

# **THIRD CARNEGIE MELLON FORUM ON BIOMEDICAL ENGINEERING**

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September 18-19, 2020

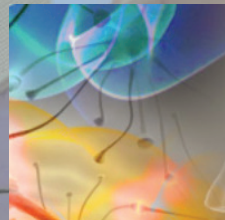
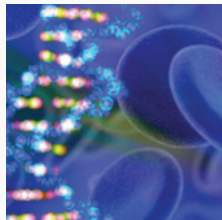
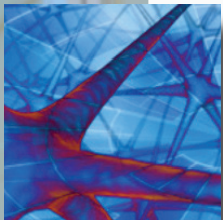
**Carnegie Mellon University**



# Explore Frontiers in Biomedical Engineering!

The Carnegie Mellon Forum on Biomedical Engineering provides a platform for discussions and identification of grand challenges and frontiers in biomedical engineering research, education, and translation.

This year's forum is held virtually and consists of keynote and plenary talks as well as poster presentations in the frontiers of biomedical engineering. A poster award competition is open to students, postdocs or fellows who present their research in any area interfacing engineering with medicine and health.



# Program

## FRIDAY, SEPTEMBER 18

### Carnegie Mellon Forum on Biomedical Engineering

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09:00 – 09:05	<b>Welcome Remarks</b> <b>William H. Sanders</b> <b>William D. and Nancy W. Strecker Dean</b> College of Engineering Carnegie Mellon University
09:05 – 09:20	<b>Biomedical Engineering at Carnegie Mellon</b> <b>Bin He, IAMBE</b> Trustee Professor and Department Head of Biomedical Engineering Carnegie Mellon University Chair, International Academy of Medical and Biological Engineering
09:20 – 09:50	<b>Keynote: Statistical Inferences using Time-Frequency Methods and Control of Brain States</b> <b>Emery N. Brown, NAS, NAE, NAM, IAMBE</b> Edward Hood Taplin Professor of Computational Neuroscience and Health Sciences & Technology Massachusetts Institute of Technology <b>Moderator: Byron Yu, PhD</b> Professor of Biomedical Engineering and Electrical & Computer Engineering Carnegie Mellon University
09:50 – 10:20	<b>Keynote: Tissue Engineering for Impact in Medicine</b> <b>Gordana Vunjak-Novakovic, NAE, NAM</b> University Professor and Mikati Foundation Professor of Biomedical Engineering and Medicine Columbia University <b>Moderator: Charlie Ren, PhD</b> Assistant Professor of Biomedical Engineering Carnegie Mellon University
10:20 – 10:30	<b>BREAK</b>
10:30 – 11:00	<b>IAMBE New Fellow Induction Ceremony</b> International Academy of Medical and Biological Engineering
11:00 – 11:30	<b>Keynote: Bioengineering as a Role Model for How Convergence Will Advance Society's Grand Challenges and Opportunities</b> <b>Kenneth R. Lutchén, IAMBE</b> Dean, College of Engineering Professor, Biomedical Engineering Boston University <b>Moderator: Bin He, IAMBE</b> Trustee Professor and Department Head of Biomedical Engineering Carnegie Mellon University Chair, International Academy of Medical and Biological Engineering

# Program continued

<b>11:30 – 12:00</b>	<p><b>Keynote: Advances in Responsive Hydrogels and their Biological Applications</b></p> <p><b>Kristi S. Anseth, NAS, NAE, NAM, IAMBE</b> Tisone Distinguished Professor of Chemical and Biological Engineering University of Colorado at Boulder</p> <p><b>Moderator: Nicholas A Peppas, NAE, NAM, IAMBE</b> Cockrell Family Regents Chaired Professor of Biomedical &amp; Chemical Engineering Director, Institute of Biomaterials, Drug Delivery and Regenerative Medicine University of Texas at Austin</p>
<b>12:00 – 12:30</b>	<p><b>Keynote: Challenges and Opportunities in Image-Guided Drug and Gene Delivery</b></p> <p><b>Katherine Ferrara, NAE</b> Professor of Radiology Stanford University</p> <p><b>Moderator: Michael R. King, IAMBE</b> J. Lawrence Wilson Professor and Department Chair of Biomedical Engineering Vanderbilt University Chair, Council of Chairs of BME/BioE Departments</p>
<b>12:30 – 13:00</b>	<b>LUNCH BREAK</b>
<b>13:00 – 13:30</b>	<p><b>Keynote: Challenges and Opportunities in Musculoskeletal Research</b></p> <p><b>Savio L-Y. Woo, NAE, NAM</b> Distinguished University Professor Emeritus and Director of Musculoskeletal Research Center University of Pittsburgh</p> <p><b>Moderator: Steve Chase, PhD</b> Associate Professor of Biomedical Engineering and Neuroscience Institute Carnegie Mellon University</p>
<b>13:30 – 14:00</b>	<p><b>Keynote: A Perspective of how COVID 19 has Impacted the Biomedical Industry</b></p> <p><b>William Gausa</b> Head of Advanced Innovation Philips</p> <p><b>Moderator: Siyang Zheng, PhD</b> Associate Professor of Biomedical Engineering and Electrical &amp; Computer Engineering Carnegie Mellon University</p>
<b>14:00 – 16:30</b>	<b>POSTER SESSION</b>
<b>16:30 – 16:45</b>	<b>Announcement of Poster Awards</b>

