SCOTT S. VERBRIDGE, PhD

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Summary and Vision

I am a biomedical innovator with over 20 years of experience applying physics and engineering principles to transform how diseases are understood and treated. My research spans cancer engineering, bioelectronic immunotherapy, engineered microbiome–tissue interfaces, nanotechnology, adaptive biomaterials, and regenerative medicine, unified by a focus on engineering tissue environments to control biological outcomes. As a former tenured professor and current NIH program director, I lead national efforts in interdisciplinary research, translation, and faculty development. I am building innovation ecosystems that implement Ecological Bioengineering to pioneer new therapeutic frontiers, accelerate translation, and embed this paradigm in training pipelines in partnership with academia, industry, and regulatory agencies.

Key Achievements

• Direct an $80M NIH portfolio, advancing regenerative medicine toward regulatory approval and clinical adoption.

• Led an internationally recognized cancer engineering program at Virginia Tech – Wake Forest that developed patented and licensed therapeutic technologies, contributing to over $16M in collaborative research funding.

• Authored more than 100 peer-reviewed publications with over 14,000 citations (Google Scholar), shaping the emerging field of cancer engineering.

• Advanced regenerative medicine technologies toward FDA approvals and led NIH–industry partnerships and multi-institutional consortia to drive translation.

Professional Experience

Program Director, NIH – Tissue Engineering & Regenerative Medicine (2023-Present)

Leading NIDCR's tissue engineering and regenerative medicine portfolio, integrating research, regulatory strategy, and commercialization to accelerate clinical translation through partnerships with industry, academia, and federal agencies.

Associate Professor, Virginia Tech – Wake Forest University (2018-2023)

Expanded a nationally recognized research program, directing interdisciplinary teams to advance cancer engineering technologies toward therapeutic development and translation.

Affiliate Faculty, Virginia Tech School of Neuroscience (2016-2023)

Developed interdisciplinary collaborations in brain cancer and traumatic brain injury research.

Affiliate Faculty, Wake Forest Comprehensive Cancer Center (2013-2023)

Built interdisciplinary partnerships with Wake Forest researchers to develop oncology solutions at the interface of cancer biology, regenerative medicine, and bioelectric therapies.

Assistant Professor, Virginia Tech – Wake Forest University (2012-2018)

Established the Laboratory of Integrative Tumor Ecology (LITE), and launched pioneering research in cancer engineering and microenvironment-driven therapeutic strategies.

Education

Postdoctoral Research, NIH-Physical Sciences in Oncology Center (PSOC), Cornell University (2008-2011)

PhD, Physics, Cornell University (2008)

MS, Physics, Cornell University (2007)

BS, Physics; BS, Applied Mathematics, University of Rochester (2002, Summa Cum Laude, Phi Beta Kappa)

National Institutes of Health

Summary

As Program Officer and Director of the Tissue Engineering and Regenerative Medicine (TERM) Research Portfolio at the National Institute of Dental and Craniofacial Research (NIDCR), NIH, oversee translational research supporting the reconstruction, repair, and regeneration of dental, oral, and craniofacial tissues. Engage with stakeholders across the NIH, in other agencies including FDA, NSF, Veterans Affairs, ARPA-H, and NIST, as well in academia and the biomedical industry.

Leadership and Innovation in Translational Research

Program Director, Tissue Engineering and Regenerative Medicine (TERM) Portfolio

- Oversee a portfolio of approximately 100 projects, managing an annual budget of ~$80M for basic and translational research in tissue engineering and regenerative medicine.
- Provide comprehensive support to external investigators throughout the grant lifecycle, ensuring compliance and effective federal program management.
- Manage diverse funding mechanisms, including basic science R-awards, SBIR/STTR translational projects, and cooperative agreements fostering small business product development.
- Serve as the primary point of contact for multiple Notice of Funding Opportunities (NOFOs), including the NIDCR R03 New Investigator mechanism and the Lymphatic System in Health and Disease R01.
- Experienced in drafting, revising, and leading the development of trans-institute NOFOs.
- Recognized for exceptional performance with an "Achieved More than Expected Results" rating across all categories in most recent Performance Management Appraisal Program (PMAP).

Project Scientist, Dental, Oral, and Craniofacial Tissue Regeneration Consortium (DOCTRC)

- Lead NIH partnership with two national Resource Centers (~$30M in NIH investment) providing research design, regulatory guidance, and commercialization support to accelerate regenerative medicine innovations by faculty and clinicians.
- Directly contributed to multiple projects achieving FDA approvals, including commercialized products, a 510(k) approval, and an IND approval.
- Demonstrated >2:1 return on investment (ROI) based on non-federal funds secured by investigators following NIH investment.

