

**Harvard Medical School
Curriculum Vitae**

Date Prepared: October 28, 2024
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Education

1997	BSc (<i>cum laude</i>)	Chemical Engineering	Technion-Israel Institute of Technology, Haifa, Israel
2004	PhD	Chemical Engineering (Prof. Moshe Narkis)	Technion-Israel Institute of Technology

Postdoctoral Training

09/05-08/09	Postdoctoral Associate	Biomedical Engineering (Prof. Elazer Edelman)	Massachusetts Institute of Technology (MIT), Cambridge, MA
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Faculty Academic Appointments

04/10-05/12	Instructor	Anaesthesia	Harvard Medical School (HMS), Boston, MA
06/12-10/15	Assistant Professor	Anaesthesia	HMS
10/15-02/23	Assistant Professor	Medicine	HMS
03/23-Present	Associate Professor	Medicine	HMS

Appointments at Hospitals/Institutions

09/09-06/16	Research Scientist	Institute for Medical Engineering and Science	MIT
07/15-Present	Associate Bioengineer	Engineering in Medicine	Brigham and Women's Hospital (BWH), Boston, MA
07/15-Present	Associate Member	Gene Therapy	Broad Institute of MIT and Harvard, Cambridge, MA
07/16-Present	Principal Research Scientist	Institute for Medical Engineering and Science	MIT

12/18-Present	Scientific Staff	One Brave Idea	BWH
03/22-Present	Associate Faculty Member	Wyss Institute	Harvard University
04/24-Present	Head of Structural Nanomedicine	Gene and Cell Therapy Institute	Mass General Brigham
07/24-Present	Core Faculty Member	Wyss Institute	Harvard University

Other Professional Positions

2024-Present	Co-Founder	Lybra Bio
2024-Present	Founder	SpideRx Biotechnologies
2023	Chair of Moffitt Biomedical Engineering Advisory Board	Moffitt Cancer Center
2014-Present	Co-Founder and Consultant	BioDevek
2018-2019	Scientific Advisory Board	Takeda Pharmaceuticals

Major Administrative Leadership Positions

National

2024	Co-Chair of 2024 Forbeck Forum	Inspires the greatest minds in medical research to find a cure for cancer
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International

2010-2017	Founder and Director	MIT-Ort Braude College, Israel - Student Exchange Program
2023	Chair of the 2023 NanoDDS symposium in Boston	Nano Drug Delivery Systems
2024	Vice Chair; Elected to become Chair in 2026	Gordon Research Conference, Drug Carriers in Medicine and Biology

Committee Service

Local

2017-2018	Subcommittee on Admissions, MD-PhD Program	HMS
2019-Present	Executive Admissions Committee. MD-PhD Program	HMS
2020-Present	Medical Executive Committee and Scientific Advisor, Stepping Strong Center for Trauma Innovation	BWH
2021-Present	Planning Committee, Center of Gene and Cell Therapy	Mass General Brigham (MGB), Boston, MA
2022-Present	BWH Ph.D. Affairs Committee	BWH

Regional

2023	Dissertation Advisory Committee for Hawa Dembele, Systems, Synthetics, and Quantitative Biology PhD candidate	Wyss Institute for Biologically Inspired Engineering at Harvard University, Boston, MA
2024	Prospectus Committee Member for Wyatt Becicka, Biomedical Engineering PhD Student	Boston University, Boston, MA

National

2022	Planning Committee	The MedTech Conference
2024-2025	Awards, Ceremonies and Nominations Committee	Society For Biomaterials

Professional Societies

2010-Present	Society for Biomaterials	
2010-Present		Member
2011-2013		Treasurer, Cardiovascular Group
2012-2019		Reviewer, Abstract Reviews
2012-2015, 2017-2021		Session Organizer
2013-2015		Chair, Cardiovascular Group
2013-2017		Member, Program Committee
2019-2020		Member, Membership Committee
2021-2023		Member, Membership Committee
2022-2023		Chair, Membership Committee
2023-2024		Member-at-Large
2024-2025		Awards, Ceremonies, and Nominations Committee
2025		Program Co-Chair

2011-2017	Biomedical Engineering Society 2011-2017 2014 2015 2017	Member Session Chair, Abstract Reviewer Reviewer, Abstract Reviews Track Chair, BMES/FDA
2019-2023	Controlled Release Society 2019-2020 2023-Present 2023-Present	Young Scientist Mentor Treasurer, Oral Drug Delivery Board Fellow
2024	Fellow	American Institute of Medical and Biological Engineers (AIMBE)

Grant Review Activities

2013	MISTI Global Seed Funds	MIT
2016, 2018- 2020	Stepping Strong Innovator Awards	Stepping Strong Center for Trauma Research, Judge
2017	Reconstructive Transplant Research Program (RTRP), Congressionally Directed Medical Research Programs (CDMRP)	U.S. Department of Defense <i>Ad hoc</i> Member
2017	Health and Technology Innovation Grants and 'Shark Tank' Reviewer	Brigham Research Institute
2018	Biomaterials & Biointerfaces Study Section (BMBI)	National Institutes of Health (NIH) <i>Ad hoc</i> Member
2019	Nanomaterials Bone Regeneration (BR), CDMRP	U.S. Department of Defense <i>Ad hoc</i> Member
2020	Orthopedic AR3 Panel, CDMRP	U.S. Department of Defense <i>Ad hoc</i> Member
2021	Bioengineering Sciences and Technologies (BST) study section, R15 Applications	NIH <i>Ad hoc</i> Member

Editorial Activities

***Ad hoc* Reviewer**

Accounts of Chemical Research
ACS Nano

Acta Biomaterialia
Advanced Functional Materials
Advanced Healthcare Materials
Advanced Materials
Angewandte Chemie
Biomacromolecules
Biomaterials
Biomedical Microdevices
Colloids and Surfaces B: Biointerfaces
European Surgical Research
Journal of Applied Polymer Science
Journal of Biomedical Materials Research: Part A
Journal of Tissue Engineering
Journal of Tissue Engineering and Regenerative Medicine
Nature Biomedical Engineering
Nature Communications
Nature Nanotechnology
Nature Reviews Cancer
Nature Reviews Materials
Nature Reviews Clinical Oncology
Proceedings of the National Academy of Sciences (PNAS)
Progress in Materials Science
Science
Science Advances
Science Translational Medicine
Small

Other Editorial Roles

2013-2014	Scientific Advisory Board (monthly literature Highlights)	<i>Science Translational Medicine</i>
2015-Present	Editorial Board	<i>Journal of Biomedical Materials Research, Part A</i>
2016-Present	Associate Editor	<i>Biomedical Microdevices</i>
2019	Guest Editor, Materials for Precision Medicine (April 2020 issue)	<i>Advanced Materials</i>
2023-Present	Associate Editor	<i>ACS Nano</i>
2024-2028	Advisory Board	<i>Cell Biomaterials</i>

Honors and Prizes

2024	Rosemary Schnell Distinguished Lecture Award	International Institute for Nanotechnology, Northwestern University	Award for outstanding research in nanoscience and nanotechnology
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2024	AIMBE Fellow	The American Institute for Medical and Biological Engineering (AIMBE)	AIMBE Fellows represent the top 2% of medical and biological engineers. They include the most accomplished medical and biological engineers in academia, industry, education, clinical practice, and government.
2023	Clemson Award for Applied Research	Society for Biomaterials	Accomplished significant goal in the biomaterials area; Evidenced by the development of a useful device or material which has achieved widespread usage or acceptance, or expanded knowledge of biomaterials/host tissue relationships which have received widespread acceptance and resulted in improvements in the clinical management of disease
2023	2024 Acta Biomaterialia Silver Medal	Acta Biomaterialia, Elsevier	Honor and recognize scientific contributions and leadership from academic, industry and public sector leaders in the midst of their careers
2023	Fellow	Controlled Release Society	Outstanding and sustained contributions to the field of delivery science and technology over a minimum of 10 years
2022	Ignite Development Award	Brigham and Women's Hospital	To advance discoveries with clinical and commercial potential
2021	MIT Future Founders finalist	MIT Future Founder Initiative	To promote female entrepreneurship in biotech
2021	The Inaugural Kabiller Rising Star Award in Nanoscience and Nanomedicine	International Institute for Nanotechnology, Northwestern University	Outstanding contributions by early career faculty

2021	MIT Koch Institute Image Award	The Koch Institute for Integrative Cancer Research at MIT	Winning project and associated image
2020	Award for women entrepreneurs	Massachusetts Life Science Center	Initiative for women entrepreneurs
2020	Career Advancement and Leadership Skills for Women in Healthcare Program	Harvard Medical School	Engineering in Medicine Division Nominee
2020	Innovation Evergreen Fund Award	Brigham and Women's Hospital	To support innovative and investigative research
2020	Mid-Career Award	Society for Biomaterials	Excellence in Research
2020	Women Leadership Program	Brigham and Women's Hospital	Career Development
2019	Bright Futures Prize	Brigham Research Institute	Excellence in Research
2018	Women in STEM ² D Scholars Program	Finalist	Johnson and Johnson
2018	Young Investigator Award	Gene Delivery and Drug Editing	Controlled Release Society
2018	Stepping Strong Innovator Award	The Gillian Reny Stepping Strong Center for Trauma Innovation	To support research and innovation to prevent traumatic injury before it occurs, to improve the treatment and care of traumatic injury when it does occur, and to ensure its associated recovery
2016	Nano-Micro Letters Researcher Award	Nano-Micro Letters	Young Investigator Award
2014	Outstanding contribution in reviewing	Acta Biomaterialia	Excellence in reviewing

Report of Funded and Unfunded Projects

Funding Information

Past

2006-2008 Adhesive materials

DuPont-MIT Alliance

Key Personnel (PI: Elazer Edelman)

The goal of the project was to design tissue adhesive materials to prevent leakage following gastrointestinal surgeries and to identify the mechanism of adhesion to tissue surfaces.

- 2010-2011 Injectable matrix-embedded endothelial cells for vascular therapy
Harvard Catalyst Pilot Grant, UL1RR025758
Co-Investigator (PI: Elazer Edelman)
The goal of this project is to map the erosion of Gelfoam matrices, fate of the embedded endothelial cells, and the immune reaction using a novel In Vivo Imaging System (IVIS) and assess the degree of tissue repair (stenosis and immune cell infiltration).
- 2010-2012 Tissue-specific adhesive materials
Co-Investigator (PI: Elazer Edelman)
MIT Deshpande Center 018795-004
I led efforts to characterize the surface chemistry of healthy and diseased GI tissue surfaces germane to surgical sealant applications.
- 2006-2009 Studying the mechanistic basis for novel drug-eluting stents
Atrium Medical
Co-Investigator (PI: Elazer Edelman)
The major goal of the project was to evaluate the pharmacokinetics and pharmacodynamics of drug released from a fatty acid (FA)matrix coated stent and quantify the erosion of the FA using bench-top experiments and computer models.
- 2014-2015 Development of novel wound dressing technology combining advanced hydrogel and perfusion enhancement technologies
Small Business Technology Transfer (STTR) programs, Department of Defense (DOD)
Subcontract PI (Overall PI: Shai Schubert, Perfuzia Medical)
The aim of this study is to design a hydrogel-based wound-dressing platform for local drug release with increased local perfusion enabled by two actuators that increase blood flow to enhance wound healing.
- 2012-2015 Develop hydrogel-nanoparticle system for monocyte polarization for peripheral artery disease (PAD)
Bonus Biogroup LTD.
PI
The goal of the study is to identify mechanisms to polarize monocytes to their angiogenic phenotype to regenerate ischemic tissue.
- 2013-2015 Design biomaterials for cartilage and bone regeneration
Sanofi Aventis
Co-PI (Co-PI: Elazer Edelman)
Design of injectable drug delivery platform that can be delivered arthroscopically to enable minimally-invasive local administration of small molecules for cartilage repair. The impact of diseased compared to healthy tissue on material performance would be studied.
- 2013-2015 Adhesive materials for skin regeneration
3M
Co-PI (Co-PI: Elazer Edelman)
The goal is to design hydrophobic topical adhesive material that would facilitate skin

regeneration and would be biocompatible.