# Program continued

## SATURDAY, SEPTEMBER 19

### IAMBE Symposium on Grand Challenges in Biomedical Engineering

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09:00 – 09:05

#### Opening Remarks

Bin He, IAMBE

Chair, International Academy of Medical and Biological Engineering

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#### SESSION 1: MEDICAL DEVICES

**Moderator:** Bin He, IAMBE

Trustee Professor and Department Head of Biomedical Engineering  
Carnegie Mellon University

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09:05 – 09:30

#### Plenary: A Point of Care Diagnostic for Emerging Pandemics

Ashutosh Chilkoti, IAMBE

The Alan L. Kaganov Professor of Biomedical Engineering and Chair of the  
Department of Biomedical Engineering  
Duke University

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09:30 – 09:55

#### Plenary: Biomedical Information Processing Studies on Optical Mapping Data of Reentrant Activities in Cardiac Arrhythmia

Ichiro Sakuma, IAMBE

Professor, School of Engineering  
Director, Research Institute for Biomedical Science and Engineering  
University of Tokyo

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09:55 – 10:20

#### Plenary: Control of Tumor Metastasis, Role of Biomedical and Engineering Interdisciplinary Research

Lisa X. Xu, IAMBE

Chair Professor in Biomedical Engineering  
Vice President for Graduate Education and International Affairs  
Shanghai Jiao Tong University

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10:20 – 10:45

#### Plenary: Frontiers of Biorobotics and Bionics Science and Engineering

Paolo Dario, IAMBE

Professor of Biomedical Robotics  
Director of The BioRobotics Institute  
Scuola Superiore Sant'Anna (SSSA), Pisa, Italy

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10:45 – 10:55

#### BREAK

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# Program continued

## SESSION 2: NEUROENGINEERING AND BIOINFORMATICS

**Moderator: Zhi-Pei Liang, IAMBE**

Franklin W. Woeltge Professor of Electrical and Computer Engineering  
Co-Chair, Integrative Imaging Theme in the Beckman Institute for  
Advanced Science and Technology  
University of Illinois at Urbana-Champaign

10:55 – 11:20

### **Plenary: Neuroengineering Frontiers: Translating Research through Big Ideas and Teamwork**

**Nitish V. Thakor, IAMBE**

Professor of Biomedical Engineering  
Johns Hopkins University and National University of Singapore  
Director, Singapore Institute for Neurotechnology  
Editor-in-Chief, Medical and Biological Engineering and Computing

11:20 – 11:45

### **Plenary: Reverse-Engineering the Brain: The Biophysical Bases of Functional Cortical Organization**

**John A. White, IAMBE**

Professor and Chair of Biomedical Engineering  
Boston University  
President-elect, Biomedical Engineering Society

11:45 – 12:10

### **Plenary: Systems Medicine at the Interface of Engineering, Data Sciences and Pathology**

**Shankar Subramaniam, IAMBE**

Distinguished Professor of Bioengineering, Bioinformatics and Systems Biology  
University of California at San Diego  
President, IEEE Engineering in Medicine and Biology Society

12:10 – 13:00

### **LUNCH BREAK**

## SESSION 3: BIOMEDICAL IMAGING

**Moderator: Gary Glover, NAE, IAMBE**

Professor of Radiology, Neurosciences & Biophysics, and of Electrical  
Engineering & Psychology  
Stanford University

13:00 – 13:25

### **Plenary: Light and Sound: Integrating Photonics with Ultrasonics for Biomedical Applications**

**Matthew O'Donnell, NAE, IAMBE**

Frank and Julie Jungers Dean Emeritus and Professor of Bioengineering  
University of Washington  
Distinguished Lecturer, IEEE-UFFC Society

# Program continued

13:25 – 13:50

**Plenary: Molecular Imaging Using Magnetic Resonance Signals:  
A Marriage of Quantum Mechanics with Machine Learning to  
Enable High Resolution**

**Zhi-Pei Liang, IAMBE**

Franklin W. Woeltge Professor of Electrical and Computer Engineering  
Co-chair, Integrative Imaging Theme in the Beckman Institute for Advanced  
Science and Technology  
University of Illinois at Urbana-Champaign

13:50 – 14:15

**Plenary: Is There Evidence That CNN/NN/DL Can Solve  
Inverse Problems in Tomographic Imaging?**

**Xiaochuan Pan, IAMBE**

Professor, Departments of Radiology and Radiation & Cellular Oncology  
and the Committee on Medical Physics  
University of Chicago  
Editor-in-Chief, IEEE Transactions on Biomedical Engineering

**SESSION 4: BIOMATERIALS AND TISSUE ENGINEERING**

**Moderator: Tejal Desai, NAM, IAMBE**

Ernest L. Prien Professor and Chair, Department of Bioengineering and  
Therapeutic Sciences  
University of California, San Francisco  
President, American Institute of Medical and Biological Engineering