Strategic Leadership and Cross-Agency Collaboration

- Steering Committee Member, Armed Forces Institute of Regenerative Medicine (AFIRM III).
- NIDCR Representative on multiple NIH-wide technical and policy groups.
- Active member of the Multi-Agency Tissue Engineering Sciences (MATES) Group, collaborating with NIH, NSF, FDA, ARPA-H, Veterans Affairs, and NIST.
- Serve as Subject Matter Expert (SME) for the NIH Regenerative Medicine Innovation Project (RMIP), advancing clinical research in regenerative medicine under the 21st Century Cures Act.
- NIDCR Liaison for the Trans-NIH Lymphatics Coordinating Committee (TNLCC).

Public Engagement and Thought Leadership

- Moderator**,** "NIDCR75: Accelerating Product Innovation – From Research to Commercialization" session at the American Association of Dental, Oral, and Craniofacial Research (AADOCR) annual meeting, New Orleans, 2024.
- Speaker, Mid-Atlantic Advanced Bioengineering Symposium (Charlottesville, July 2024), presenting on NIDCR funding mechanisms and engaging with current and prospective awardees.
- Responded to congressional data calls on federally funded stem cell research and priorities.

Virginia Tech – Wake Forest University

Summary

Served as Assistant and then Associate Professor with tenure (2012–2023) in the Virginia Tech – Wake Forest School of Biomedical Engineering and Sciences (SBES) and the Department of Biomedical Engineering and Mechanics (BEAM). Directed a federal, state, and industry-funded cancer engineering lab supporting undergraduate, graduate, and postdoctoral training and innovation in oncology, nanotechnology, and tissue engineering.

Research and Funding

(At VT-WF - ***total external funding***: >$16 million (~$4 million my share); ***>30 grants funded***).

Integrative Vision and Framework

After completing my Ph.D. in physics with a focus on nanobiotechnology (advised by Drs. Harold Craighead and Jeevak Parpia), I launched my biomedical research career within the NIH *Physical Sciences in Oncology Center (PSOC)*. There I worked with my postdoctoral advisors Drs. Claudia Fischbach (BME) and Abraham Stroock (Chem E.), to expand *Cancer Engineering* as a discipline that integrates physics, mathematics, and tissue biology to decode and ultimately redirect disease evolution. From that beginning I established my own Laboratory of Integrative Tumor Ecology (LITE) which embraced a unifying vision: **to engineer the adaptive landscapes that shape cancer**, laying the groundwork for what has become my broader paradigm of *Ecological Bioengineering.* At Virginia Tech and Wake Forest, this vision translated into a series of ambitious, well-funded research themes that combined quantitative modeling, microengineered tissues, and translational collaboration to bridge discovery and therapy.

Engineering the Tumor Ecosystem

My lab pioneered 3D microtissue and microfluidic systems that recreate the *vascularized tumor microenvironment* under precisely controlled chemical, mechanical, and electrical gradients. These platforms enabled the first high-resolution, quantitative, multi-omic mapping of tumor adaptation to stress and therapeutic perturbation, forming foundational steps toward engineering tumors into evolutionary "dead ends." Supported by an **NSF CAREER Award** and multiple **NIH R01 grants**, this work established new standards for *physics-driven cancer modeling* and generated a platform technology now adopted by multiple collaborators.

Directing Tumor Evolution through Bioelectronic Control

Recognizing the physical hallmarks of malignancy as tractable engineering targets, my team advanced *pulsed electric field (PEF)*–based tumor ablation and immunomodulation. We advanced next-generation irreversible electroporation (IRE) modalities, now licensed and in clinical translation, for solid tumors such as glioblastoma, pancreatic, and prostate cancer. This body of work, supported by **NIH R21, R01, and P01 funding**, revealed that electric fields can do more than ablate; they can *reprogram immune and stromal function*, inaugurating a new direction I now term **bioelectronic immunotherapy**.

