Feasibility of a Plasma Contact for Faraday Generators", M.S. Thesis, Summer 2013, served as principal advisor, currently at Applied Materials Inc.
- (4) Michelle Wilson, "Design and Fabrication of an Electromagnetic Probe for Biomedical Applications", M.S. Thesis, Summer 2011, served as principal advisor.
- (5) Emily Sequin, "Imaging of Cancer in Tissues Using an Electromagnetic Probe", M.S. thesis, August 2009, served as principal advisor.
- (6) Shannon Yee, "Nuclear fuel cycle modeling approaches for recycling and transmutation of spent nuclear fuel", Nuclear Engineering, co-advised with Xiaodong Sun, June 2008, completed his Ph.D. with Prof. Arun Majumder at the University of California, Berkeley. Currently tenure-track Assistant Professor of Mechanical Engineering at Georgia Institute of Technology (Georgia Tech).
- (7) Jennifer McFerran, "Behavior of Particulates Suspended in a DC Glow Discharge", M.S. Thesis, Winter 2006, served as principal advisor. Presently Associate Professor and Chair, Department of Mechanical Engineering, University of Alaska, Anchorage.
- (8) Ranjit Annamalai, "Drawing of Continuous Fibers of Single-Walled Carbon Nanotubes", M.S. Thesis, Summer 2005, served as principal advisor.
- (9) Doug Dietz, Undergraduate Research Associate, M.S. and Ph.D. candidate, NDSEG and OSU Fellow, 1999-2002, served as principal advisor, dropped out of program to pursue entrepreneurial activities.
- (10) Kamran Aslam, "Implementation and Performance of Parallel Numerical Libraries on a Cluster Computer for a Compressible Flow Code", M.S. Thesis, Winter 2002, served as principal advisor. Presently with Aerospace Corporation.
- (11) Jared Lilly, "Coulomb Crystals in Striated D.C. Glow Discharges, M.S. Thesis, Spring 2002, served as principal advisor. Presently with Lockheed Martin Corporation.
- (12) Allen White, "Propagation of Finite Amplitude Disturbances in Glow Discharges", M. S. Thesis, Summer 2000, served as principal advisor.
- (13) Alla Belova, "Modeling of Electric Discharge Ignition and Combustion of Gaseous Mixtures", M.S. Thesis, March 2000, served as principal advisor.
- (14) Kenneth Wodzisz, "Removal of NO from Automotive Exhausts Using Barrier Discharges", M. S. Thesis, Summer 1998, served as principal advisor, Joined Ford Motor Company.
- (15) Lisa M. Abrams, "Feasibility of plasma enhanced catalysis by a DC discharge", M. S. Thesis, December 1997, served as co-advisor. Presently Associate Chair, Department of Engineering Education, The Ohio State University.

- (16) Sanjay Gupta, "Feasibility of Plasma-Enhanced Catalysis", recipient of Center for Automotive Research Fellowship, M.S. Thesis, March 1997, served as principal advisor.
- (17) Leo Sharkey, "Laser Polishing of Diamond Films", M.S. Thesis, June 1996, served as principal advisor.
- (18) Chien-Chang Lee, "Development of a Novel Manganin/Diamond Transducer for Measurement of Contact Pressure", M. S. Thesis, March 1995, served as principal advisor. Presently with Mathworks.
- (19) Daniel Kirby, "Deposition of Diamond Films Using DC Plasma Methods", M. S. Thesis, March 1995, served as principal advisor. Presently with Ford Motor Company.
- (20) Jeffrey C. Tufts, "Spectroscopic Diagnostics of Vibrationally Nonequilibrium Molecular Gases", M. S. Thesis, August 1991, served as co-advisor. Joined Ford Motor Company.
- (21) Karen A. Meister, "Nonequilibrium Vibrational Kinetics of Carbon Monoxide at High Translational Mode Temperatures", M. S. Thesis, June 1991, served as co-advisor. Joined Ford Motor Company.
- (22) Edward A. Frey, "Flame Deposition of Diamond on Silicon", M. S. Thesis, March 1992, served as principal advisor. Joined Robert Shaw Controls.
- (23) Glenn Lefever-Button, "A Method for Measurement of Electrode Surface Temperatures in a High Current Density Discharge", M. S. Thesis, June 1992, served as principal advisor. Joined Luxel Corp, Friday Harbor, Washington.
- (24) Douglas L. Straub, "Laser-Excited Chemical Vapor Deposition (LECVD) of Carbon Films", M.S. Thesis, June 1991, served as principal advisor. Presently with the U.S. Department of Energy, Morgantown, West Virginia.
- (25) Alain Chiroux de Gavelle de Roany, "Study of Molecular Gas Laser Systems", M. S. Thesis, November 1989, served as co-advisor.
- (26) Jagdish H. D. Rebello, "Design of a Vacuum System for Chemical Vapor Deposition", M.S. Thesis, November 1990, served as principal advisor.
- (27) Esmael Samimy, "Short Wavelength Operation of an Electric Discharge CO Laser", M.S. Thesis, August 1989, served as co-advisor. Presently with General Motors Corporation.
- (28) Bulent A. Mehmetli, "Electric-Discharge Conduction-Cooled Carbon Monoxide Laser," M. S. Thesis, August 1988, served as co-advisor.
- (29) Kevin S. Hoyer, "Steady Diffuse Mode Operation of the Cathode in an MPD Thruster," M. S. Thesis, May 1989, served as principal advisor. Joined AC Delco.