14:15 – 14:40

**Plenary: Synthetic Molecular Chaperones for Trauma Resuscitation**

**Raphael Lee, NAE, IAMBE**

Paul and Allene Russell Professor of Surgery  
Professor of Medicine and Organismal Biology and Anatomy  
The University of Chicago

14:40 – 15:05

**Plenary: Challenges and Opportunities in 3D Bioprinting**

**Adam W. Feinberg**

Arthur Hamerschlag Career Development Professor  
Professor, Biomedical Engineering and Materials Science & Engineering  
Carnegie Mellon University

15:05 – 15:30

**Plenary: An Engineer-Physiologist Meets Molecular Biologists:  
Posttranslational Regulation of Cardiac Muscle Contraction by  
Myofilament Acetylation**

**Sanjeev G. Shroff, IAMBE**

Distinguished Professor and Department Chair of Bioengineering  
Professor of Medicine  
University of Pittsburgh

15:30 – 15:55

**Plenary: New Insights of Bone Modeling and Remodeling in  
Response to Mechanical Loading**

**X. Edward Guo, IAMBE**

Stanley Dicker Professor and Chair, Biomedical Engineering  
Columbia University

15:55 – 16:00

**Concluding Remarks**





### Dr. Kristi S. Anseth

Tisone Distinguished Professor of Chemical and Biological Engineering  
University of Colorado at Boulder  
Member, National Academies of Sciences, Engineering, and Medicine

Dr. Kristi S. Anseth is the Tisone Distinguished Professor of Chemical and Biological Engineering and Head of Academic Leadership of the BioFrontiers Institute at the University of Colorado at Boulder, USA. Her research interests lie at the interface between biology and engineering where she designs new biomaterials for applications in drug delivery and regenerative medicine. Dr. Anseth is an elected member of the National Academy of Engineering, the National Academy of Medicine, the National Academy of Sciences, the National Academy of Inventors, and most recently the American Academy of the Arts and Sciences. She is also a Fellow of the American Association for the Advancement of Science, American Institute for Medical and Biological Engineering, Society for Biomaterials, American Institute of Chemical Engineers, and Materials Research Society. Dr. Anseth currently serves on the Board of Directors of the American Institute of Chemical Engineers, Board of Trustees for the Gordon Research Conferences, on the Scientific Advisory Board of the Allen Institute. She is also an editor for *Progress in Materials Science*.



### Dr. Emery N. Brown

Edward Hood Taplin Professor of Computational Neuroscience and  
Health Sciences & Technology  
Massachusetts Institute of Technology  
Member, National Academies of Science, Engineering and Medicine

Dr. Emery N. Brown is the Edward Hood Taplin Professor of Medical Engineering and professor of computational neuroscience at Massachusetts Institute of Technology. He is the Warren M. Zapol Professor of Anaesthesia at Harvard Medical School and Massachusetts General Hospital (MGH), and an anesthesiologist at MGH. Brown received his BA (magna cum laude) in Applied Mathematics from Harvard College, his MA and PhD in statistics from Harvard University, and his MD (magna cum laude) from Harvard Medical School. He completed his internship in internal medicine at the Brigham and Women's Hospital and his residency in anesthesiology at MGH. Brown is an anesthesiologist-statistician recognized for developing signal processing algorithms for neuroscience data analysis and for defining the neurophysiological mechanisms of general anesthesia. Brown was a member of the NIH BRAIN Initiative Working Group. He received an NIH Director's Pioneer Award, the National Institute of Statistical Sciences Sacks Award and the American Society of Anesthesiologists Excellence in Research Award. He is a fellow of the IEEE, the AAAS, the American Academy of Arts and Sciences and the National Academy of Inventors. Brown is a member of the National Academy of Medicine, the National Academy of Sciences and the National Academy of Engineering.



### Dr. Ashutosh Chilkoti

The Alan L. Kaganov Professor of Biomedical Engineering and  
Chair of the Department of Biomedical Engineering  
Duke University

Dr. Ashutosh Chilkoti is the Alan L. Kaganov Professor and the Chair of the Department of Biomedical Engineering at Duke University. His areas of research include genetically encoded materials and biointerface science. He has pioneered the development of the first artificial polypeptides to enter clinical trials for drug delivery that provide a genetically encoded, injectable system for sustained delivery of protein drugs. He also invented a new method to purify protein drugs without chromatography, and developed an innovative technology for point-of-care clinical diagnostics. He was awarded the *Clemson Award for Contributions to the Literature* by the Society for Biomaterials in 2011, the *Robert A. Pritzker Distinguished Lecture award* by the Biomedical Engineering Society in 2013, was elected to the *National Academy of Inventors* in 2014, received the *Distinguished*



*Alumni award* from the Indian Institute of Technology, Delhi in 2015, and the Diamond award from the College of Engineering at the University of Washington in 2017, and was elected to the *American Association for the Advancement of Science* in 2020. He is a fellow of American Institute of Medical and Biological Engineering, the Biomedical Engineering Society, and the Controlled Release Society. He is the founder of five start-up companies: (1) PhaseBio Pharmaceuticals, a publicly traded company on NASDAQ (ticker: PHAS) that is taking drug delivery technology that he developed into clinical trials; (2) Sentilus, a clinical diagnostics company that was acquired by Immucor in 2014; (3) GatewayBio, that is commercializing a next-generation PEGylation technology for biologics; (4) Isolere Bio that is developing a non-chromatographic technology for purification of monoclonal antibodies; and (5) inSoma Bio that is developing a recombinant protein matrix for tissue reconstruction.