- 2013-2015 Characterization of PEG-based hydrogels
NOF Inc.
Co-PI (Co-PI: Elazer Edelman)
The major goal of the study is to characterize new PEG-based polymers and identify the conditions in which hydrogels with adequate mechanical properties and adhesion can be formed. Characterize material biocompatibility in vivo.
- 2013-2016 Develop materials for cartilage and bone repair and regeneration
Sanofi Aventis.
Co-PI (Co-PI: Elazer Edelman)
The major goal of the study is to characterize new PEG-based polymers and identify the conditions in which hydrogels with adequate mechanical properties and adhesion can be formed. Characterize material biocompatibility in vivo.
- 2015-2019 Modification and Characterization of Gelatin-Based Microcarriers for Cell Therapy
Lonza Inc.
PI
The major goal of the study is to develop and characterize Gelatin-based microcarriers and identify the conditions that best warrants cell therapy efficacy.
- 2016-2017 Create Designer Tertiary Lymphoid Structures to Improve Cancer Immunotherapy
H. Lee Moffitt Cancer Center & Research Institute Hospital, Inc.
PI
The major goal of the study is to develop and characterize tumor lymphoid structures for melanoma immunotherapy.
- 2016-2019 Intranasal delivery of antibody drugs in the treatment of brain cancer
Mass Eye and Ear
PI
The goal is to develop an intranasal delivery system that can effectively deliver drugs to the brain, compared to local intracranial delivery and systemic delivery.
- 2018-2020 Dual localized therapy for simultaneous bone regeneration and infection prevention
Stepping Strong Center for Trauma Research, BWH
PI
Develop a hydrogel-based delivery of miRNAs for bone regeneration and selective delivery of antimicrobial agents to treat osteomyelitis
- 2019 Training an immuno-army: Exploiting immunoengineering for the treatment of pediatric gliomas
BRI Bright Futures Award
PI
Locally delivery a cocktail of immunotherapy for the treatment of pediatric glioma for the generation of systemic anti-tumor immune responses.
- 2019 Early Detection of Cardiovascular Disease
One Brave Idea (American Heart Association, Verily, AstraZeneca)
Subproject PI (Overall PI: Calum MacRae)
This subproject is looking to develop minimally invasive means for the simultaneous detection of multiple CVD-related biomarkers in interstitial fluid (ISF), by using a flexible adhesive microneedle array.

- 2019-2020 Engineering nanoparticles-based delivery platform for STING agonist as a cancer vaccine
Takeda/Millennium Pharmaceuticals
PI
The major goal of this project is to develop nanoparticle-based system for systemic delivery of STING-agonist, in combination with checkpoint blockade therapy, targeting solid tumors, and to characterize the immune responses to the therapy.
- 2020-2021 Nanoparticles targeting inflammatory myeloid populations (IMP) for the treatment of Inflammatory Bowel Disease (IBD)
Takeda
PI
The major goal is to screen for polymer-based nanoparticles that can target the gastrointestinal tract and locally suppress inflammation, for the treatment of IBD.
- 2020-2021 Accessible point-of-care device for early detection and monitoring of Cancer
MIT Sloan Latin America Office
PI
The goal is to develop a microneedle patch for local delivery of therapeutics with an integrated diagnostic device that can send data remotely to clinicians.
- 2020-2022 Studying the role of nanoparticle properties and administration mode on their accumulation in specific organs
Otsuka America Pharmaceutical, Inc
PI
Identify means to enhance nanoparticle accumulation in kidney, lymphoid organs and the central nervous system.
- 2020-2022 Microneedle-based platform for local immunomodulation to promote long-term skin allograft survival
Innovation Evergreen Fund (IEF) Award, Department of Medicine, BWH, Harvard Medical School
Co-PI (Co-PI: Jamil Azzi)
The goal is to develop a microneedle patch for local delivery of chemokines to enhance T regulatory cells migration and expansion at the site of transplantation, to prevent skin allograft rejection.
- 2020-2023 Local hydrogel-mediated vaccine for brain cancer
Deshpande Center, MIT
PI
Locally delivering chemotherapy for the treatment of glioma in combination with standard-of-care therapies.
- 2019-2023 Local drug delivery for medical applications
"La Caixa" Foundation MIT Seed Fund
Co-PI (co-PI, Prof. Salvador Borros)
Study the effect of administration route and sequence of cancer therapy on immune responses and therapeutic outcomes.
- 2020-2023 Ultrasound-induced immunotherapeutic nanomedicine delivery to brain tumors under MRI guidance
MIT-Israel Zuckerman STEM Fund
Co-PI (co-PI, Prof. Haim Azhari)

- Study the effect of focused ultrasound in combination with immunotherapy on the treatment of brain cancer.
- 2021-2022 Stimulating Fracture Healing by Blocking Salt Inducible Kinases
2021 Stepping Strong Center Breakthrough Award, BWH
Co-PI (Co-PIs Prof. Marc Wein, MGH and Prof. Ara Nazarian, BIDMC)
Study the role of SIK/SIK3 targeting in long bone healing in mice
- 2021-2022 Studying the synergism between radiation therapy and immune-modulating therapies in eliminating cancer
Sirtex Medical Inc.
PI
Understand the role of external-beam radiation in modulating the immune system and identify immunomodulatory therapies that synergize with radiation.
- 2022-2023 Microneedle-Based Platform for Local Delivery of Drugs for the Management of Alopecia Areata
BWH Ignite
Co-PI (Co-PI: Jamil Azzi, MD)
Local delivery of immune-modulator via a polymeric microneedle patch for Alopecia Areata.
- 2022-2023 Local immunomodulation using a microneedle patch for the management of skin transplant
NIH/NIAID R56
Multi-PI (Multi-PI: Jamil Azzi, MD)
The aims to engineer a novel microneedle (MN)-based polymeric platform for Treg recruitment at the site of allo-immunity to delay skin transplant rejection.
- Current**
- 2021-2024 Local hydrogel-mediated vaccine for brain cancer
Deshpande Center, MIT
PI (\$588,500)
Study the effect of focused ultrasound in combination with immunotherapy on the treatment of brain cancer.
- 2022-2025 Gene Therapy for Generalized Calcification of Infancy (GACI) Program
Mass General Research Institute (MGRI) – Angea Biotechnologies
Co-PI (Co-PIs: Patricia Musolino, MD, Mark Lindsay, MD, Rajeev Malhotra, MD) (\$1.8M)
Gene replacement strategy for the treatment of Generalized arterial calcification of infancy (GACI)
- 2023-2025 Early diagnosis of Lyme disease using a microneedle patch integrated with isothermal nucleic acid amplification technologies
Wyss Institute
PI (\$70,000)
Develop a bioinspired microneedle patch integrated with the SHERLOCK technology for sampling and detection of bacterial DNA in skin interstitial fluid.
- 2023-2024 Development of an Optimized Immunostimulatory Duplex RNA Therapeutic for Cancer
Wyss Institute
Co-PI (co-PIs Don Ingber and William Shih) (\$189,005)

Develop an optimized duplex RNA molecule that potently increases endogenous levels of interferons through stimulation of the RNA sensor, RIG-I, that can be dosed systemically to treat solid tumors, and to design DNA origami- and nanoparticle-based structures for effective systemic delivery of the duplex-RNA.

- 2023-2024 Brain-Targeted Nanoparticles for Systemic Treatment of Brain Diseases
Wyss Institute (co-PI Don Ingber) (\$178,518)
Synthesize and design a novel brain-targeted drug delivery platform by combining unique coated Lipid Nano Particle (LNPs) drug carriers with engineered antibody shuttles that mediate transport across blood brain barrier (BBB) with high efficiency, and to understand the mechanisms controlling drug uptake into the brain and recirculation.
- 2023-2025 Delivery of combination therapy for the treatment of lung cancer
JANSSEN/JnJ
PI (total direct cost \$1.66M)
Develop an injectable hydrogel to enable intratumoral delivery and sustained release of cisplatin for the treatment of lung cancer.
- 2023-2024 Early diagnosis of Lyme disease, prior to seroconversion, using a bioinspired microneedle patch for sampling of *Borrelia* DNA in skin interstitial fluid, integrated with isothermal nucleic acid amplification technologies for detection at the point-of-care
Brigham-Wyss Diagnostics Accelerator Seed Grant
Co-PIs: Natalie Artzi, James Collins, David Walt (\$75,000)
Developing an advanced method for early diagnosis of Lyme disease.
- 2023-2024 Non-viral gene delivery and gene editing nanostructures for organ and cell-specific targeting
Gene and Cell Therapy Institute
PI (\$225,000)
- 2024 Co-delivery of Immunomodulatory and Osteogenic RNAi Drugs to Enhance Bone Fracture Healing
Brigham and Women's Hospital
PI (\$50,000)
- 2024 Monitoring the drug response of melanoma using polymeric microneedles and SPEAR-se1
Wyss Institute's Director's Fund Track 1 Northpond Fund
Co-PIs: Peng Yin and Natalie Artzi (\$23,000)
- 2024-2025 Use of microneedles for the management of Alopecia Areata
National Alopecia Areata Foundation (NAAF)
PI (\$50,000)
Study the therapeutic potential of a microneedle platform for the management of Alopecia Areata by restoring the immune equilibrium in the Hair Follicles. Recruit and amplify endogenous regulatory T cells to affected skin lesions using our novel hydrogel-based microneedle (MN) platform for the treatment of Alopecia Areata.
- 2024-2025 Impact of Immune-Targeting Therapies on the GBM Tumor Immune Interface
Co-I (PI: Forest White and Franziska Michor) (\$158,504)
NCI, NIH U54CA283114 Supplement
Characterization of the efficacy and immunophenotypes of biomaterial-mediated immunotherapy combinations in an orthotopic GBM GEMM, and to identify and quantify

MHC class I peptide repertoire alterations following treatment of orthotopic GBM tumors with intracranial chemoimmunotherapy.

2024-2027 Disease-Agnostic Innate Immunotherapeutic RNA Platform
ARPA-H
PI (\$22,010,380 total)
Our goal is to develop a discovery and translation platform for the development, validation, delivery, and scalable manufacturing of RNA immunotherapeutic that harness the body's innate immune system using an exciting double-stranded RNA (dsRNA) lead molecule developed at the Wyss Institute at Harvard that exhibits pan-antiviral and anticancer activity by inducing expression of multiple type I and III interferons (IFNs).