Uncovering Microbial Accelerants of Cancer Evolution

Expanding into host–microbe–immune interactions, my lab leveraged engineered tissue and microfluidic models to reveal how *oral microbes infiltrate and reprogram tumor cell behavior*. These discoveries, supported by **NIH R21** and **Wake Forest Cancer Center** funding, were among the first to demonstrate that *intracellular bacteria* can act as active accelerants of tumor evolution and metastasis, directly linking the **microbiome–immune–tissue axis** to malignancy. This insight now underpins my current efforts to engineer microbial ecosystems that stabilize cancer and regenerative outcomes rather than drive pathology.

Trajectory and Translation

Across these efforts, my research group established a robust translational pipeline: from microengineered platforms and mechanistic insight to *licensed patents, industrial partnerships, and clinical progress*. Collectively, these programs have secured over **$16 million** in competitive funding for my lab and collaborators on these projects (funding details below), produced **multiple licensed technologies**, and shaped an interdisciplinary training ecosystem spanning **over 60 PhD researchers**. This integrated portfolio represents not only a record of scientific achievement but the early realization of a larger framework now guiding my future work: **Ecological Bioengineering, engineering the adaptive rules of life to favor health over disease**.

External Grant Highlights

1. Combining modeling and experiments to study the evolution of cells with altered ploidy, National Institutes of Health, NIGMS (R01), 2021-2025; MPI: Scott Verbridge, Daniela Cimini, Eva Schmelz, share: $338,362. (Total amount: $1,353,448).
2. Deciphering Mechanisms of Mechanotransduction in Astrocyte Reactivity, National Science Foundation, 2022-2025; PI: Pamela VandeVord, Co-PI: Scott Verbridge, share: $219,206. (Total amount: $438,411)
3. CAREER: Multi-Gradient Microtissue Arrays to Analyze Patient-Derived Cancer Cell Modulation by Combinatorial Electrical and Chemical Stimulation, National Science Foundation, 2017-2023; PI: Scott Verbridge, share: $504,160. (Total amount: $504,160).
4. High-frequency Irreversible Electroporation (H-FIRE) Combinatorial GBM Treatment, National Institutes of Health, NCI (R01), 2017-2023; MPI: Scott Verbridge, Rafael Davalos, Co-I: John Rossmeisl, John Robertson, share: $440,321. (Total amount: $1,761,285).
5. Maximizing Local Access to Therapeutic Deliveries in Glioblastoma, National Institutes of Health, NCI (P01, lead institute: Wake Forest), 2017-2023, Lead PI: Waldemar Debinski (Wake Forest), VT Project PI: Rafael Davalos, Co-I: Scott Verbridge, share: $622,500. (Total amount: $9,200,000).
6. A Tissue Engineering Approach to Analyzing Host-Microbe Interactions in Colorectal Cancer, National Institutes of Health, NCI (R21), 2019-2022, MPI: Scott Verbridge, Daniel Slade, share: $125,519. (Total amount: $358,627).
7. Targeted electric field therapy for malignant infiltrative glioma, National Institutes of Health, NCI (R21), 2015-2018; MPI: Scott Verbridge, Rafael Davalos, share: $258,720. (Total amount: $386,149).
8. 3D micro-addressable tissue models to understand spatiotemporal heterogeneity in transcriptional regulation, National Institutes of Health (R21), 2014-2017; PI: Scott Verbridge, Co-I: Chang Lu, share: $284,536. (Total amount: $406,480).
9. INSPIRE to Fight Brain Cancer, Virginia Biosciences Health Research Corporation, 2016-2017; PI: Rafael Davalos, Co-PIs: Scott Verbridge, John Rossmeisl, share: $125,400. (Total amount: $380,000).
10. Defining the Electrical Properties and Biological Impact of Tumor Ablation Modalities for Use in the Prostate to Maximize Therapeutic Impact, Angiodynamics Task Order, 2019-2021, PI: Irving Allen, Co-PIs: Scott Verbridge, Rafael Davalos, share: $55,360. (Total amount: $425,844).

Notable Awards

- 2022, Distinguished Leader in Research (DLR) Award, Virginia Tech
- 2020, Liviu Librescu Faculty Prize Awardee at Virginia Tech
- 2020, Received the Virginia Tech Engineering Dean's Award for Research
- 2019, Inducted into the Hilton High School ***Alumni Hall of Fame***, Hilton, NY
- 2018, Named a Virginia Tech Engineering Dean's Awards *Faculty Fellow*
- 2017, ***NSF CAREER Award winner,*** from the BME program in CBET
- 2015, Received the Virginia Tech Engineering Dean's Award for Outstanding New Assistant Professor