### **Dr. Paolo Dario**

Professor of Biomedical Robotics

Director of The BioRobotics Institute

Scuola Superiore Sant'Anna (SSSA), Pisa, Italy

Paolo Dario is a Professor of Biomedical Robotics and Director of The BioRobotics Institute of the Scuola Superiore Sant'Anna (SSSA), Pisa, Italy. He has been Visiting Professor at Brown University, Providence, RI, USA; at the École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland; at the École Normale Supérieure de Cachan, France; at the Collège de France, Paris, France; at the Polytechnic University of Catalunya, Barcelona, Spain; at Waseda University, Tokyo, Japan; at Zhejiang University, Hangzhou and at Tianjin University, China. His main research interests are in the fields of medical robotics, bio-robotics, bio-mechatronics and micro/nano engineering and robotics. He is the coordinator of many national and European projects, the editor of two books on the subject of robotics, and the author of more than 500 scientific papers (300+ on ISI journals). His H-index (ISI Web of Science) is 48 (so he is in the list of Top Italian Scientists). Prof. Dario has been and is Editor-in-Chief, Associate Editor and member of the Editorial Board of many international journals. He has been program chair and plenary invited speaker in many international conferences (including IEEE ICRA, IROS and EMBC). He has been also the General Chair of the 1st IEEE RAS/EMBS Conference on Biomedical Robotics and Biomechatronics (BioRob 2006), and of the IEEE International Conference on Robotics and Automation (ICRA 2007). He is also a member of the Board of the International Foundation of Robotics Research (IFRR) and a Fellow of the School of Engineering, University of Tokyo. He has served and serves in many Boards and Committees, including the IST Advisory Group (ISTAG) of the European Commission (two terms), the Horizon 2020 Advisory Group on Societal Challenge 1 'Health, demographic change and wellbeing' of the European Commission, the Technology Council of ST Microelectronics, the International Scientific Committee of the Institute for Bioengineering of Catalonia (IBEC), the Global Agenda Council on Robotics and Smart Devices of the World Economic Forum, the Scientific Advisory Board of the Advanced Robotics Centre of the National University of Singapore, and the Board of Directors of the euRobotics AISBL, the entity promoting the creation of a Public Private Partnership in Robotics in Europe. He has promoted the creation of more than 20 start-up companies active in the market of biomedical devices and services, and he is/has been a partner of 5 of these start-up companies.



### **Dr. Adam W. Feinberg**

Arthur Hamerschlag Career Development Professor, Biomedical Engineering and Materials Science & Engineering  
Carnegie Mellon University

Dr. Adam W. Feinberg is the principal investigator of the Regenerative Biomaterials and Therapeutics Group, founded at Carnegie Mellon University in 2010. He earned his BS in Materials Science and Engineering from Cornell University in 1999 with co-op experience at Abiomed, Inc., working on total artificial hearts. This was followed by MS and Ph.D. degrees in Biomedical Engineering from the University of Florida, where his doctoral work focused on engineering cell-material interactions to prevent and enhance adhesion. Dr. Feinberg then moved to Harvard University as a Postdoctoral Fellow working on developing new biomaterials and cardiac tissue engineering strategies for 3-dimensional myocardial regeneration, with a focus on stem cell-based approaches (and two publications in *Science*). He subsequently joined CMU in the fall of 2010 as an Assistant Professor with joint appointments in Biomedical Engineering and Materials Science and Engineering. Throughout his career, Dr. Feinberg has co-authored over 15 peer-reviewed publications and holds 10 US patents and patent applications. As an Assistant Professor, Dr. Feinberg has received the NIH Director's 2012 New Innovator Award and the 2013 Ladd Research Award from the Carnegie Institute of Technology at CMU.



### **Dr. Katherine Ferrara**

Professor of Radiology  
Stanford University  
Member, National Academy of Engineering

Dr. Katherine Whittaker Ferrara is a Professor of Radiology. She is a member of the National Academy of Engineering and a fellow of the IEEE, American Association for the Advancement of Science, the Biomedical Engineering Society, the Acoustical Society of America and the American Institute of Medical and Biological Engineering. Dr. Ferrara received her Ph.D. in 1989 from the University of California, Davis. Prior to her PhD, Dr. Ferrara was a project engineer for General Electric Medical Systems, involved in the development of early magnetic resonance imaging and ultrasound systems. Following an appointment as an Associate Professor in the Department of Biomedical Engineering at the University of Virginia, Charlottesville, Dr. Ferrara served as the founding chair of the Department of Biomedical Engineering at UC Davis. Her laboratory is known for early work in aspects of ultrasonics and has more recently expanded their focus to broadly investigate molecular imaging and drug delivery.