Submitted

2025 CirVaxGel: Hydrogel Based Microneedle Mediated Delivery of Circular RNA as Novel Infectious Disease Vaccines
BARDA/Luminary Labs
PI (\$2,000,000 total)
The goals of this concept period are: (1) to identify the lead combination formulations (HA-MAPs, LNPs) of CircVaxGel for pre-clinical in vivo efficacy and safety testing; (2) to compare immune responses elicited by crRNA and mRNA formulations; and (3) to scale up material production for NHP pre-clinical studies and derisk combination product manufacturing.

2025-2027 Tumor protease-activatable peptide-STING agonist conjugate simultaneously activating immunogenic cancer cell death and STING pathway for enhanced cancer immunotherapy
NIH R21
PI (\$275,000 total)
Our goal is to develop a nanomedicine that releases the therapeutic molecules specifically in the tumor microenvironment and trains the immune system to identify and eliminate cancer cells to generate robust antitumor immune memory

2025-2029 Gene Therapy for Generalized Arterial Calcification of Infancy
NIH R01
Co-I (PI: Rajeev Malhotra) (\$3,311,272)
The goal of this study is to investigate a novel gene therapy approach for the treatment of GACI and other calcific disorders using both in vitro and in vivo model systems with endpoints of efficacy that model what occurs in human disease.

Training Grants and Mentored Trainee Grants

2011-2015 Biodegradable adhesives as a controlled drug release system for the treatment of inflammatory breast cancer
"La Caxia" PhD Foundation
Mentor of Nuria Oliva
The goal is to understand how tissue surface properties are altered in disease to enable adhesion of a biomaterial for local and sustained delivery of chemotherapy-conjugated nanoparticles for targeted cancer therapy.

2014-2017 Cancer Hydrogel Patch
H2020 Marie Skłodowska-Curie Actions (London) FP7-PEOPLE-2013-IOF
Mentor of Dr. Joao Conde.

The major goal is to determine the role of thermal ablation, gene therapy, and antiangiogenic agents on cancer progression.

- 2016-2017 NIH Ruth L. Kirschstein T32 post-doctoral fellowship 5T32EB016652-02
Mentor of Dr. Nuria Oliva.
The major goal is to develop a translational delivery platform for local, sustained and selective delivery of chemotherapy.
- 2017-2018 NIH Ruth L. Kirschstein T32 post-doctoral fellowship 5T32EB016652-03
Mentor of Dr. Kui Wang.
The major goal is to design an artificial ectopic lymph node using bioengineered matrix for cancer immunotherapy.
- 2019-2022 Development of a 3D bioprinted osteoconductive constructs for chemotherapy delivery in large bone defects following osteosarcoma tumor resection
Marie Skłodowska-Curie Actions (London). #839150
Mentor of Dr. Fiona Freeman.
The major goal is to understand the relationships between bone regeneration and cancer elimination in osteosarcoma.
- 2020-2023 Development of a biomaterials-based combination immunotherapy vaccine for the treatment of pediatric glioblastoma
National Science Foundation (NSF) Graduate Research Fellowship (GRF)
Mentor of Michelle Dion.
The major goal is to understand the glioblastoma immunobiology to inform the selection of combination therapy that will eradicate the tumor.
- 2023 Co-delivery of Immunomodulatory and Osteogenic RNAi Drugs to Enhance Bone Fracture Healing.
Stepping Strong Innovator Award, BWH
Mentor of Dr. Pere Dosta.
The major goal is to heal bones using RNAi that modulate the immune system.
- 2023-2024 Microneedles for the treatment and monitoring of autoimmune skin diseases.
Blavatnik Fellowship in Life Science Entrepreneurship at Harvard Business School.
Mentor of Dr. Nuria Puigmal.
The major goal is to translate technologies into the clinic.
- 2023 Mentee Dr. Maria Poley awarded the NIH T32 Fellowship.
- 2023-2024 IMES Martin Prince Fellowship 2023-2024 awarded to Michelle Dion.
- 2025-2027 Cristobal Riojas Javelly, Accepted to Harvard Business School.

Report of Local Teaching and Training

Teaching of Students in Courses

HMS/HSDM/DMS Courses

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| 2020-2023 | BBS 330: Critical Thinking and Research Proposal Writing (graduate students) | HMS
2-hr sessions every 2 weeks and grant reviewing, 14 weeks per year |
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Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs)

2020	Novel diagnostics technologies Pathology MD-PhD Fellows and Residents	BWH One hour lecture
2021	Microneedles as a tool to sample skin biomarkers Pathology MD-PhD Fellows and Residents	One hour lecture
2024	Adaptive biomaterial platforms for therapeutic applications Faculty K Awardees	Harvard Program: Building Interdisciplinary Research Careers in Women's Health (BIRCWH) Two hour lecture

Research Supervisory and Training Responsibilities

2019-Present	Research Supervision MIT graduate student (average number of trainees per semester: 1)	MIT 1.5-hour lab meeting per week; 1:1 supervision 8 hours per week, 52 weeks per year Daily mentorship
2015-Present	Research Supervision Undergraduate students (average number of trainees per semester: 6)	BWH 1.5-hour lab meeting per week; 1:1 supervision 4 hours per week, 48 weeks per year
2015-Present	Research Supervision Graduate Students (average number of trainees per semester: 3)	BWH 1.5-hour lab meeting per week; 1:1 supervision 2 hours per week, 48 weeks per year
2015-Present	Research Supervision Graduate Students (average number of trainees per semester: 3)	BWH 1.5-hour lab meeting per week; 1:1 supervision 2 hours per week, 48 weeks per year
2015-Present	Research Supervision Research Fellows (average number of trainees per semester: 7)	BWH 1.5-hour lab meeting per week; 1:1 supervision 8 hours per week, 52 weeks per year
2022-Present	Research Supervision Junior Faculty (average number of trainees per year: 1)	BWH 1.5-hour lab meeting per week; 1:1 supervision 8 hours per week, 52 weeks per year

Formally Mentored Harvard Medical, Dental and Graduate Students

2017-Present	Anvay Ukidve, Harvard Class of 2020
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Currently conducting thesis in Prof. Samir Mitragotri's lab at Harvard University. I serve as part of his PQE committee. Thesis entitled: "Improving delivery of nanoparticles to tissue endothelium by Erythrocyte Hitchhiking".

- 2021-Present Ninad Kumbhojkar, Harvard Class of 2024
Currently conducting thesis in Prof. Samir Mitragotri's lab at Harvard University. I serve as part of his PQE committee. Thesis entitled: "Neutrophil-hitchhiking for drug delivery"
- 2025-2027 Cristobal Riojas Javelly, Accepted to Harvard Business School.

Other Mentored Trainees and Faculty

- 2006-2007 Cristina Crespo Roman, M.Sc. M.B.A / Global Access Market and Pricing Lead, Early Neurology, Sanofi, Spain
Career stage: MSc student at IQS, Spain. Mentoring role: research advisor.
Accomplishments: Authorship on a publication and thesis completion.
- 2009-2010 Sagi Shitreet, BSc / Owner of Home Renolution, Newmarket, Ontario, Canada
Career stage: BSc student at Ort Braude College of Engineering, Israel. Mentoring role: research advisor.
Accomplishments: Authorship on a publication and thesis completion.
- 2009-2017 Nuria Oliva, PhD / Assistant Professor at IQS Barcelona, Catalonia, Spain
Career stage: PhD student, MIT class of 2016 and a T32 postdoctoral fellow.
Mentoring role: PhD thesis advisor.
Accomplishments: Multiple first-author manuscripts and patents.
- 2010-2013 Maria Carcole, MSc / Global Head of Brand Owner Management, Neste, Geneva, Switzerland
Career stage: MSc student at IQS, Spain. Mentoring role: research advisor.
Accomplishments: Authorship on a publication, an inventor on a patent, and thesis completion.
- 2011 Vladik Yushvaev, BSc / Asepcit Production Technician at Nextar chempharma solutions, Israel
Career stage: BSc student at Ort Braude College of Engineering, Israel. Mentoring role: research advisor.
Accomplishments: Authorship on a publication and thesis completion.
- 2011 Ela Levy, BSc / Plant Engineer at Rafa Laboratories, Jerusalem, Israel
Career stage: BSc student at Ort Braude College of Engineering, Israel. Mentoring role: research advisor.
Accomplishments: Authorship on a publication and thesis completion.
- 2011-2012 Alina Freiman, PhD candidate / Research Team Leader at Bonus BioGroup, Israel
Career stage: BSc student at Ort Braude College of Engineering, Israel. Mentoring role: research advisor.
Accomplishments: Authorship on a publication and thesis completion.
- 2011-2012 Zohar Shtsberg, PhD / Process Engineer at Intel Corporation

	<p>Career stage: BSc student at Ort Braude College of Engineering, Israel. Mentoring role: research advisor. Accomplishments: Authorship on a publication and thesis completion.</p>
2011-2012	<p>Moshe Beck, BSc MBA / Salesforce Consultant at Praxis Solutions, LLC, Fort Myers, Florida Career stage: BSc student at Ort Braude College of Engineering, Israel. Mentoring role: research advisor. Accomplishments: Authorship on a publication and thesis completion.</p>
2013-2016	<p>Lyndon Charles, PhD / Vice President of Program Management and Strategy at Elektrofi, Boston, Massachusetts Career stage: postdoctoral fellow. Mentoring role: research advisor. Accomplishments: Multiple publications, an inventor on a patent, and thesis completion.</p>
2014-2015	<p>Joao Conde, PhD / Vice Dean for Research at NOVA Medical School – Faculdade de Ciências Médicas, Lisbon, Portugal Career stage: Marie Curie postdoctoral fellow. Mentoring role: research advisor. Accomplishments: Multiple first-author publications as a Marie Curie fellow and patents.</p>
2016-2018	<p>Kui Wang, PhD / Senior Scientist, Verve Therapeutics Career stage: T32 postdoctoral fellow. Mentoring role: research advisor. Accomplishments: Multiple research publications.</p>
2017-2020	<p>Shiran Ferber, PhD / Venture Partner at Target Global, Director of Scientific Affairs at the GBC Foundation, San Diego, California Career stage: postdoctoral fellow. Mentoring role: research advisor. Accomplishments: Multiple research publications and a patent.</p>
2018-2023	<p>Pere Dosta, PhD / Instructor at UT Southwestern, Department of Biomedical Engineering, Dallas, Texas Career stage: postdoctoral fellow promoted to faculty at HMS, Department of Medicine. Mentoring role: research advisor. Accomplishments: Multiple research publications and patents. Promoted to an Instructor at HMS.</p>
2019-Present	<p>Alex Cryer, PhD / Instructor at HMS, Department of Medicine, Cambridge, Massachusetts Career stage: postdoctoral fellow and faculty. Mentoring role: research advisor. Accomplishments: Multiple research publications and patents. Promoted to an Instructor at HMS.</p>
2019-Present	<p>Daniel Dahis, MSc, PhD / Lead Scientist at BioDevek, Cambridge, Massachusetts Career stage: PhD Student at the Technion, Israel Institute of Technology. Mentoring role: PhD co-advisor. Accomplishments: Multiple research publications.</p>
2021-Present	<p>R. Kōnane Bay, Ph.D. / Assistant Professor and Sylvia Norviel Cancer Research Faculty Fellow, Chemical and Biological Engineering, at the University of Colorado Boulder</p>

Career stage: Princeton Presidential Postdoctoral Research Fellow, Department of Chemical and Biological Engineering, Princeton University. Mentoring role: career mentor.