Publications and Research Impact

Google Scholar h-index: 42, >14,000 total citations; *research has been published in high impact journals including Science, Science Signaling, Nature Protocols, Mbio, Biomaterials, Nano Letters, Physical Review Letters*, etc.; *research accomplishments have been highlighted in numerous major media outlets including the BBC, Newsweek, Scientific American, NBC News, and US News and World Report.*

Peer-reviewed journal papers (Excludes papers prior to 2010 for space, *refer to Google Scholar for a comprehensive list*)

1. Esparza, S.; Jacobs, E.; Hammel, J.H.; Michelhaugh, S.K.; Alinezhadbalalami, N.; Nagai-Singer, M.; Imran, K.M.; Davalos, R.V.; Allen, I.C.; Verbridge, S.S.; Munson, J.M., Transient Lymphatic Remodeling Follows Sub-Ablative High-Frequency Irreversible Electroporation Therapy in a 4T1 Murine Model, *Annals of Biomedical Engineering 2025*.
2. Udayasuryan, B.; Zhou, Z.; Ahmad, R.N.; Sobol, P.; Deng, C.; Nguyen, T.D.; Kodikalla, S.; Morrison, R.; Goswami, I.; Slade, D.J.; Verbridge, S.S.; Lu, C., Fusobacterium nucleatum infection modulates the transcriptome and epigenome of HCT116 colorectal cancer cells in an oxygen-dependent manner, *Communications Biology 2024*, 7, (1), p. 551.