### **Mr. William Gausa**

Head of Advanced Innovation  
Philips

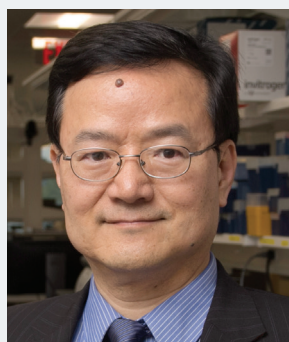
Mr. Bill Gausa is currently the Head of Advanced Innovation at Philips. As the Head of Advanced Innovation, Bill leads a diverse team of researchers, engineers, and marketers to transform new ideas into new ventures that delight our customers. Immediately prior to that, Bill served in multiple leadership roles within Philips including leading Strategic Marketing, Advance Research, Clinical and Global Product Management. Bill has experience across multiple industries with positions at McKesson (healthcare automation), Timesys (embedded software development), Inrange Technologies (IT), and Westinghouse (control systems). Throughout his career, Bill has built upon his skills in Product Management, Healthcare Information Technology, Innovation Management, and Engineering to redefine how corporations can innovate in like agile startups. Bill holds a Masters in Business Administration from Carnegie Mellon University and a Bachelor's Degree in Electrical and Electronics Engineering from the University of Pittsburgh.



## Dr. X. Edward Guo

Stanley Dicker Professor and Chair, Biomedical Engineering  
Columbia University

Dr. Guo received his M.S. in 1990 and Ph.D. in 1994 in Medical Engineering and Medical Physics from Harvard University-MIT. In 1994-1996, Professor Guo did his postdoctoral fellowship in the Orthopaedic Research Laboratories at the University of Michigan at Ann Arbor with Professor Steven A. Goldstein in orthopaedic bioengineering. In 1996 he joined the Department of Mechanical Engineering and then Department of Biomedical Engineering at Columbia University as an Assistant Professor. He was promoted to Associate Professor in 2001, Associate Professor with tenure in 2003, Professor in 2007, and named as Stanley Dicker Professor in 2018. He directs the Bone Bioengineering Laboratory in the Department of Biomedical Engineering at Columbia focusing his research interests in micromechanics of bone tissue, computational biomechanics, and mechanobiology of bone. His past honors include Young Investigator Recognition Award from the Orthopaedic Research Society, National Research Service Award from the US National Institutes of Health (NIH), a CAREER award from the US National Foundation of Science (NSF), Funds for Talented Professionals (Joint Research Fund for Overseas Chinese Young Scholars) from the National Natural Science Foundation of China. He was elected as a fellow to the American Institute for Medical and Biological Engineering. He was one of the founders and served as co-Editor-in-Chief of Cellular and Molecular Bioengineering (CMBE), an international journal of US Biomedical Engineering Society (BMES). He has served many review panels for NIH, NSF, and NASA. His research has been supported by the Whitaker Foundation, the NSF, and the NIH. He served as President of International Chinese Musculoskeletal Research Society, the Society for Physical Regulation in Biology and Medicine, Member of Board of Directors of Orthopaedic Research Society, and Member of Board of Directors of American Institute for Medical and Biological Engineering. He also founded the Special Interest Group (SIG) in CMBE in the BMES and served as its founding Chair.

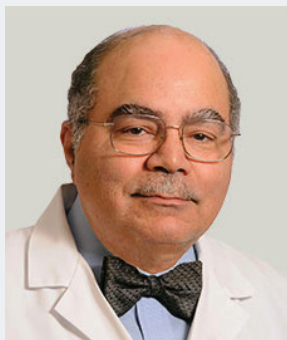


## Dr. Bin He

Trustee Professor and Head, Department of Biomedical Engineering,  
Carnegie Mellon University  
Chair, International Academy of Medical and Biological Engineering

Dr. Bin He is Trustee Professor and Head of Department of Biomedical Engineering, and Professor of Electrical and Computer Engineering and of the Carnegie Mellon Neuroscience Institute at Carnegie Mellon University, Pittsburgh. Dr. He has made significant research and education contributions to the field of neuroengineering and biomedical imaging, including functional biomedical imaging, multimodal neuroimaging and noninvasive brain-computer interface. His pioneering research has helped transforming electroencephalography from a 1-dimensional detection technique to 3-dimensional neuroimaging modality. His lab demonstrated for the first time for humans to fly a drone and control a robotic arm using noninvasive means just by thinking about it. He has contributed significantly to neuroengineering education including editing the first textbook in Neural Engineering, and led NIH and NSF training grants in neuroengineering. Dr. He has received a number of awards including the IEEE Biomedical Engineering Award, the IEEE William J. Morlock Award, the IEEE EMBS Academic Career Achievement Award and IEEE EMBS Distinguished Service Award from the IEEE Engineering in Medicine and Biology Society (EMBS), the Established Investigator Award from the American Heart Association, and the NSF CAREER Award. He is an elected Fellow of International Academy of Medical and Biological Engineering, IEEE, American Institute of Medical and Biological Engineering (AIMBE), and Biomedical Engineering Society. Dr. He served as a past President of the IEEE Engineering in Medicine and Biology Society, the International Society for Functional Source Imaging, the International Society on Bioelectromagnetism, and as Chair of Publications Committee of AIMBE. Dr. He served as the Editor-in-Chief of IEEE Transactions on Biomedical Engineering from 2013-2018, and during his tenure, the journal's impact factor has increased by more than 92%. Since 2018, Dr. He has been elected as the Chair of the International Academy of Medical and Biological Engineering.