Ph.D. Dissertations

- (1) Travis Jones, "On the Interactions between Electromagnetic Fields with Human Cells", Ph.D. Dissertation, Spring 2020, served as principal advisor. Presently postdoctoral researcher at The Ohio State University working with Prof. Jonathan Song (MAE) and Dr. Laith Abushaheen, M.D. (Medical Oncology).
- (2) Anriksh Luthra, "Mid-IR Plasmonics, Cavity Coupled Excitations, and IR Spectra of Individual Airborne Particulate Matter", Ph.D. Dissertation, Autumn 2016, served as co-Advisor with Professor James Coe, Chemistry. Presently with Lam Research Corporation.
- (3) Emily (Sequin) Alkandry, "Effects of Induced Electric Fields on Tissues and Cells", Ph.D. Dissertation, Summer 2014, served as principal advisor, Howard Hughes Medical Institute Med Into Grad Scholar. Presently with Saint-Gobain Performance Plastics as Testing Program Engineer.
- (4) Jennifer McFerran-Brock, "An Electromagnetic Method for Cancer Detection", Ph.D. Dissertation, August 2009, served as principal advisor. Presently Professor of Mechanical Engineering and Associate Dean for Academics, University of Alaska, Anchorage.
- (5) Sergio Hernandez- Gonzalez, "Non-catalytic Production of Hydrogen via Reforming of Diesel, Hexadecane and Bio-diesel for Nitrogen Oxides Remediation", Ph.D. Dissertation, December 2008, served as co-advisor. Presently with Cummins Corporation.
- (6) Ranjit Annamalai, Ph.D. candidate, served as principal advisor until Summer 2007; released after candidate failed the Ph.D. Qualifying Examinations.
- (7) Allen White, Ph.D. candidate, served as principal advisor until February 2004; released due to insufficient progress and unprofessional conduct toward other group members.
- (8) Doug Dietz, Undergraduate Research Associate, M.S. and Ph.D. candidate, NDSEG and OSU Fellow, 1999-2002, served as principal advisor, dropped out of program to pursue entrepreneurial activities.
- (9) Shashikant Aithal, "Numerical Simulation of Reacting Atomic and Molecular Plasma Flows", Ph. D. Dissertation, March 1997, served as principal advisor. Presently Staff Computational Scientist, Argonne National Laboratory.
- (10) Gary Koester, "Propagating Gas Combustion Fronts in Inert Porous Media", Ph.D. Dissertation, March 1997, served as principal advisor.
- (11) Jagdish H. D. Rebello, "Selective Deposition of Diamond using Laser Excitation of the Gas Phase", Ph.D. Dissertation, August 1995, served as principal advisor.
- (12) Bulent A. Mehmetli, "Isotope Separation by Multiphoton Dissociation of Polyatomic Molecules", Ph.D. dissertation, August 1993, served as co-advisor. Presently with Kia, Turkey.

Post-Doctoral Researchers, Research Scientists, and Visiting Scholars

- (1) V. Babu, presently Professor of Mechanical Engineering, Indian Institute of Technology Madras, Chennai, India.

- (2) A. P. Malshe, presently Distinguished Professor of Mechanical Engineering and Twenty-First Century Endowed Chair in Materials, Manufacturing and Integrated Systems at University of Arkansas, Fayetteville, USA. **Elected to the National Academy of Engineering (NAE) in 2018.**
- (3) S. M. Aithal, presently Staff Computational Scientist, Argonne National Laboratory, USA.