3. Khan, Z.M.; Zhang, J.; Gannon, J.; Johnson, B.N.; Verbridge, S.S.; Vlaisavljevich, T.E., Development of an Injectable Hydrogel for Histotripsy Ablation Toward Future Glioblastoma Therapy Applications, *Annals of Biomedical Engineering 2024*, 52, 12, pp. 3157-3171.
4. Duncan, J.L.; Ahmad, R.N.; Danesi, H.; Slade, D.J.; Davalos, R.V.; Verbridge, S.S., Electro-antibacterial therapy (EAT) to enhance intracellular bacteria clearance in pancreatic cancer cells, *Bioelectrochemistry 2024*, 157, 108669.
5. Campelo, S.N.; Lorenzo, M.F.; Partridge, B.; Alinezhadbalalami, N.; Kani, Y.; Garcia, J.; Saunier, S.; Thomas, S.C.; Hinckley, J.; Verbridge, S.S.; Davalos, R.V.; Rossmeisl Jr, J.H., High-frequency irreversible electroporation improves survival and immune cell infiltration in rodents with malignant gliomas, *Frontiers in Oncology 2023*, 13, 1171278.
6. Khan, Z.M.; Munson, J.M.; Long, T.E.; Vlaisavljevich, E.; Verbridge, S.S., Development of a Synthetic, Injectable Hydrogel to Capture Residual Glioblastoma and Glioblastoma Stem-Like Cells with CXCL12-Mediated Chemotaxis, *Advanced Healthcare Materials 2023*, 12, 14, 2300671.
7. Udayasuryan, B.; Ahmad, R.; Nguyen, T.D.; Umana, A.; Roberts, L.M.; Sobol, P.; Jones, S.D.; Munson, J.; Slade, D.J.; Verbridge, S.S., Fusobacterium nucleatum induces pancreatic cancer cell proliferation and migration by regulating autocrine and paracrine signaling, *Science Signaling* 2022, 15, (756) (*selected as cover article*).
8. Khan, Z.M.; Wilts, E.; Vlaisavljevich, E.; Long, T.E.; Verbridge, S.S., Characterization and structure-property relationships of an injectable thiol-Michael addition hydrogel toward compatibility with glioblastoma therapy, *Acta Biomaterialia* 2022, 144, pp. 266-278.
9. Queen, J.; Domingue, J.C.; White. J.R.; Stevens, C.; Udayasuryan, B.; Nguyen, T.D.; Wu, S.; Ding, H.; Fan, H.; McMann, M.; Corona, A.; Larman, T.C.; Verbridge, S.S.; Housseau, F.; Slade, D.J.; Drewes, J.L.; Sears, C.L., Comparative Analysis of Colon Cancer-Derived Fusobacterium nucleatum Subspecies: Inflammation and Colon Tumorigenesis in Murine Models, *Mbio* 2022, 13, (1), e02991-21.
10. Huntington, A.J.; Udayasuryan, B.; Du, P.; Verbridge, S.S.; Abramowitch, S.D.; De Vita, R., Smooth Muscle Organization and Nerves in the Rat Vagina: A First Look using Tissue Clearing and Immunolabeling, *Annals of Biomedical Engineering* 2022, 50, (4), 440-451.
11. Khan, Z.M.; Wilts, E.; Vlaisavljevich, E.; Long, T.E.; Verbridge, S.S., Electroresponsive Hydrogels for Therapeutic Applications in the Brain, *Macromolecular bioscience* 2022, 22, (2), 2100355.
12. Goswami, I.; Bielitz, R.; Verbridge, S.S.; von Spakovsky, M.R., A thermodynamic scaling law for electrically perturbed lipid membranes: Validation with steepest entropy ascent framework, *Bioelectrochemistry* 2021, 140, 107800.
13. Alinezhadbalalami, N.; Graybill, P.M.; Khan, M.I.; Verbridge, S.S.; Allen, I.C.; Davalos, R.V., Generation of Tumor-Activated T cells using Electroporation, *Bioelectrochemistry* 2021, 142, 107886.
14. Arena, S.L.; Lee, Y.W.; Verbridge, S.S.; Muelenaer, A.; VandeVord, P.J.; Arena, C.B., Web Conferencing Facilitation Within Problem-Based Learning Biomedical Engineering Courses, *Biomedical Engineering Education* 2021, 1, (1), 127-131.
15. Massaro, E.K.; Goswami, I.; Verbridge, S.S.; von Spakovsky, M.R., Electro-chemo-mechanical model to investigate multi-pulse electric field-driven integrin clustering, *Bioelectrochemistry* 2021, 137, 107638.
16. Udayasuryan, B.; Nguyen, T.D.; Slade, D.J.; Verbridge, S.S., Harnessing Tissue Engineering Tools to Interrogate Host-Microbiota Crosstalk in Cancer, *iScience* (Cell Press Open Access Journal) 2020.
17. Casasanta, M.A.*; Yoo, C.C.*; Udayasuryan, B.* (co-first); Sanders, B.E.; Umana, A.; Zhang, Y.; Peng, H.; Duncan, A.J.; Wang, Y.; Li, L.; Verbridge, S.S.; Slade, D.J., Fusobacterium nucleatum host cell binding and invasion induces IL-8 and CXCL1 secretion that drives colorectal cancer cell migration, *Cover article at Science Signaling* 2020, 13, (641), eaba9157.
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19. Lorenzo, M.F.; Thomas, S.C.; Kani, Y.; Hinckley, J.; Lee, M.; Adler, J.; Verbridge, S.S.; Hsu, F.C.; Robertson, J.L; Davalos, R.V.; Rossmeisl, J.H., Temporal characterization of blood-brain-barrier disruption with high-frequency electroporation, *Cancers* 2019, 11, (12), 1850.
20. Ringel-Scaia, V.M.; Beitel-White, N.; Lorenzo, M.F.; Brock, R.M.; Huie, K.E.; Coutermarsh-Ott, S.; Eden, K.; McDaniel, D.K.; Verbridge, S.S.; Rossmeisl, J.H.; Oestreich, K.J.; Davalos, R.V.; Allen, I.C., High-frequency irreversible electroporation is an effective tumor ablation strategy that induces immunologic cell death and promotes systemic anti-tumor immunity, *EMBioMedicine* 2019, 44, 112-125.

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23. Alinezhadbalalami, N.; Douglas, T.A.; Balani, N.; Verbridge, S.S.; Davalos, R.V., The feasibility of using dielectrophoresis for isolation of glioblastoma subpopulations with increased stemness (*selected for cover*), *Electrophoresis* 2019, (40), 18-19, 2592-2600.
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27. Latouche, E.L.; Arena, C.B.; Ivey, J.W.; Garcia, P.A.; Pancotto, T.E.; Pavlisko, N.; Verbridge, S.S.; Davalos, R.V.; Rossmeisl, J.H., High-frequency irreversible electroporation for intracranial meningioma: A feasibility study in a spontaneous canine tumor model, *Technology in Cancer Research and Treatment* 2018, 17.
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Papers in refereed conference proceedings