### **Dr. Raphael C. Lee**

Paul and Allene Russell Professor of Surgery  
Professor of Medicine and Organismal Biology and Anatomy  
The University of Chicago Medicine  
Member, National Academy of Engineering

Dr. Raphael Lee, MD, ScD, is a senior plastic surgeon with special interest in aesthetic reconstruction, regenerative engineering for repair of abdominal hernias, peripheral nerve injuries, varicose veins, and the scar deformities. He has pioneered functional reconstructive surgery methods for correction of congenital and acquired gynecologic defects. Dr. Lee, Past-President, Midwest Association of Plastic Surgeons, is regularly selected as one of America's Top Plastic Surgeons by Chicago Magazine and national publications. He is a member of the American Surgical Association, National Academy of Engineering, International Academy of Medical and Biological Engineering, MacArthur Fellow, and Fellow of the American Association for the Advancement of Science.



### **Dr. Zhi-Pei Liang**

Franklin W. Woeltge Professor of Electrical and Computer Engineering  
Co-chair, Integrative Imaging Theme in the Beckman Institute for  
Advanced Science and Technology  
UIUC

Dr. Zhi-Pei Liang received his Ph.D. degree in Biomedical Engineering from Case Western Reserve University in 1989. He subsequently joined the University of Illinois at Urbana-Champaign (UIUC) first as a postdoctoral fellow (supervised by the late Nobel Laureate Paul Lauterbur) and then as a faculty member in the Department of Electrical and Computer Engineering. Dr. Liang is currently the Franklin W. Woeltge Professor of Electrical and Computer Engineering; he also co-chairs the Integrative Imaging Theme in the Beckman Institute for Advanced Science and Technology. Dr. Liang's research is in the general area of magnetic resonance imaging and spectroscopy, ranging from spin physics, signal processing, machine learning, to biomedical applications. Research from his group has received a number of recognitions, including the Sylvia Sorkin Greenfield Award (Medical Physics, 1990), Whitaker Biomedical Engineering Research Award (1991), NSF CAREER Award (1995), Henry Magnuski Scholar Award (UIUC, 1999), University Scholar Award (UIUC, 2001), Isidor I. Rabi Award (International Society of Magnetic Resonance in Medicine, 2009), IEEE-EMBC Best Paper Awards (2010, 2011), IEEE-ISBI Best Paper Award (2010, 2015), Otto Schmitt Award (International Federation for Medical and Biological Engineering, 2012), Technical Achievement Award (IEEE Engineering in Medicine and Biology Society, 2014), and Andrew Yang Research Award (UIUC, 2017). Dr. Liang was selected as the Paul C. Lauterbur Lecturer for the 2016 ISMRM meeting and as the Savio L. Woo Distinguished Lecturer for the 2017 WACBE World Congress on Bioengineering. He is a Fellow of the IEEE, the International Society for Magnetic Resonance in Medicine, the American Institute for Medical and Biological Engineering, and the International Academy of Medical and Biological Engineering. Dr. Liang served as President of the IEEE Engineering in Medicine and Biology Society from 2011-2012 and received its Distinguished Service Award in 2015.



## Dr. Kenneth R. Lutchien

Dean, College of Engineering  
Professor, Biomedical Engineering  
Boston University

Dr. Kenneth R. Lutchien, is Dean of the College of Engineering and Professor of Biomedical Engineering (BME) at Boston University. He has published over 145 peer-reviewed journal articles cited over 8000 times. His research uncovers the mechanisms that cause lung disease and novel methods for diagnosing lung disease. While Chair of BME the department ranking improved from 18th to 6th in the nation. As Dean, the College's Graduate Ranking has improved from 54th to 35th and is ranked 16th among all private universities. He oversaw the creation of a new Divisions in Materials Science and Engineering and in Systems Engineering and a 20,000 sq. ft *Engineering Product Innovation Center (EPIC)* and a new 5000 sq. ft. *Bioengineering Technology and Entrepreneurship Center (BTEC)* both designed to instill interdisciplinary product design skills throughout engineering education. Dean Lutchien has advanced the concept of "Creating the Societal Engineer" as a foundational principle of Engineering Education to prepare students for life-long learning and impact. He has also published op-ed pieces on engineering education and technology transfer in Harvard Business Review and Forbes magazine. Dean Lutchien served on the Advisory Committee to the Directorate for Engineering of The National Science Foundation. He is Past-President of the American Institute of Medical and Biological Engineering (AIMBE) and has served on the Board of Directors of the Biomedical Engineering Society and the Wyss Institute for Bioinspired Engineering at Harvard. Dr. Lutchien has been the recipient of the AIMBE Pierre Galletti Award, AIMBE's highest honor.