Accomplishments: Accepted to become a faculty member at the University of Colorado.

2022-2023	Maria Alejandra Hernandez Mustieles, Tec de Monterrey Supervising Undergraduate BME student cohort throughout 1-year internship
2023-2024	Silvia Vargas Franyuti, Tec de Monterrey Supervising Undergraduate BME student cohort throughout 1-year internship
2023-2024	Beatriz Nicolas Ruiz, Tec de Monterrey Supervising Undergraduate BME student cohort throughout 1-year internship
2024	Berta Vall Brossa, IQS Barcelona Supervising Graduate student's Master of Science in Bioengineering and Biomedical Engineering thesis and internship
2024	Romy El Khoury, Universite Paris Cite Supervising Graduate student's Master of Biomedical Engineering thesis and internship
2024	Audrey Struzyk, Cornell University Supervising undergraduate Biomedical Engineering student's internship
2024	Amelya Fox, University of Tennessee, Knoxville Supervising undergraduate Biomedical Engineering student's Amgen Scholar internship
2024	Serly Chohmalian, Brown University Supervising undergraduate Biomedical Engineering student's Fellowship
2024	Shashaank Abhinav, MIT Supervising Graduate student's HST rotation
2024	Logan Albert Beatty, MIT Supervising Graduate student's HST rotation
2024	Amy Oh, MIT Supervising Graduate student's HST rotation
2024	Juan Pablo Garcia, MIT Supervising Graduate student's HST rotation
2024-2025	Andrea Michasevich Soto, Tec de Monterrey Supervising Undergraduate BME student cohort throughout 1-year internship
2024-2025	Angela Villarreal Jezzini, Tec de Monterrey Supervising Undergraduate BME student cohort throughout 1-year internship
2024-2025	Daniela Simental Lopez, Tec de Monterrey Supervising Undergraduate BME student cohort throughout 1-year internship

- 2024-2025 Nathalie Nicole Castele Hernandez, Tec de Monterrey
Supervising Undergraduate BME student cohort throughout 1-year internship
- 2024-2025 Martha Andrea de Shonshtant Garcia Mendez, Tec de Monterrey
Supervising Undergraduate BME student cohort throughout 1-year internship
- 2022-2025 Nelly Andrews, Tec de Monterrey
Supervising Graduate BME student through 2 years of internship and Masters thesis
- 2024-2025 William Sawyer, University of Florida
Supervising Graduate student's thesis and 1-year internship to obtain Master of Science in Material Science and Engineering Student

Formal Teaching of Peers (e.g., CME and other continuing education courses)

- | | | |
|------|--|--|
| 2020 | iD2D: Innovation from Discovery to Delivery. Mixed audience (researchers, engineers, product development experts, patient advocates)
One Brave Idea | Workshop content development and one lecture session
Boston, MA |
| 2021 | TRANSforming Care with Emerging, Novel Devices (TRANSCEND)
Harvard Catalyst | 5-session course
Online |

Local Invited Presentations

No presentations below were sponsored by outside entities.

- 2012 The Interrelationship of Industry And MIT: Why is it Successful? / Health Policy Innovation Seminar
Universitat Internacional de Catalunya and Real Colegio Complutense at Harvard University, Cambridge, MA
- 2016 Stepping Strong: Making Strides in Trauma Care / Invited lecture
Brigham Innovation Day, BWH, Boston, MA
- 2016 Leveraging Multifunctional (Nano)Biomaterials to Study, Diagnose and Treat Cancer/ Invited lecture
Center for Engineering in Medicine, Massachusetts General Hospital, Boston, MA
- 2017 12 Disruptive Technologies / Invited presenter
World Biomedical Innovations Forum, Boston, MA
- 2017 Engineering of (nano)Biomaterials for Cancer Therapy, Medical Device Development / Harvard Catalyst Course
Boston, MA
- 2017 Multifunctional biomaterials for on-demand cancer therapy, Micro and Nano Technologies Workshop
Harvard University, Boston, MA

- 2018 Engineering Biomaterials for Personalized Medicine/ Keynote address
BWH Research Retreat, Somerville, MA
- 2018 (Nano)Biomaterials for Immuno-Cancer Therapy/ Invited lecture
Dana Farber cancer Institute, Boston MA
- 2018 Cancer-specific and Biologically-informed (nano)materials / Invited lecture
School of Engineering, Harvard University, Cambridge, MA
- 2019 Local Delivery of Combination Therapy for Cancer / Invited lecture
The Head and Neck Cancer Symposium: *Evolving Paradigms
in Head and Neck Cancer Therapy*
BU and Dana Farber Cancer Institute, Boston, MA
- 2021 GCT delivery; Perfecting the technology / Moderator
World Medical Innovation Forum, Boston, MA (Virtual)
- 2021 Moving Beyond Viruses to Ferry Genes, 12 Disruptive Technologies/ Invited
presenter
World Biomedical Innovations Forum, Boston, MA (Virtual)
- 2021 Versatile Polymer-based Nanocarriers for Targeted Therapy and
Immunomodulation/ First Look presenter
World Medical Innovation forum, Boston, MA (Virtual)
- 2021 Innovations in Bone and Muscle Healing / Moderator
4th Annual Stepping Strong Trauma Research and Innovation Symposium
Boston, MA (Virtual)
- 2022 Local drug delivery via an adhesive hydrogel for the treatment of brain
cancer/ Invited lecture
DFCI/BWH Neuro-Oncology Multi-Disciplinary Conference, Boston (Virtual)
- 2022 The Doctor is In / Panelist
World Medical Innovation Forum, Boston, MA
- 2022 New technologies for delivering gene therapies, 12 Disruptive Technologies
/ Invited Presenter
World Biomedical Innovations Forum, Boston, MA
- 2023 Biomaterials for Gene Therapy and Immunomodulation / Invited Speaker in
Non-Viral Platforms Session, Gene and Cell Therapy Symposium, Boston,
MA
- 2023 Delivering on the Promise of Immunotherapy for the Treatment of Brain
Cancer / Invited Speaker, World Medical Innovation Forum, Boston, MA
- 2023 On the Promise of Immunotherapy / Invited Speaker, Immunitas
Therapeutics, Waltham, MA

- 2023 Getting to Know Israeli HealthTech Leaders in the MA Ecosystem / Invited Speaker, Panel Session at Harvard Business School, Cambridge, MA
- 2023 Invited Speaker, Panel Session at 8400 Health Network Leadership Program / Harvard Business School, Cambridge, MA
- 2023 Session Chair, Cancer Panel; Wyss Retreat
Wyss Institute at Harvard University, Boston, MA
- 2024 Supercharging Immunotherapy Through Nanotechnology: Chemical Structure Matters / Invited Speaker
Department of Medicine Research Retreat, Brigham & Women's Hospital, Boston, MA
- 2024 Wyss Faculty Forum / Invited Speaker
Church Lab, Wyss Institute of Harvard University, Boston, MA
- (November) Gene and Cell Therapy Institute / Invited Speaker
2024 Mass General Brigham, Boston, MA
- (November) Stepping Strong Symposium / Invited Speaker
2024 Mass General Brigham, Boston, MA
- (November) Structural Nanomedicine -- The Next Frontier in Pharmaceutical
2024 Development / Invited Speaker, Cancer Forum
Mass General Brigham, Boston, MA (Virtual)

Report of Regional, National and International Invited Teaching and Presentations

Invited Presentations and Courses

Those presentations below sponsored by outside entities are so noted and the sponsor is identified in parentheses.

Regional

- 2011 Engineering Biomaterials to Deliver the Desired Clinical Outcome / Invited lecture
Franciscan Hospital, Tufts Medical School Seminar Series, Boston, MA
- 2012 Imaging as a Tool to Investigate Biomaterials Efficacy / Invited lecture
Revolutionaries for Global Health Summit, Perkin Elmer, Newton, MA
- 2012 Tissue-Specific Adhesive Materials / Invited lecture
IDEASTREAM, MIT Deshpande Center Symposium, Cambridge, MA
- 2014 Considering Tissue Type and State in the Rational Design of Materials and Medical
Devices / Invited lecture
NEBEC 2014, Boston, MA

- 2014 From Bench to Bedside: Nanotechnology in Personalized Medicine / Invited lecture
IProNet, Boston, MA
- 2014 ABCs of Bioresorbable Polymers and Metals / Invited lecture
Cardiovascular Research Foundation, Boston, MA
- 2015 Using Materials Engineering: Targeted Cancer Treatment and State of the Art
Medical Care / Invited lecture
American Technion Society, Newton, MA
- 2017 When multifunctional nanobiomaterials meet cancer / Invited lecture
UMass, Lowell, MA
- 2018 Biologically-informed materials for cancer therapy / Invited lecture
Takeda, Cambridge, MA
- 2018 Cancer-specific and biologically-informed (nano)materials / Invited lecture
Gordon Research Conference on Drug Carriers in Medicine and Biology, Dover, VT
- 2018 Adaptable Biomaterials for Combination Cancer Therapy / Invited lecture
Boston University Nano Symposium, Boston, MA
- 2019 Combination Immunotherapy for Cancer / Invited lecture
DRAPER Laboratories, Boston, MA
- 2019 Bioengineering approaches to therapy: cancer and cancer-associated vascular
changes / Invited lecture
Cancer-Associated Thrombosis and Vascular Dysfunction: From Molecular to Large
Data Bases Symposium. Boston University, Boston, MA
- 2019 Frontier Science / Panelist
Convergence Forum, Chatham, Cape Cod, MA
- 2019 Rational and Biologically-Informed Material Design for Cancer Therapy / Invited
lecture Gordon Research Conference, Cancer Nanotechnology, West Dover, VT
- 2020 Engineering Therapeutic Immunity using Materials: New Opportunities for Precision
Delivery / Invited lecture
5th Translational Medicine and Bioengineering Conference (Virtual)
- 2020 Bringing University Innovations to Market / Invited lecture
Medical Development Group, Boston (Virtual)
- 2020 Partnering and Engaging Strategies / Invited lecture
Massachusetts Medical Device Industry Council (MassMEDIC), Boston, MA (Virtual)
- 2021 Biomedical Engineering Entrepreneurship and Strategy course (undergraduate and
graduate students) /Invited Guest Lecturer Spring (BME 0194)
Department of Biomedical Engineering, Tufts University, Medford, MA (Virtual)
- 2021 Combination radioimmunotherapy in the treatment of solid tumors / Invited lecture
Sirtex Scientific Advisory Board Meeting, Woburn, MA (Virtual)
- 2021 Biomaterials-Aided Combination Immunotherapy / Invited lecture