1. Alinezhadbalalami, N.; Douglas, T.; Balani, N.; Verbridge, S.S.; Davalos, R.V., Isolating Glioblastoma Stem Cells Based on their Dielectric Properties, *Journal of Cancer* 2018, 6, e1003.
2. Thayer, P.; Plessl, D.; Tong, E.; Verbridge, S.S.; Dahlgren, L.; Guelcher, S.; Goldstein, A., Influence of Sparse Electrospun Fibers on the Differentiation of Mesenchymal Stem Cells in Collagen Gels, *Tissue Engineering Part A* 2014, 20, (S18).
3. DelNero, P.; Verbridge, S.S.; Lane, M.; Rabbany, P.; Kwee, B.*; Zheng, Y.; Stroock, A.D.; Fischbach, C., 3D Context Regulates Hypoxic Response and Angiogenesis in Engineered Models of the Tumor Microenvironment, *Tissue Engineering Part A* 2014, 20, (S94).
4. Hosseini, Y.; Verbridge, S.S.; Agah, M., Geometrical cues mediate the invasion of endothelial cells in collagen I hydrogel, *18th International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS)* 2014, The Royal Society of Chemistry.
5. Choi, N.; Verbridge, S.S.; Williams, R.M.; Park, K.; Zipfel, W.R.; Fischbach, C.; Stroock, A.D., Oxygen-Sensing Microfluidic Scaffolds. *International ASME Conference on Nanochannels, Microchannels and Minichannels* 2009, ICNMM2009-82292.
6. Stroock, A.D.; Choi, N.; Wheeler, T.D.; Cross, V.; Verbridge, S.S.; Fischbach, C.; Bonassar, L.J., Microvascular Structure and Function in Vitro. *International ASME Conference on Nanochannels, Microchannels and Minichannels* 2009.

7. Verbridge, S. S.; Shapiro, D. F.; Bunch, J. S.; Van der Zande, A. M.; McEuen, P. L.; Parpia, J. M.; Craighead, H. G., An All-Optical Actuation and Detection Scheme for Studying Dissipation and Materials Properties of NEMS Resonators. *Invited talk at IEEE LEOS Meeting*, Lake Buena Vista, FL, 2007.
8. Liu, H.; Kameoka, J.; Verbridge, S.S.; Craighead, H.G., Polymeric Nanowire Architectures and Nanodevices, *NSTI-Nanotech* 2005, 3.

Book Chapters/Edited Volumes

1. Udayasuryan, B.; Slade, D.J.; Verbridge, S.S., Microfluidics in Microbiome and Cancer Research, in *Nanotechnology and Microfluidics* 2020, Wiley, 281-317.
2. Balhouse, B.; Ivey, J.; Khan, Z.; Verbridge, S.S., Engineered microenvironments for cancer study, in *Three-Dimensional Microfabrication Using Two-Photon Polymerization* (Updated Second Edition) 2020, Elsevier Publishing, 625-670.
3. Balhouse, B.; Ivey, J.; Verbridge, S.S., Engineered microenvironments for cancer study, in *Three-Dimensional Microfabrication Using Two-Photon Polymerization* (First Edition) 2016, Elsevier Publishing, 417-445.
4. Verbridge, S.S., Lu, C. (volume co-editors), *Microfluidic Methods for Molecular Biology* 2016, Springer International Publishing.