## Dr. Matthew O'Donnell

Frank and Julie Jungers Dean Emeritus and Professor of Bioengineering  
University of Washington  
Member, National Academy of Engineering

Following undergraduate, graduate, and post-doctoral training at Notre Dame and Washington University in St. Louis, Dr. O'Donnell joined General Electric Corporate Research and Development Center in Schenectady, NY in 1980, where he worked on medical electronics, including MRI and ultrasound imaging systems. In 1990, he moved to University of Michigan in Ann Arbor, MI where he held appointments in Electrical Engineering & Computer Science and in Biomedical Engineering. In 1998, he was named the Jerry W. and Carol L. Levin Professor of Engineering. From 1999-2006 he also served as Chair of the Biomedical Engineering Department. In 2006 he moved to the University of Washington in Seattle, WA where he was the Frank and Julie Jungers Dean of Engineering from 2006-2012. He is now Frank and Julie Jungers Dean Emeritus and a Professor of Bioengineering at the University of Washington. His most recent research has explored new imaging modalities, including elasticity imaging, in vivo microscopy, optoacoustic devices, photoacoustic contrast agents for molecular imaging and therapy, laser ultrasound systems, and catheter-based devices. He has won numerous awards, including the Distinguished Alumni Award from the University of Notre Dame, the Achievement and Rayleigh Awards from the IEEE-UFFC Society, the William J. Morlock Award for Excellence in Biomedical Technology from the IEEE-EMBS Society, and the IEEE Biomedical Engineering Award. He is a fellow of the IEEE and AIMBE and is an elected member of the Washington State Academy of Sciences and the National Academy of Engineering.



## Dr. Xiaochuan Pan

Professor, Departments of Radiology and Radiation & Cellular Oncology and the Committee on Medical Physics  
University of Chicago  
Editor-in-Chief, IEEE Transactions on Biomedical Engineering

Dr. Xiaochuan Pan is a Professor in the Departments of Radiology and Radiation & Cellular Oncology and the Committee on Medical Physics at The University of Chicago. His research centers on physics, algorithms, and engineering underpinning tomographic imaging and its biomedical and clinical applications. He has developed close clinical and industrial collaboration and established robust translational programs. He is the recipient of awards such as IEEE NPSS Early Achievement Award and IEEE EMBS Technical Award, a Fellow of AAPM, AIMBE, IAMBE, IEEE, OSA, and SPIE, and Distinguished Investigator Award of ARR. Dr. Pan has served as a chair and/or reviewer of study sections/review panels for funding agencies, including NIH, NSF, DOE, NSERC, NSFC, and ASF, as the Editor-in-Chief of IEEE Trans. Biomed Eng., as an associate editor (or editorial board member) for journals in the field such as IEEE Trans. Med. Imaging, IEEE Trans. Biomed Eng., IEEE J. Transl. Eng. Health and Med., Phys. Biol. Med., Med. Phys., and J. Med. Imaging, as a chair/member of technical committees of professional organizations such as IEEE, RSNA, and AAPM, and as a general chair, chair/member of programs, themes, and technical/scientific committees for conferences such as IEEE EMBC, IEEE MIC, RSNA, AAPM, and MICCA.



## Dr. Ichiro Sakuma

Professor, School of Engineering  
Director, Research Institute for Biomedical Science and Engineering  
University of Tokyo

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### **Dr. Sanjeev G. Shroff**

Distinguished Professor and Gerald E. McGinnis Chair in Bioengineering  
Professor of Medicine, Department Chair of Bioengineering, University of Pittsburgh

Dr. Sanjeev Shroff is the Distinguished Professor and Gerald E. McGinnis Chair in Bioengineering and Professor of Medicine at the University of Pittsburgh. Dr. Shroff's research is in the cardiovascular arena, with two main focus areas: (1) Contractile and regulatory proteins and post-translational regulation of cardiac contraction. (2) Role of vascular stiffness in cardiovascular function and potential therapeutic applications of vascular stiffness-modifying drugs and/or hormones (e.g., relaxin). His research efforts have been supported by numerous grants from NIH (continuous funding since 1986), AHA, NSF, and industry sources. He was the recipient of the Established Investigator Award from the AHA and was elected as a Fellow of the American Physiological Society, Fellow of the American Institute for Medical and Biological Engineering, and the Fellow of Biomedical Engineering Society. Dr. Shroff has been serving as the Principal Investigator on a NIH-NHLBI pre-doctoral T32 training grant (Cardiovascular Bioengineering Training Program) since 2005 and the Coulter Translational Research Partnership II grant since 2013.



### **Dr. Shankar Subramaniam**

Distinguished Professor of Bioengineering, Bioinformatics and  
Systems Biology University of California at San Diego  
President, IEEE Engineering in Medicine and Biology Society

Dr. Shankar Subramaniam is a Distinguished Professor of Bioengineering, Computer Science and Engineering, Cellular and Molecular Medicine and Nanoengineering. He is currently the President of IEEE EMBS. He was the Chair of the Bioengineering Department at the University of California at San Diego (2008-13) leading the Department to be ranked first in NRC rankings. He holds the inaugural Joan and Irwin Jacobs Endowed Chair in Bioengineering and Systems Biology. He was the Founding Director of the Bioinformatics Graduate Program at the University of California at San Diego. He is a fellow of the American Institute for Medical and Biological Engineering (AIMBE) and is a recipient of the Smithsonian Foundation and Association of Laboratory Automation Awards and his research spans systems biology and medicine. In 2013, he was elected as a Fellow of AAAS. In 2002, he received the Genome Technology All Star Award. In 2011, he was appointed as a Distinguished Scientist at the San Diego Supercomputer Center. In 2019 he was awarded the of IIT Kanpur Jubilee Year Distinguished Alumni Award. Subramaniam is a pioneer in Systems Biology research. He has published in leading journals such as Nature, Cell, Science family and in 2008, he was awarded the Faculty Excellence in Research Award at UCSD. His work at the interface of engineering and medicine has impacted several research areas in biomedicine. He has served on several national research advisory councils including the National Institutes of Health.