Evolution Summit, Encore, Boston, MA

- 2021 Accessible point-of-care medical device for early detection and monitoring of cancer / Invited lecture
MIT Sloan Latin America Seminar, Boston, MA (Virtual)
- 2021 Engineering tertiary lymphoid structures in tumors to enhance cancer immunotherapy outcomes / Invited lecture
Takeda, Boston, MA (Virtual)
- 2021 Nanoparticles for gene therapy and immunomodulation / Invited lecture
Translate Bio, Boston, MA (Virtual)
- 2021 Bringing University innovation to Market / Invited lecture
Medical Development Group (MDG) of Boston, Boston, MA (Virtual)
- 2022 Innovation experience for biomedical technology entrepreneurs/ Workshop leader
MIT Inq IDEAspark, Cambridge (Virtual)
- 2022 Translating Academic Innovations Into the Marketplace / Invited lecture
Medical Development Group (MDG) of Boston, Boston, MA (Virtual)
- 2022 Technical Risk and Scientific Plan Workshop / Invited panelist
Nucleate, Boston, MA (Virtual)
- 2022 Delivering on the Promise of Immunotherapy / Invited Talk and Session Moderator
The 7th Bioengineering and Translation Medicine Conference, AlChE, Boston, MA
- 2022 Eliminating Brain Cancer At Its Source / Invited speaker
TEDxMIT, Cambridge, MA
- 2023 Delivering on the Promise of Immunotherapy / Invited Speaker
4th Annual Glioblastoma Drug Development Summit, Boston, MA
- 2023 Biomaterials for immunomodulation in neoplasia and autoimmunity / Invited Speaker, Tufts University, Medford, MA
- 2023 Biomaterials for delivering on the promise of immunotherapy / Invited Speaker, Cornell University, Ithaca, NY
- 2023 Delivering on the Promise of Immunotherapy / Invited Speaker
Department of Biomedical engineering, Tufts University, Medford, MA
- 2023 Cancer / Panel Moderator and Chair
Wyss Retreat, Boston, MA
- 2023 Delivering on the Promise of Gene Therapy / Invited Speaker
MGB Gene and Cell Therapy Institute Retreat, Somerville, MA
- 2023 Biomaterials for delivering on the promise of immunotherapy / Invited Speaker
Langer Lab Seminar, MIT, Cambridge, MA
- 2023 Biomaterials for Delivering on the Promise of Immunotherapy / Invited Speaker
Boston University, Boston, MA

- 2023 Engineering Therapeutic Immunity Using (nano)Biomaterials / Invited Speaker
Aggregate in Nanoscience and Bioengineering webinar, Wiley (Virtual)
- 2023 Biomaterials for delivering on the promise of immunotherapy / Invited Speaker
Brown University, Providence, RI
- 2024 Adaptive biomaterial platforms for therapeutic applications / Building Interdisciplinary
Research Careers in Women's Health (BIRCWH) Scholar Meeting
Brigham & Women's Hospital, Boston, MA
- 2024 Microneedle drug delivery patch to treat autoimmune skin diseases / Invited Speaker
and Panelist
World Medical Innovation Forum (WMIF), Boston, MA
- 2024 Department of Medicine Research Retreat / Invited Speaker
Brigham & Women's Hospital, Boston, MA
- (November) U54 Team Meeting / Invited Speaker
2024 MIT, Cambridge, Massachusetts
- (TBD) 2025 Spring Seminar Series / Invited Speaker
UMass Amherst Biomedical Engineering, Amherst, MA

National

- 2010 Tracking Material Fate and Erosion: Implications for Bioabsorbable Stent
Design / Invited talk
Transcatheter Cardiovascular Therapeutics, Washington DC
- 2012 Non-invasive Tracking, Modeling and Predicting the Erosion of Environmentally-
responsive Dynamic Materials / Invited lecture
Functional Imaging for regenerative Medicine, Gaithersburg, MD
- 2013 Mechanistic Understanding of Materials Performance in Complex Biological
Environments as a Tool for Rapid Translation / Invited lecture
3M External Innovation Corporate Scientists Meeting, St. Paul, MN
- 2015 Primer to Biabsorbable Polymers, Cardiovascular research Technologies,
Washington DC
- 2015 Understanding Complex Biological Environments Drives Multifunctional Materials
Design for Cancer Therapy, Houston Methodist Research Institute, Houston,
Texas
- 2016 Leveraging Multifunctional (Nano)Biomaterials for Cancer Therapy / Invited
lecture NCI, NIH, Shady Grove in Rockville, MD
- 2017 Multifunctional biomaterials for on-demand cancer therapy / Invited lecture
ACS conference, Washington DC
- 2017 Multifunctional biomaterials for on-demand cancer therapy / Invited lecture

Moffitt Center for Cancer research, Tampa, Florida

- 2017 Multifunctional (nano)biomaterials for diagnosis and therapy / Invited lecture
Ethicon, JnJ, Somerville, NJ
- 2018 Cancer-specific and biologically-informed biomaterials for gene therapy / Invited
lecture
Controlled Release Society, New York, NY
- 2019 Combination Immunotherapy for Cancer / Invited lecture
Institute for Nano-bio-technology, Johns Hopkins University, Baltimore, MD
- 2019 Precision Biomaterials for Combination Cancer Therapy / Invited lecture
University of North Carolina, Center for Nanotechnology in Drug Delivery, NC
- 2019 Precision Biomaterials for Combination Cancer Therapy / Invited lecture
Northwestern University, Evanston, IL
- 2020 Adaptive Biomaterial Platform for Therapeutic Applications / Invited lecture
Johnson and Johnson External Innovation, JnJ Innovation Center, Cambridge,
MA
- 2021 Biomaterials-Aided Combination Immunotherapy / Invited lecture
St. Johns University, New York, NY (Virtual)
- 2021 Next generation of surgical solutions for polyp removal treatment / Invited lecture
Johnson and Johnson Lobster Pot, Boston, MA
- 2021 Biomaterials-Aided combination Immunotherapy / Invited lecture
Center for Targeted Therapeutics and Translational Nanomedicine (CT3N)
Symposium, University of Pennsylvania, Philadelphia, Pennsylvania (Virtual)
- 2021 Engineering Therapeutic Immunity using Materials: New Opportunities for
Precision Delivery / Invited lecture
NIH Bioengineering, Washington DC (Virtual)
- 2021 Smart Adaptive Biomaterial / Invited lecture
The MedTech conference, Minneapolis, MN
- 2022 Engineering Immunity Using Biomaterials / Invited Speaker
Society for Biomaterials, Baltimore, MD
- 2022 Microneedles for Diagnosis and Therapy of Neoplastic and Autoimmune Diseases
Society for Biomaterials, Baltimore, MD
- 2022 Biomaterials for Immune Modulation for Cancer Therapy / Invited Speaker
Gordon Research Conference, Drug Carriers in Medicine and Biology, West
Dover, VT

- 2022 Smart adaptive biomaterials / Invited Speaker
Mayo Clinic Beahrs Surgical Innovation Summit, Rochester, MN
- 2022 Engineering therapeutic immunity to glioblastoma using adhesive hydrogels / Invited Speaker
Bioinnovations in brain cancer, University of Michigan, Inaugural brain cancer symposium, Ann Arbor, MI
- 2022 Delivering on the promise of immunotherapy / Invited Speaker
Northwestern University, 2022 IIN Symposium-International Institute for Nanotechnology, Evanston, IL
- 2023 Delivering on the promise of immunotherapy / Invited Speaker
University of Utah, Salt Lake City, UT
- 2023 Engineering therapeutic immunity to glioblastoma through the intracranial delivery of chemoimmunotherapy using adhesive hydrogels / Invited Speaker and Session Moderator
'Drug Delivery to the Brain' Keystone Conference, Breckenridge, CO
- 2023 Immune modulation using biomaterials for treatment and diagnosis of neoplastic and autoimmune diseases / Invited Speaker
SLAS 2023 International Conference, San Diego, CA
- 2023 Engineering therapeutic immunity using biomaterials / Invited Speaker
School of Chemical and Biomolecular Engineering, Georgia Institute of Technology, Atlanta, GA
- 2023 Enhancing the antitumour potency of a STING agonist via conjugation to a systemically delivered polymeric nanoparticle / Invited Speaker
Pittcon 2023, Philadelphia, PA
- 2023 New strategies for biological analysis and Imaging: reagents and detection technologies / Invited Speaker
Pittcon 2023, Philadelphia, PA
- 2023 Engineering therapeutic immunity using (nano)biomaterials / Invited Speaker
Department of Bioengineering, University of Pennsylvania, Philadelphia, PA
- 2023 Delivering on the Promise of Immunotherapy / Invited Speaker
Feinberg School of Medicine, Northwestern University, Chicago, IL
- 2023 Delivering on the Promise of Immunotherapy / Invited Speaker
Department of Biomedical Engineering
College of Science and Engineering, University of Minnesota, Minneapolis, MN
- 2023 SFB Conjugated STING-agonist nanoparticles enhance antitumor immunity / Invited Speaker
Society for Biomaterials, San Diego, CA

- 2023 Engineering therapeutic Immunity to Solid Tumors Using (Nano)Biomaterials / Invited Speaker
Mechanisms And Barriers in Nanomedicine Conference-Workshop, Denver, CO
- 2023 Delivering on the Promise of Immunotherapy using Biomaterials / Invited Speaker
Department of Neurosurgery in the School of Medicine and Department of Biomedical Engineering, Washington University in St. Louis, MO
- 2023 Delivering on the Promise of Immunotherapy / Invited Speaker, Adelson
Melanoma Research Foundation, Needham, MA (Virtual)
- 2023 Engineering therapeutic immunity to glioblastoma using biomaterials / Invited Speaker, Tech Session 4: Nervous System Delivery
Invited Moderator, Tech Session 1: New and Emerging Technologies for Drug Delivery, Controlled Release Society 2023 Annual Meeting, Las Vegas, NV
- 2023 Delivering on the Promise of Immunotherapy / Invited Speaker
Department of Biomedical engineering, Cornell University, Ithaca, NY
- 2024 Delivering on the Promise of Immunotherapy / Invited Speaker
Department of Biomedical engineering, College of Engineering, Carnegie Mellon University, Pittsburg, PA
- 2024 Delivering on the Promise of Immunotherapy / Invited Speaker
Moffitt Cancer Center Retreat, Tampa, FL
- 2024 Tissue and Cell Responsive <aterials / Cancer Bioengineering Session / Session Organizer and Moderator
17th Annual Business of Biotech Moffitt Conference, Moffitt Cancer Center, Tampa, FL
- 2024 How can nanotechnology in combination with immunotherapy enhance curing cancer? / Invited Speaker and Session Chair
Cancer and Nanotechnology, Forbeck Forum, Pacific Grove, CA
- 2024 SFB Drug Delivery SIG Trainee Network Event / Invited to participate in Breakout Session with Q&A
Society for Biomaterials, San Diego, CA (Virtual)
- 2024 Tissue-adaptive biomaterials for therapeutic applications / Invited Speaker
Tissue Talks: Weekly Lecture Series from Global Leaders in Tissue Engineering, Department of Biological Engineering, Columbia University, New York, NY
- 2024 Rational immunotherapy using controlled nanostructure synthesis / Invited Speaker
Colloidal Nanoparticle Synthesis and Assembly, 2024 ACS Spring Meeting, New Orleans, LA
- 2024 Delivering on the Promise of Immunotherapy / Invited Speaker