Courses Taught

(new courses developed in bold)

- ME99, *Undergraduate Advising*, (undergraduate)
- ME250/ME2850, *Numerical Methods and Analysis in Mechanical Engineering*, (undergraduate)
- **ME294, Introduction to Mechanical Engineering**, (undergraduate)
- ME311, *Introduction to Heat Transfer*, (undergraduate)
- ME500, *Introduction to Thermal Sciences*, (undergraduate)
- ME503/ME3503, *Introduction to Fluid Dynamics I*, (undergraduate)
- ME504, *Introduction to Fluid Dynamics II*, (undergraduate)
- ME510/ME4510, *Introduction to Heat Transfer*, (undergraduate)
- **ME512, Thermal Sciences Laboratory**, (undergraduate)
- ME564, *Mechanical Engineering Design I*, (undergraduate)
- ME565.02, *Senior Design Project*, (Goodrich Aircraft Brake Heat Shield) (undergraduate)
- ME565.03, *Senior Design Project*, (Goodrich Aircraft Brake Heat Shield) (undergraduate)
- ME570, *Mechanical Engineering Measurements*, (undergraduate)
- ME581, *Mechanical Engineering Laboratory*, (undergraduate)
- ME601, *Gas Dynamics*, Wi. 1991 and Wi. 1992 (advanced undergraduate).
- **MEH610, ME5510H Direct Energy Conversion**, (advanced undergraduate)
- ME627, *Principles of Turbomachinery*, (advanced undergraduate)
- ME634, *Gas Turbine Power Plants*, (advanced undergraduate)
- ME681H, *Undergraduate Honors Research in Mechanical Engineering*, (undergraduate)
- ME701, *Gas Dynamics*, (graduate)
- ME710/ME6510, *Intermediate Heat Transfer*, (graduate)
- ME803, *Statistical Thermodynamics*, (advanced graduate)
- ME806, *Viscous Fluid Flow*, (advanced graduate)
- ME804, *Physical Gas Dynamics*, formerly *Physics of Fluids* (advanced graduate)
- **ME805/ME894V, Electrical Gas Discharges**, (advanced graduate)
- **CIS794Y, Case Studies in Computational Science and Engineering**, (graduate class in Computer Science team-taught with Prof. P. Sadayappan and Prof. R. Lee)
- **CIS888.11V/EE894R/ME894V, Case Studies in Computational Science and Engineering**, (graduate class in Mechanical Engineering team-taught with Prof. P. Sadayappan and Prof. R. Lee); taught by long-distance to University of Cincinnati students as well as OSU students from The Ohio Supercomputer Center

Professional Activities (National and International)

- Overseas Fellow, Royal Society of Medicine, London, U.K. (since 2017)
- Member, Sigma Xi
- Senior member, American Society of Mechanical Engineers (ASME)

- Senior member, American Institute of Aeronautics & Astronautics (AIAA)
 - Former member, AIAA Technical Committee on Electric Propulsion
 - Reviewer, Clinical Cancer Research
 - Reviewer, ASME Journal of Power & Energy
 - Reviewer, Journal of Applied Physics
 - Reviewer, Physics of Fluids
 - Reviewer, AIAA Journal of Propulsion & Power
 - Reviewer, AIAA Journal
 - Reviewer, AIAA Journal of Thermophysics & Heat Transfer
 - Reviewer, International Journal of Engineering Science
 - Reviewer, Plasma Sources Science & Technology
 - Reviewer, IEEE Transactions on Plasma Science
 - Reviewer, Journal of Fluids Engineering, Transactions of the ASME
 - Reviewer, Powder Technology
 - Reviewer, Research Grants Council, Hong Kong.
 - Reviewer, McGraw-Hill, College Division.
 - Reviewer, John Wiley & Sons, College Division.
 - Reviewer, National Science Foundation.
 - Reviewer, President's Challenge Fund, JPL, California Institute of Technology
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- Session Chairman (Invited), Diamond and Related Coatings, 4th International Conference on Surface Modification Technologies, November 6-9, 1990, Paris, France.
 - Session Chairman (Invited), Diamond and Related Coatings, 5th International Conference on Surface Modification Technologies, September 2-4, 1991, University of Birmingham, United Kingdom.
 - Discussion Leader (Invited), Optical Diagnostics for Diamond Films, Gordon Conference on Diamond Synthesis, June 19-24, 1994, Plymouth, New Hampshire.
 - Member of eight-person U.S. delegation at the U.S./Brazil Joint Workshop on Thermal Sciences Research, Rio de Janeiro, December 10-17, 1994 (Invited).
 - Poster presentation, "Eddy Current Measurement: A Novel Tool for Detecting Cancer", National Institute of Health Workshop on Cancer Detection and Diagnostic Technologies for Global Health, Bethesda, Maryland, August 22-23, 2011 (Invited).