Selected Invited Presentations

1. Tissue Engineering to Analyze Host-Microbiome Crosstalk in Cancer, *BME department seminar at Pennsylvania State University*, April, 2021
2. Glioma Treatment using Combinatorial High-Frequency Irreversible Electroporation (H-FIRE), *3rd World Congress on Electroporation*, September, 2019, Toulouse, France
3. Towards targeting the physical hallmarks of cancer: New directions for effective and targeted tumor ablation, *BME department seminar at Rochester Institute of Technology*, February, 2019, Rochester, NY
4. Micro-Engineered Tumor Niches to Optimize Cancer-Targeted Ablation, *Society for Interventional Radiology (SIR) Annual Meeting*, March, 2018, Los Angeles, CA
5. Targeting the physical hallmarks of cancer: New directions for precision tumor ablation, *Seminar presented at the French National Center for Scientific Research (CNRS) at the University of Toulouse*, September, 2018, Toulouse, France
6. Towards targeting the physical hallmarks of cancer: New directions for electric field-based tumor ablation, *Radiology group seminar at the Moffitt Cancer Center*, October, 2018, Tampa, FL
7. Micro-Engineered Tumor Niches to Optimize Combinatorial Ablation Therapies, *Virginia NanoSymposium on Engineered Health*, April, 2018, Roanoke, VA
8. Micro-Engineered Tumor Niches to Optimize Combinatorial Ablation Therapies, *IEEE-NEMS Annual Meeting*, April, 2017, Los Angeles, CA
9. Targeting the physical hallmarks of cancer: new strategies in tumor engineering, and targeted tumor ablation, *BME Department Seminar at Rutgers University*, September, 2017, New Brunswick, NJ
10. Toward targeting the physical hallmarks of tumors with pulsed electric field ablation therapy, *Macromolecules Innovation Institute (MII) annual meeting*, October, 2016, Blacksubrg, VA
11. Tumor Engineering, *Presented as part of the Additive Manufacturing Tutorial Session of the 2016 Manufacturing Science and Engineering Conference (MSEC)*, June, 2016, Blacksburg, VA
12. Toward targeting the physical hallmarks of tumors with pulsed electric field ablation therapy, *BMES Annual meeting*, October, 2016, Minneapolis, MN
13. Targeted Electric Field Therapy for Malignant Glioma, *Wake Forest Brain Tumor Center of Excellence meeting presentation*, June, 2015, Winston-Salem, NC
14. Targeted Electric Field Therapy Development in 3D Models of the Heterogeneous Glioma Microenvironment, *Functional Analysis and Screening Technologies Congress*, November, 2014, Boston, MA
15. 3-D Microfluidic Angiogenesis Models to Analyze the Physicochemical Regulators of Brain Tumor Therapy Response, *Physiologically-Relevant Cellular Models for Drug Discovery meeting*, February, 2014, La Jolla, CA
16. Microengineering for cancer studies, *Wake Forest Brain Tumor Center of Excellence meeting*, June, 2013, Winston-Salem, NC
17. Microengineered in-vitro blood vessels to study paracrine and autocrine triggers of the tumor angiogenic switch, *Biomedical Engineering Society Annual Meeting*, 2012, Atlanta, GA.
18. Microengineered tissue models of the pro-angiogenic tumor microenvironment, *Wake Forest University Graduate School Seminars*, July, 2012, Winston-Salem, NC
19. Tissue engineered cancer models: Microengineered 3-D cultures to study the pro-angiogenic tumor microenviroment, *Virginia Tech-Wake Forest SBES Distinguished lecturer series,* 2011, Blacksburg, VA

20. Tissue engineered cancer models: Microengineered 3-D cultures to study the pro-angiogenic tumor microenvironment, *SUNY Buffalo Department of Biomedical Engineering Seminar,* 2011, Buffalo, NY

Commercialization Activities

My pioneering research on harnessing pulsed electric fields and physical immunomodulation to modulate the tumor microenvironment has led to multiple patented innovations, now licensed by industry leaders at the forefront of tumor ablation therapy.

Patents

1. Long, T.E.; Verbridge, S.S.; Vlaisavljevich, E.; Khan, Z., Injectible Hydrogels and Methods of Capturing Cells Using the Same, 2020, US Provisional Application 63/068,961.
2. Ivey, J.; Latouche, E.L.; Verbridge, S.S.; Davalos, R.V.; Lesser, G.J.; Debinski, W., Induced cell morphology electroporation, 2020, US20200046967A1.
3. Slade, D.J.; Davalos, R.V.; Verbridge, S.S., Electro-Antibacterial-Therapy (EAT) to Target the Intracellular Bacteria that Drive Cancer, 2019, US Provisional Application 62/943,911.
4. Sano, M.B.; Arena, C.B.; Verbridge, S.S.; Davalos, R.V., High-frequency electroporation for cancer therapy, 2019, US20190328445A1.
5. Sano, M.B.; Arena, C.B.; Verbridge, S.S.; Davalos, R.V., Selective modulation of intracellular effects of cells using pulsed electric fields 2019, US20190351224A1.

Courses Taught

Virginia Tech/Wake Forest (***With overall above-department-average student evaluations of my teaching effectiveness***)

- BMES 2104 Introduction to Biomedical Engineering
- BMES 3984 Fields and Forces in Bioengineering
- BMES 5054 Quantitative Cell Physiology
- BMES 5614 Multiscale Cancer Engineering
- BMES 5984 Cell Engineering
- Presented guest lectures in several additional classes in Biomedical Engineering; Translational Biology, Medicine, and Health; Computational Tissue Engineering IGEP; and Biochemistry