Web of Life, The University of Oklahoma Health Sciences Center, Norman, OK

- 2024 Delivering on the Promise of Immunotherapy / Invited Speaker
Stephenson School of Biomedical Engineering, the University of Oklahoma,
Norman, OK
- 2024 Seminar series / Invited Speaker
Emerging Drug Delivery Platforms, GSK, Collegeville, PA
- 2024 Vice Chair and Invited Speaker
Gordon Research Conference (GRC), Portland, ME
- (November)
2024 Invited Session Moderator
Chicago BioEngineering Conference (CBEC), Chicago, IL
- (November)
2024 Supercharging Immunotherapy Through Nanotechnology: Chemical Structure Matters
/ Invited Speaker
Department of Bioengineering, Rice University, Houston, TX
- (November)
2024 Supercharging Immunotherapy Through Nanotechnology: Chemical Structure Matters
/ Invited Speaker
Rosemary Schnell Distinguished Lecture in Nanotechnology, 2024-2025 Frontiers in
Nanotechnology Series, Departments of Chemistry and Chemical and Biological
Engineering and Medicine, Northwestern University
- (November)
2024 6th Annual Immunomodulation and Engineering Symposium (IMES) / Invited
Keynote Speaker
Drexel University, Philadelphia, PA
- (December)
2024 10th Mayo Clinic Symposium on Immuno-Oncology and Tumor Microenvironment
/ Invited Speaker
Mayo Clinic, Ponte Vedra Beach, FL
- (December)
2024 The 16th US-Japan Symposium on Drug Delivery Systems / Invited Speaker
Langer Lab, Honolulu, HI
- (January) 2025 Invited Speaker
Biomedical Engineering Seminar Series, Columbia University, New York, NY
- (March) 2025 3rd Terasaki Innovation Summit / Invited Keynote Speaker
Terasaki Institute, Woodland Hills, CA
- (March) 2025 Bold Science from ARPA-H / Invited Panelist
13th Annual BioMedical Engineering and Imaging Institute (BMEII) Symposium,
New York Academy of Medicine (NYAM), New York, NY
- (March) 2025 Nanoparticle Materials: Synthesis and Self-Assembly through Division of Colloid

and Surface Chemistry (COLL) / Invited Speaker
American Chemical Society (ACS) Spring Meeting Symposium, San Diego, CA

- (April) 2025 Tissue Adaptive Biomaterials for Therapeutic Applications / Invited Speaker
NIH T-32 Seminar, Invited Speaker
University of Michigan, Ann Arbor, MI
- (April) 2025 Society for Biomaterials (SFB) 2025 Meeting / Invited Speaker
SFB, Chicago, IL
- (May) 2025 Seminar series / Invited Speaker
Icahn Genomics Institute (IGI), Department of Immunology and Immunotherapy,
Icahn School of Medicine at Mount Sinai, New York, NY
- (July) 2025 Controlled Release Society (CRS) Annual Meeting / Invited Speaker
CRS, Philadelphia, PA

International

- 2002 Innovative Polymer/Clay Nanocomposites Produced by Melt-Mixing / Invited lecture
The Italian Ministry of Science, Ischia, Italy
- 2003 Polymer/Clay Nanocomposites Systems: Development, Characterization and
Processing-Structure-Property Relationships/ Invited lecture
Universite de Lyon, France
- 2010 Modular Polymeric Materials for Clinical Applications / Plenary speaker
Israel Polymers and Plastics Society, Tel Aviv, Israel
- 2012 Tunable Adhesive Materials for Specific Tissue Microenvironments / Invited lecture
The 13th Adhesion and Adhesives Congress, Barcelona, Spain
- 2013 Controlling and Predicting Materials Performance in Complex Biological
Environments/ Invited lecture
Israel Society for Polymers and Plastics, Ramat-Gan, Israel
- 2013 Biomaterials Performance is Differentially Altered by Inflammatory and Neoplastic
Diseases/ Invited lecture
Israel Society for Biotechnology Engineering, Tel-Aviv, Israel
- 2014 Using Materials to Understand Biology and Biology to Optimize Materials / Invited
lecture
SIMEC 2014, Buzios, Brazil
- 2017 Multifunctional biomaterials for on-demand cancer therapy / Invited lecture
Department of Medicine, Tel-Aviv University, Israel
- 2017 Multifunctional biomaterials for on-demand cancer therapy / Invited lecture
BIGHEART Symposium, Singapore

- 2018 Biologically informed (nano)biomaterials for precision cancer therapy / Invited lecture
Department of Biomedical Engineering, Technion, Haifa, Israel
- 2019 Rational Material Design for Precision Cancer Therapy/ Invited lecture
Controlled Release Society, Valencia, Spain
- 2020 Translating Smart Adaptive Biomaterials / Invited lecture
BioAsia Taiwan. (Virtual)
- 2020 Technology and Entrepreneurship/ Moderator
BioAsia Taiwan (Virtual)
- 2020 Engineering Therapeutic Immunity using Materials / Invited lecture
11th World Biomaterials Congress, Scotland (Virtual)
- 2021 Engineering Therapeutic Immunity using Materials / Invited lecture
National Science Day Event, MIT-ADT University, Pune, India (Virtual)
- 2021 Engineering Therapeutic Immunity Using Materials / Invited lecture
Cell Press Webinar (Virtual)
- 2021 Biomaterials-aided combination immunotherapy / Invited lecture
PAT-ICRS, Israel (Virtual)
- 2021 Biomaterials-aided combination immunotherapy / Invited lecture
The 1st International conference on Nanomedicine meets the Tumor
MicroEnvironment (NanoTME2021), Netherlands (Virtual)
- 2021 Biomaterials-Aided Combination Immunotherapy / Invited lecture
Bio-Inspired Nano Materials, Nature Conference, Seoul National University, South
Korea (Virtual)
- 2021 Engineering Therapeutic Immunity using Materials: New Opportunities for Precision
Cancer Therapy / Invited lecture Summer School on Molecular Imaging, Spain
(Virtual)
- 2022 New Opportunities for Precision Immunomodulation Using Biomaterials / Invited
Lecture
5th International Conference on Recent Trends in Bioengineering (ICRTB), MIT-ADT
University, Pune, India (Virtual)
- 2022 Engineering Immunity Using Biomaterials / Invited Lecture
Controlled Release Society Annual Meeting, Montreal, Canada
- 2022 Biomaterials for Immune modulation / Invited Lecture
Institute for Digital Medicine (WisDM), National University of Singapore, Biomedical
Engineering, Singapore
- 2022 Delivering on the Promise of Immunotherapy / Invited Lecture
Advanced Manufacturing Technology Symposium, Nanyang Technological
University, Singapore

- 2024 Delivering on the Promise of Immunotherapy / Invited Lecture
7th International Conference on Recent Trends in Bioengineering, MIT/ADT University, Pune, India (Virtual)
- 2024 Tissue-Responsive Biomaterials for Medical Applications / Invited Speaker
International Conference On Advancement in Chemical & Biological Research: Breaking Boundaries & Shaping the Future (ACBBBF-2024), Tarsadia Institute of Chemical Science, Gujarat, India (Virtual)
- 2024 Biomaterials for delivering on the promise of immunotherapy / Invited Speaker
Biomedical Engineering Department, University of Toronto, Toronto, CA
- 2024 Delivering on the Promise of Immunotherapy / Invited Speaker
The Institute for Digital Medicine (WisDM) at NUS Medicine Innovation Forum, National University of Singapore, Singapore
- 2024 An Adaptive Biomaterial Platform for Therapeutic Applications / Keynote Speaker
2024 International Symposium on Superwettability+, Sentosa, Singapore
- 2024 Delivering on the Promise of Immunotherapy / Distinguished Invited Speaker
ACS Nano Summit, City University of Hong Kong, Hong Kong
- 2024 Tissue- and Cell- Responsive Materials for Medical Applications / Invited Speaker
Mini Workshop, Seoul National University, South Korea
- 2024 Delivering on the Promise of Immunotherapy / Invited Speaker
Acta Biomaterialia Silver Medal Award Talk, World Biomaterials Conference, Daegu, South Korea
- 2024 Local Chemoimmunotherapy Delivery for Brain Cancer / Invited Speaker
Clemson Award for Applied Science Talk, World Biomaterials Conference, Daegu, South Korea
- 2024 Tissue- and cell- responsive materials for therapy / Keynote Speaker
Bio-inspired Materials: From Design to Function
Gordon Research Conference (GRC), Les Diablerets, Switzerland
- 2024 Tissue- and Cell- Responsive Materials for Medical Applications / Invited Speaker
Controlled Release Society (CRS), Bologna, Italy
- (June) 2025 Invited Speaker
Gordon Research Conference 2025, Lucca, Italy

Report of Technological and Other Scientific Innovations

Biocompatible adhesive materials and methods describes the formulation of a hydrogel-based adhesive sealants to prevent leakage after internal surgeries and

US patent number 8802072; Patent Granted August 12, 2014. <https://patents.justia.com/patent/8802072>
During my postdoctoral studies at the Edelman lab at MIT, I developed an adhesive material formulation for medical applications. This patent has been licensed by me and my co-founder, Prof. Elazer Edelman from MIT, to our company, BioDevek. www.biodevek.com

reinforce the anastomotic line.

The company has raised close to \$4M in non-dilutive funds and has partnered with major industry leaders to propel the technology to the clinic.

Theranostic Nanoprobes for Overcoming Cancer Multidrug Resistance and Methods.

US Publication Number: 20160243254. Patent Application filed February 19, 2016. <https://patents.justia.com/patent/20160243254>
Theranostic nanoprobes are provided for overcoming cancer multidrug resistance using gold nanoparticles functionalized with DNA-hairpin. The DNA-hairpin is configured to hybridize to a complementary target, which silences or lessens the multidrug resistance of cancer cells. The theranostic nanoprobes may be configured to release a chemotherapeutic agent upon hybridization of the DNA-hairpin to a target molecule, and to report on these events by light emission. This approach has been used and validated by many labs in the US and abroad.

Method for imaging biomaterial erosion in vivo as well as drug release non-invasively using an in vivo imaging system (IVIS) which is now used routinely in the scientific community.

US patent number 9480404; Patent Granted November 1, 2016. <https://patents.justia.com/patent/9480404>
During my postdoctoral studies at the Edelman lab at MIT, I developed this method to enable serial noninvasive imaging of implants to study their degradation rate and fate while eliminating the need to sacrifice animals at different time points that provides with qualitative measures and excessive use of animals. The same strategy is used to track embedded drugs as well as treatment outcomes in tumors and in other diseases by multiple labs in US and abroad.

Micro-RNA Delivery compositions, Devices, and Methods describe the use of metal nanoparticles for gene therapy that can be combined with other drugs and delivered alone or via a hydrogel depot.

US Publication Number: 20190185854. Patent Application filed June 23, 2017. <https://patents.justia.com/patent/20190185854>
My lab, in collaboration with Tel-Aviv University, provided compositions that include a metal nanoparticle functionalized with a miRNA and a targeting molecule. The compositions may be used to prevent or reduce the rate of metastasis of cancer cells. The compositions also may include a drug, such as a chemotherapeutic agent. The compositions also may include a hydrogel in which the metal nanoparticles are dispersed. Methods of miRNA and/or drug delivery and kits also are provided. This approach has been used and validated by many labs in the US and abroad.