Service

Departmental Committees

1. Chair of Search Committee for Cluster Hire in detection and imaging of cancer; Lead author of successful proposal for hire of four faculty members in Biomedical Engineering, Mechanical & Aerospace Engineering, Electrical & Computer Engineering, and Chemical & Biomolecular Engineering (2012 – 2013). Search concluded successfully in hiring of Prof. Jonathan Song in Mechanical & Aerospace Engineering.
2. Chair, Committee for Review of Undergraduate and Graduate Curriculum (2005 – 2008).
3. Chair, Graduate Studies Committee (2009-2012); in charge of graduate program comprising ~ 150 PhD students and ~150 MS students.
4. Member, Ph.D. Qualifying Examination Committee (Heat Transfer) (1990-1991; 1994-1996; 2001-2016).
5. Member, ABET (Continuous Quality Improvement or CQI) Committee (2005).

6. Chair of Search Committee for Ohio Eminent Scholar Position in Nanotechnology, (2004-2005). Search concluded successfully in hiring of Prof. Joseph Heremans.
7. Member, Undergraduate Studies Committee (1992-1997, 2001-2004).
8. Member, Promotion & Tenure Committee (1999-2002).
9. Chairman, Promotion & Tenure Committee (2001).
10. Member, Capital Campaign Committee (1999-2001).
11. Member, Space Allocations Committee (1993 - 1998).
12. Member, Graduate Studies Committee (1996-1998).
13. Faculty Advisor for American Society of Mechanical Engineers (ASME), OSU chapter, (1994 – 1997).
14. Member, Search Committee for faculty recruiting in Tribology (1994-1995).
15. Chairman, Fluid & Thermal Sciences and Energy Conversion & Energy Systems Interest Groups, Department of Mechanical Engineering, September 1991-August 1992; 2014-present; Responsibilities included organization of annual faculty teaching loads & schedules, and other administrative issues related to new course offerings, curriculum revision/change, and faculty grievances.

College or University Committees

1. Member, Institute for Materials Research (IMR) Vision Committee (2005).
2. Member, College Committee on Academic Affairs (2002 – 2004).
3. Member, College of Engineering Research Committee (serves in an advisory capacity to the Dean and the Associate Dean for Research on research-related issues) (5/1/2001-4/30/2004).
4. Member, Executive Committee (at the invitation of Vice-President for Research), Center for Materials Research (1997-2004).
5. Member, College Committee on Academic Affairs (1992-1993, 2002-2003).
6. Member, Presidential Fellowship Committee, The Graduate School (1999-2001)
7. Member, College of Engineering Strategic Target Area Task Force on Energy and Environmental Quality; wrote Academic Enrichment proposal entitled “Institute for Computational Turbulent Reacting (CTR) Flows and Plasma Flows, ranked #2 out of 9 proposals, and submitted to University (1999-2000).
8. Member, College of Engineering Strategic Target Area Task Force on Information Engineering (1999-2000).
9. Member, Faculty Search Committee, Ohio Spectroscopy Institute (1997-1998).

10. Member, Faculty Advisory Committee (at the invitation of Vice-President for Research), Center for Materials Research (1997-1999).
11. Member of Visiting Scholars Committee of Spectroscopy Institute (1997-1999).
12. Member, PEGS Program Review Committee, The Graduate School (1999).
13. Departmental Representative for College of Engineering "Career Day for Future Engineers and Architects", Saturday, November 12, 1994; Saturday, April 17, 1999.
14. Member, Seed Grants Review Committee (1995-1996, 1997-1998).
15. Member, College of Engineering Awards Committee (1995-1996, 1997-1998).
16. Member, Ad-Hoc Committee for Review of Academic Enrichment Proposals, College of Engineering (1997).
17. Center for Materials Research Representative for CMR Scholar II Search Committee (1996).
18. Chemistry Liaison Subcommittee (1992).
19. Materials Coordinating Committee (1992).