Advising and Mentorship

Summary

- 7 Ph.D. graduated: Jill Ivey (2017), Megan Cox (2018), Ishan Goswami (2018), Barath Udayasuryan (2022), Nastaran Alinezhadbalalami (2022), Zerin Khan (2022), Savieay Esparza (2024)
- 3 M.S. graduated: Brittany Balhouse (2017), Robert Bielitz (2018), Sean Thomas (2020)
- 4 postdocs advised
- Served on dissertation committees as either primary advisor or committee member for over 60 completed Ph.D. projects at Virginia Tech or Wake Forest
- Over 25 undergraduate lab research projects advised

Student Recognitions

- 2022, PhD advisee Barath Udayasuryan was named the Virginia Tech College of Engineering Outstanding Doctoral Student
- 2022, PhD advisee Barath Udayasuryan won 1st place in the Torgerson graduate research poster awards
- 2020, Ph.D. advisee Barath Udayasuryan won a research talk award at the VTCDD Annual meeting
- 2020, Ph.D. advisee Zerin Khan won a highly competitive NSERC Graduate Fellowship
- 2019, Ph.D. advisee Zerin Khan won a poster award at the VTCDD Annual Meeting
- 2018, Ph.D. advisee Ishan Goswami won the 3rd place poster award at BioEM in Slovenia
- 2017, Ph.D. advisee Jill Ivey won 2nd place in the Torgerson graduate research poster awards
- 2017, Undergrad advisee Andrea Kuliasha won the Honors College Patricia C. Perna Award

Community Outreach Contributions

- Served as faculty mentor to the BMES graduate student chapter at Virginia Tech for 7+ years, which carries out significant outreach to local community groups
- Developed and presented a middle school outreach activity for CEED on the physics of cancer
- Designed and led a project for middle school students from rural communities in southwest Virginia in the VT IMAGINATION program
- Act as a judge and award presenter at the annual Blue Ridge Regional Science Fair for middle and high school students in southwest Virginia
- Presented a popular level talk at an American Cancer Society "Hope Talks" community event in Blacksburg, VA
- Regularly led department tours for perspective students and parents, and alumni

Professional Service

Virginia Tech:

- BEAM P&T Committee Member, 2022-2023
- BEAM Undergraduate Curriculum Committee, 2019-2023
- BEAM Undergraduate Admissions Committee, 2019-2023
- BEAM Translational Cancer Research track chair, 2019-2023
- BMES Faculty Search Committee Chair 2019-2020
- BME/ESM Program Strategic Plan Committee Member, 2019
- BMES Faculty Search Committee Member 2015, 2017
- Served as panelist in a junior faculty mentoring workshop offered by the Virginia Tech Provost's office, 2016
- Served as mock reviewer for an NIH funding faculty development course, 2016
- Served as panelist in numerous faculty development workshops for NSF (specifically CAREER) and NIH funding, 2016-present
- Faculty Advisor to Graduate Student BMES Chapter, 2014-2023

External:

- BMES Annual Fall Meeting Session Chair, 2012-2023
- BMES Annual Fall Meeting Abstract Reviewer, 2012-2023
- Peer reviewer for the Wake Forest Comprehensive Cancer Center Pilot Awards, 2014-2023
- Ad-hoc Peer Reviewer for NIH (NCI, NIAID, NIDCR), 2012-2023
- Ad-hoc Peer Reviewer for NSF (Engineering Directorate), 2013-2023

International:

- Editorial Board Member for the journal *Cancers*, 2022-2023
- Editorial Board Member for the journal *Annals of Biomedical Engineering*, 2022-2023
- Peer-reviewer for the Swiss National Science Foundation, 2023
- On the Scientific Program Committee for the 4th World Congress on Electroporation, Copenhagen, Denmark, 2021
- Editorial Board Member for the international NPG journal *Scientific Reports*, 2017-2023
- Abstract award judge at the World Congress on Electroporation, 2017, 2019
- Provided expert external grant reviews for international academic stakeholders (e.g. McMaster University, Canada, 2018)
- Served on international student Ph.D. dissertation committee (University of Toulouse, France, 2018)

Journal Reviewer: *Biomaterials, Integrative Biology, Scientific Reports, Nature Protocols, Nano Letters, Tissue Engineering, ACS Biomaterials Science and Engineering, Journal of Microelectromechanical Systems, Plos One, Cancer Letters,* Journal *of Biomedical Materials Research Part A, Annals of Biomedical Engineering, Acta Biomaterialia, Advanced Drug Delivery Reviews, Lab on a Chip, Bioelectrochemistry, Biophysical Journal, etc.*