Functionalized Nanoparticles and Compositions for Cancer Treatment and Methods.

US Publication Number: 20190142966. Patent Application filed May 11, 2017. <https://patents.justia.com/patent/20190142966>
This invention describes the use of two types of metal nanoparticles for drug delivery and gene therapy as well as laser ablation in the treatment of cancer. This approach has been used and validated by many labs in the US and abroad.

Polymeric Carriers and Methods were developed for large-scale cell manufacturing.

US Publication Number: 20200080051. Patent application Filed May 1, 2018. <https://patents.justia.com/patent/20200080051>
My lab, in collaboration with Lonza, provided methods of controlling disassociation of cells from a carrier, compositions, and methods of collecting cells that may include contacting a polymeric carrier with one or more digesting agents to disassociate at least a portion of a plurality of cells from the polymeric carrier. This method is being validated by Lonza.

<p>Narrowly-Distributed Multi-Armed Polyethylene Glycol Compounds, Hydrogels, and Methods describe the development of an adhesive for medical applications.</p>	<p>US Patent Number: 10526457. Patent Granted January 7, 2020. https://patents.justia.com/patent/10526457 Funded by NOF Corporation, we developed methods for treating, adhering, or sealing a biological tissue with hydrogels composed of narrowly-distributed multi-armed polyethylene glycol compound, and kits for making a hydrogel. Drug releasing compositions also are provided. NOF is validating this work.</p>
<p>Controllably degradable compositions and methods describes a method by which hydrogel-based adhesive materials applied following trauma can be dissolved on-demand to enable facile material removal for follow-up treatment.</p>	<p>US patent number 8802072; Patent Granted August 11, 2020. https://patents.justia.com/patent/10736914 US patent number 9877984; Patent Granted January 30, 2018. https://patents.justia.com/patent/9877984 During my postdoctoral studies at the Edelman lab at MIT, I developed a method by which materials can be dissolved on demand by the addition of pH modifying agents or light to enable safe removal of temporary dressing. These patents have also been licensed to BioDevek.</p>
<p>Microneedle-Based Platform for Simultaneous Local Delivery of Drugs and Skin Interstitial Fluid (ISF) extraction describe a method for transdermal drug delivery and monitoring of ISF biomarkers.</p>	<p>Provisional Patent Application 63/154688 (Composition of Matter). Filed March 1, 2021. This microneedle technology provides a patch that can be self-administered to deliver drugs transdermally as well as to sample ISF for biomarker analysis, including soluble factors and cells that inform on the patient's health state. This is now being used in my lab for multiple applications, including cancer therapy and diagnosis, autoimmune diseases, as well as CNS diseases, and multiple sponsored-research agreements are being signed with my lab leveraging this technology.</p>
<p>Nucleic acid-conjugated poly-beta-amino-esters (pBAE)-based nanoparticles for gene therapy.</p>	<p>Provisional Patent Application 2021-380. Filed April 22, 2021. My lab developed a nanoparticle formulation for the systemic delivery of stimulator of interferon gene (STING)-agonist for cancer therapy. The project was funded by Takeda Pharmaceuticals.</p>
<p>Compositions For Local Therapy Delivery to Brain Tumors and Methods.</p>	<p>Provisional Patent Application 17648-0276. Filed April 25, 2022. My lab developed an adhesive-based hydrogel for local and sustained delivery of therapy in the brain and other organs. The project won internal Harvard and MIT award and is underway to become a NewCo.</p>

Report of Education of Patients and Service to the Community

Activities

Those presentations below sponsored by outside entities are so noted and the sponsor is identified.

- 2009-2016 Boston Regional Manager, ScienceAbroad
Organized lectures and recruiting events for Israeli scientist residing in Boston

- 2015 Daniel Fulop, MD/MSCR Candidate / Icahn School of Medicine at Mount Sinai, New York, NY

Research advisor to high school student seeking career guidance.

2016-Present Scientific Advisory Board, ScienceAbroad

2017 Work-life balance: personal fulfillment and professional success, Amazon, Cambridge, MA
Lecture.

2023-2024 Research Supervision over summer internship at BWH
Research internship supervisor for two high school students

Recognition

- 2009 MIT team aims to tailor surgical glues for specific applications
MIT News: <https://news.mit.edu/2009/glue-0709> (July 9, 2009). Nature Medicine: <https://www.nature.com/articles/nm0909-978c>
- 2015 MIT researchers design tailored tissue adhesives: Glue can be modified for optimal performance in different types of diseased tissue.
<https://news.mit.edu/2015/tailored-tissue-adhesives-0128> (Jan 28, 2015).
NanoWerk News: <https://www.nanowerk.com/news2/biotech/newsid=38881.php> (Jan 29, 2015).
Qmed: <https://www.mddionline.com/10-biomaterial-breakthroughs-matter-medtech/gallery?slide=5> (June 16, 2015).
- 2015 New nanodevice defeats drug resistance
MIT News: <https://news.mit.edu/2015/nanodevice-defeats-cancer-drug-resistance-0302> (Mar 2, 2015).
Cnet: <https://www.cnet.com/news/new-nanodevice-delivers-a-smackdown-to-cancers-defenses/> (Mar 3, 2015).
Cosmos Magazine: <https://cosmosmagazine.com/biology/gold-trojan-nano-horse-fights-cancer/> (Mar 16, 2015).
Nature reviews Drug Discovery. <https://www.nature.com/articles/nrd4617> (Apr 24, 2015).
- 2015 A new way to deliver microRNAs for cancer treatment
MIT News: <https://news.mit.edu/2015/micrna-shrink-tumor-cancer-treatment-1207> (Dec. 7, 2015).
Brigham Clinical and Research News: https://bwhclinicalandresearchnews.org/2015/11/19/whats-new-in-research-19/?utm_source=twitter&utm_medium=social&utm_campaign=clinical&utm_term=other&date=120715&u=115#artzi (Nov 19, 2015).
Science Translational Medicine:

		https://stm.sciencemag.org/content/7/319/319ec219 (Dec 23, 2015).
2016	Patch that delivers drug, gene, and light-based therapy to tumor sites shows promising results	MIT News: https://news.mit.edu/2016/patch-delivers-drug-gene-light-based-therapy-tumor-0725 (July 25, 2016). The Naked Scientists: https://www.thenakedscientists.com/articles/science-news/patch-beats-colorectal-tumours (Aug 3, 2016). Science Translational Medicine: https://stm.sciencemag.org/content/8/352/352ec132 (Aug 17, 2016).
2016	MIT Research Uncovers a Way to Keep Cancer From Spreading	The business journals. https://www.bizjournals.com/boston/inno/stories/news/2016/09/19/mit-research-uncovers-a-way-to-keep-cancer-from.html (Sep 19, 2016).
2016	Local Scientists Bolstering Joe Biden's Cancer Campaign.	Boston Herald https://www.bostonherald.com/2016/10/20/local-scientists-bolstering-joe-bidens-cancer-campaign/ (October 19, 2016)
2019	7 innovative MedTech leaders you need to know	MassDevice. https://www.massdevice.com/7-innovative-medtech-leaders-you-need-to-know/4/ (November 8, 2019)
2020	MALSI awardee	Massachusetts Life Sciences. https://www.masslifesciences.com/wp-content/uploads/MassNextGen-Year-Three-Bios-V2.pdf (June 15, 2020)
2020	Notable Technion Alumni: Where Are They Now?	American Technion society. https://ats.org/wp-content/uploads/2020/08/2020-TUSA-Evergreen_FINAL.pdf (July 1, 2020).
2021	Utilizing Complex Materials to Improve Post-Surgical Outcomes.	Nasdaq. https://www.nasdaq.com/articles/natalie-artzi%3A-utilizing-complex-materials-to-improve-post-surgical-outcomes-2021-04-21 (April 21, 2021).
2021	Donations to Massachusetts Institute of Technology (MIT) and Brigham and Women's Hospital in support of the Artzi Lab	Sirtex Medical https://www.prnewswire.com/news-releases/sirtex-medical-provides-donations-to-massachusetts-institute-of-technology-mit-and-brigham-and-womens-hospital-in-support-of-the-artzi-lab-as-part-of-sirtexs-corporate-citizenship-strategy-to-support-research-and-innovation-301307514.html (June 8, 2021)

2021	Microneedle Patches Could Offer Local, Painless Drug Delivery	Brigham Clinical and Research News: https://bwhclinicalandresearchnews.org/2021/06/11/whats-new-in-research-june-2021/ (Jun 11, 2021).
2021	<i>Top 50 MedTech Startups for Annual Showcase and Accelerator.</i>	MedTech Innovator https://medtechinnovator.org/medtech-innovator-unveils-top-50-medtech-startups/ (June 15, 2021)
2021	Enhancing Surgical Outcomes with Transformative Adhesive Materials	Outcomes Rocket https://outcomesrocket.health/biodevek/2021/09/ (Sept 28, 2021)
2021	MedTech Innovator Finalist	Ximedica https://www.linkedin.com/feed/update/urn:li:activity:6846970851196317696/ (September 29, 2021)
2021	Medical Design and Outsourcing— Women in MedTech 2021	Issuu https://issuu.com/wtwhmedia/docs/mdo_october-wimt-21_vs2/44 (October 1, 2021)
2021	Catheter-Deliverable Biomaterial Sealants: Interview with Natalie Artzi, Co-founder of BioDevek	The Health Guild https://thehealthguild.com/catheter-delivery-biomaterial-sealants-interview-with-natalie-artzi-co-founder-of-biodevek/27861/ (Nov 30, 2021)
2021	Stepping Strong Breakthrough Award Recipient	Stepping Strong Center for Trauma Innovation, Brigham and Women's Hospital https://steppingstrong.bwh.harvard.edu/stepping-strong-breakthrough-innovator-2021-marc-wein-md-phd/ (Nov 5, 2021)
2021	MIT Future Founders Initiative	MIT News https://news.mit.edu/2021/mit-future-founders-initiative-prize-promote-female-biotech-entrepreneurs-1130 (Nov 30, 2021)
2022	Harvard Innovations Labs	President's Innovation Challenge. 25 Finalists. https://harvard.us2.list-manage.com/track/click?u=fa4d71772068da0016522f5b4&iid=3bbfa5d90e&e=5836fc5d2b (April 21, 2022)
2022	Hacking the immune System	Mass General Brigham Post at the New York Times https://www.nytimes.com/paidpost/mass-general-brigham/hacking-the-immune-system.html

		(May 2, 2022)
2022	Natalie Artzi, PhD is Leading the way in Gene Therapy	Mass General Brigham https://www.massgeneralbrigham.org/how-we-lead/innovation/gene-cell-therapy/natalie-artzi-leading-the-way (May 4, 2022)
2022	New member of the Wyss Associate Faculty	Wyss Institute for Biologically Inspired Materials https://www.linkedin.com/company/wyssinstitute/ https://wyss.harvard.edu/team/associate-faculty/ (May 9, 2022)
2023	Moving the needle on monitoring skin cancer	Wyss Institute for Biologically Inspired Materials https://wyss.harvard.edu/news/moving-the-needle-on-monitoring-skin-cancer/ (Aug 21, 2023)
2023	Personalizing the Future of Cancer Detection	American Institute of Chemical Engineers (AIChE)- Chemical Engineering Progress (CEP) https://www.aiche-cep.com/cep/magazine/november_2023/MobilePagedArticle.action?articleId=1927553&app=false#articleId1927553 (November 1, 2023)
2024	Acta Biomaterialia Silver Medal	Acta Biomaterialia https://www.sciencedirect.com/science/article/pii/S1742706123006396 (Jan 1, 2024)
2024	A sprayable gel could make minimally invasive surgeries simpler and safer	MIT News https://news.mit.edu/2024/sprayable-gel-could-make-minimally-invasive-surgeries-simpler-safer-0312 (March 12, 2024)
		Brigham Clinical and Research News https://bwhclinicalandresearchnews.org/2024/03/15/whats-new-in-research-march-2024/#artzi (March 22, 2024)
		MIT Technology Review https://www.technologyreview.com/2024/06/25/1093105/sprayable-gel-simplifies-surgeries/ (June 25, 2024)
2024	Advancing Care Using Advanced Delivery Materials	Brigham Clinical and Research News https://bwhclinicalandresearchnews.org/2024/03/15/brigham-researchers-pursue-the-next-generation-of-gene-therapy-technologies/ (March 15, 2024)

2024	New Treatment Could Reverse Hair Loss Caused By An Autoimmune Skin Disease	MIT News https://news.mit.edu/2024/new-treatment-could-reverse-hair-loss-caused-autoimmune-skin-disease-0509 (May 9, 2024)
		The Harvard Gazette https://news.harvard.edu/gazette/story/2024/06/researchers-reverse-hair-loss-caused-by-alopecia-areata-autoimmune/ (June 12, 2024)
		U.S. News https://www.usnews.com/news/health-news/articles/2024-05-13/microneedle-patches-might-reverse-a-form-of-hair-loss (May 13, 2024)
		HealthDay https://www.healthday.com/health-news/general-health/microneedle-patch-might-restore-hair-growth-after-alopecia (June 10, 2024)
2024	Exploring How to Enhance Drug Delivery and Efficacy Through Nanoparticles and Macroscale Materials	Brigham Health On A Mission https://www.brighamhealthonamission.org/2024/05/20/exploring-how-to-enhance-drug-delivery-and-efficacy-through-nanoparticles-and-macroscale-materials (May 21, 2024)
2024	Harvard Researchers Plan to Develop New RNA Therapies	ARPA-H https://arpa-h.gov/research-and-funding/mission-office-iso/awardees (August 1, 2024)
		Politico https://www.politico.com/newsletters/future-pulse/2024/08/01/hospitals-go-green-00172173 (August 1, 2024)
2024	Wyss Institute Promotes Natalie Artzi to its Core Faculty	Wyss Institute https://wyss.harvard.edu/news/wyss-institute-promotes-natalie-artzi-to-its-core-faculty-and-appoints-di-feng-as-an-associate-faculty-member/ (August 12, 2024)

Report of Scholarship

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* denotes equal contribution

Peer-reviewed publications in print or other media

Research investigations

1. **Artzi N**, Nir Y, Wang D, Narkis M, Siegmann A. EVOH/Clay Nanocomposites Produced by Melt Processing. *Polymer Composites*. 2001;22: 710-720. <https://doi.org/10.1002/pc.10573>
2. **Artzi N**, Nir Y, Narkis M, Siegmann A. Melt Blending of EVOH/Clay nanocomposites: Effect of Clay Type and Processing Conditions. *Journal of Polymer Science Part B: Polymer Physics*. 2002;40;1741-1753. <https://doi.org/10.1002/polb.10236>
3. **Artzi N**, Nir Y, Narkis M, Siegmann A. The Effect of Maleated Compatibilizers on the Structure and Properties of EVOH / Clay Nanocomposites. *Polymer Composites*. 2003;24:627-639. <https://doi.org/10.1002/pc.10058>
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5. **Artzi N**, Khatua BB, Tchoudakov R, Narkis M, Berner A, Siegmann A, Lagaron JM. Physical and Chemical Interactions in Melt Mixed Nylon-6 / EVOH Blends. *Journal of Macromolecular Science Part B: Physics*. 2004;B43(3):605-624. <https://doi.org/10.1081/MB-120030009>
6. **Artzi N**, Tzur A, Narkis M, Siegmann A. The Effect of Extrusion Processing Conditions on EVOH/clay Nanocomposites at Low Organo-Clay Contents. *Polymer Composites*. 2005;26(3):343-351. <https://doi.org/10.1002/pc.20096>
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4. Freeman, F.E, Dosta Pons, P, Burdis, R, Mahon, O.R, Kelly, D.J, **Artzi, N**. (2022). The Orthopaedic Research Society (ORS) Meeting 2022, Feb 5-8th, In Person. Localized nanoparticle-mediated delivery of miR-29b and systemic doxorubicin as a potential combination therapy to suppress osteosarcoma growth whilst also aiding in the regeneration of the surrounding damaged bone. Selected for oral presentation presented by [Freeman, F].

Narrative Report

I am an Associate Bioengineer in the Division of Engineering in Medicine at Brigham and Women's Hospital, and an Associate Professor of Medicine at Harvard Medical School. Additionally, I am one of twelve Core Faculty members at the Wyss Institute for Biologically Inspired Engineering at Harvard University, and a Principal Research Scientist at the Institute for Medical Engineering and Science (IMES) at MIT. I serve as the Head of Structural Nanomedicine at Mass General Brigham's Gene and Cell Therapy Institute. I also serve as a scientific advisor to the BWH Stepping Strong Center for Trauma Innovation and sit on its Medical Executive Committee.

My research focuses on understanding the role of biomaterials in modulating the immune system. My laboratory combines chemistry, materials science, biology, immunology, and imaging to design site-, time-, and disease-specific modular materials, with the goal of understanding fundamental mechanisms that will guide the design of clinical solutions. I seek to enhance the understanding of tissue-material interactions under specific environments and applications. My research team and I invented tissue-responsive adhesive materials that sense and respond to chemical and biological cues, maximizing performance under different disease types and states. Based on this body of work, I co-founded BioDevek, a company focused on developing biomaterials as surgical solutions to enhance patients' quality of life and life expectancy. In a 2015 paper published in *PNAS*, we leveraged cancer-specific traits—specifically, the mRNA of multidrug resistance protein 1, which is responsible for chemotherapy resistance—to trigger the release of chemotherapy once this protein is knocked down by our gene therapy. We are now utilizing tissue- and cell-responsive nanostructures for the effective delivery of immune modulators and investigating the effects of administration routes, combination therapies, and spatiotemporal release kinetics on immune responses.

Our work has played a pivotal role in establishing the emerging field of structural nanomedicine, which focuses on designing nanostructures with controlled architectures at the molecular and cellular levels for therapeutic and diagnostic applications. A library of nanoparticle-based materials for systemic gene therapy delivery served as the foundation for our collaboration with Takeda Pharmaceuticals (2019-2021). We then engineered cell-responsive nanostructures chemically conjugated to an immune activator—a stimulator of interferon genes (STING) agonist—to enhance drug stability and loading per particle. These potent structures facilitated the study of efficacy and immune responses across a range of solid tumors (*Nature Nanotechnology*, 2023). In this work, we uncovered a novel phenomenon we termed the “paracrine transfer effect” (PTE), where nanomedicines undergo exocytosis from a ‘waypoint cell’ and are subsequently taken up by a ‘destination cell,’ thereby influencing both. This finding has important implications for nanomedicine design. Additionally, we discovered that the spleen is essential for generating anti-tumor immune memory, which is critical for developing robust, long-lasting therapies. To leverage these outcomes in hard-to-reach tumors, we utilized our adhesive hydrogels to enable local delivery of combination chemoimmunotherapy for brain cancer treatment (BWH Bright Futures Prize, 2019; MIT Deshpande Center grant, 2020-2023), eliminating the need to cross the blood-brain barrier and enhancing therapeutic outcomes. I founded SpideRx Biotechnologies to advance this approach to clinical applications.

Another organ that can benefit from localized delivery is the skin—the only accessible organ in our body. However, conventional drug delivery often relies on systemic administration since topical creams struggle to penetrate the skin's selective membrane—the stratum corneum. To address this challenge, we developed a microneedle patch for transdermal delivery of therapeutics and simultaneous sampling of skin interstitial fluid biomarkers (Evergreen Innovations Fund Award, 2020; Brigham Ignite Award, 2022-2023, with Dr. Jamil Azzi). This technology shows promise for treating alopecia areata, psoriasis, male pattern baldness, vitiligo, and dermatitis (*Advanced Materials*, 2024). This innovation led to the co-founding of Lybra Bio to transform treatments for patients with autoimmune skin disorders. Additionally, my lab is part of a consortium funded by Angea Biotherapeutics (2022-2025, co-PIs: Patricia Musolino, Mark Lindsay, and Rajeev Malhotra, MGH) that focuses on developing non-viral delivery systems for treating rare diseases—specifically, gene therapy for multisystemic smooth muscle disease syndrome and gene editing for multisystem smooth muscle dysfunction syndrome.

My leadership in science is underscored by my roles and contributions across prestigious institutions and committees. I am Chair of the Moffitt Biomedical Engineering Advisory Board at the Moffitt Cancer Center, and Associate Editor of the American Chemical Society (ACS) Nano journal. In addition to being Chair of the 2023 international NanoDDS conference, for which I organized and fundraised the program, I was Co-Chair of the 2024 Forbeck Forum, Vice Chair of the 2024 Drug Carriers in Medicine and Biology Gordon Research Conference (GRC), and elected Chair of the upcoming 2026 GRC.

For my significant supporting activities, I serve as the Head of Structural Nanomedicine at Mass General Brigham's Gene and Cell Therapy Institute (GCTI). I work with the GCTI leadership to ensure manufacturability of nanomaterials that can be made as a service to the MGB community, generate new technologies that can attract patients to MGB for clinical trials, and establish partnerships with industry. I also serve as the scientific adviser of the Stepping Strong Center for Trauma Research at BWH and serves on the Center's medical advisory board. In my role, I help shape the scientific direction of the Center, select top programs to be funded by the Center, and help in planning and executing the annual Stepping Strong Symposium, and support translation of advanced inventions to patients.

As an immigrant to the United States and a mother of three, I am committed to supporting female scientists and engineers, as reflected by my initiatives to increase access and resources for students. I have established international student exchange programs with countries like Mexico, Spain, and Israel, enriching educational experiences and promoting global collaboration. I also mentor local high school students, introducing them to biomedical engineering. My contributions have been recognized with numerous prestigious awards, including the 2024 Acta Biomaterialia Silver Medal, the 2024 Clemson Award for Applied Research, and the mid-career award from the Society for Biomaterials. I was the inaugural recipient of the Kabiller Rising Star Award in Nanomedicine. I am a Fellow of both the American Institute for Medical and Biological Engineering (AIMBE) and the Controlled Release Society, honoring contributions to biomedical engineering and drug delivery technologies.