### **Dr. Nitish V. Thakor**

Professor of Biomedical Engineering  
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Director, Singapore Institute for Neurotechnology  
Editor in Chief, Medical and Biological Engineering and Computing

Dr. Nitish V. Thakor is a Professor of Biomedical Engineering, Electrical and Computer Engineering and at Johns Hopkins University since 1983 and National University of Singapore since 2012. He is also the Founding Director of Singapore Institute for Neurotechnology at the National University of Singapore. His technical expertise is in the field of Neuroengineering, where he has pioneered many technologies for brain monitoring, implantable neurotechnologies, neuroprosthesis and brain-machine interface. He has published over 400 refereed journal papers, has 17 US and international patents and co-founded 3 active companies. He was previously the Editor in Chief of IEEE Transactions on Neural Systems and Rehabilitation Engineering, and currently the EIC of Medical and Biological Engineering and Computing (Springer/Nature). He is the Editor of an upcoming authoritative reference Handbook of Neuroengineering. Prof. Thakor is a recipient of the Technical Achievement Award (Neuroengineering) as well as the Academic Career Award from the IEEE Engineering in Medicine and Biology Society. He received a Research Career Development Award from the National Institutes of Health and a Presidential Young Investigator Award from the National Science Foundation, and is a Fellow of the American Institute of Medical and Biological Engineering, Life Fellow of IEEE, Biomedical Engineering Society, and International Federation of Medical and Biological Engineering.



### **Dr. Gordana Vunjak-Novakovic**

University Professor and Mikati Foundation Professor of  
Biomedical Engineering and Medicine  
Columbia University  
Member, National Academies of Engineering and Medicine

Dr. Gordana Vunjak-Novakovic is University Professor, the highest academic rank at Columbia University reserved for only a few active faculty out of 4,000, as the first engineer in history of Columbia to receive this highest distinction. She is also the Mikati Foundation Professor of Biomedical Engineering and Medical Sciences, and a faculty in the Irving Comprehensive Cancer Center and in the Center for Human Development. She directs the Laboratory for Stem Cells and Tissue Engineering, serves on the Columbia University President's Task Force for Precision Medicine, and on the Executive Leadership of the Columbia University Medical Center. The focus of her research is on engineering functional human tissues for regenerative medicine and studies of development and disease. With 38,800 citations and  $h=112$ , she is one of the most highly cited individuals of all times, in all disciplines. With her students, Dr. Vunjak-Novakovic has 85 licensed, issued and pending patents and has founded four biotech companies. She is a frequent advisor to government and industry and serves on numerous advisory boards and councils. Among her many distinctions, Dr. Vunjak-Novakovic is a Founding Fellow of the International Society for Tissue Engineering and Regenerative Medicine, one of the Foreign Policy's 100 Leading Global Thinkers for 2014, and the recipient of the Pritzker Award of the Biomedical Engineering Society in 2017. She is a member of the Academia Europaea, AAAS, American Institute of Medical and Biological Engineering, National Academy of Engineering, National Academy of Medicine, and National Academy of Inventors.



### **Dr. John A. White**

Professor and Chair of Biomedical Engineering  
Boston University  
President-Elect, Biomedical Engineering Society

Dr. John A. White is Professor and Chair of Biomedical Engineering at Boston University. He has joint appointments in the Program in Neuroscience and the Department of Pharmacology and Experimental Therapeutics. He is PI and Program Director for BU BME's long-standing NIGMS training grant in Quantitative Biology and Physiology. Prof. White received his BS in BME from Louisiana Tech University (1984), and his PhD in BME from Johns Hopkins University (1990). Professor White's research group uses engineering and computational approaches to study computation in single neurons and astrocytes, as well as network interactions. He is co-developer of RTXI, the most widely used programming environment for virtual-reality-inspired experiments in neurophysiology, and is known for describing the biophysical bases of neuronal oscillations and the factors that limit signal-to-noise in neurons and neuronal networks. His group has collaborated to develop new mouse lines, and new scanning approaches, for fluorescence imaging in neurons and astrocytes. He is author of over 100 peer-reviewed publications, has given over 150 invited lectures, and has raised over \$50M in external funding. White is a Fellow of the Biomedical Engineering Society and the American Institute for Medical and Biological Engineering. In 2019, White was elected President of the Biomedical Engineering Society.



### **Dr. Savio L-Y. Woo**

Distinguished University Professor Emeritus and Director of Musculoskeletal Research Center  
University of Pittsburgh  
Member, National Academies of Engineering and Medicine

Dr. Woo is a Distinguished University Professor Emeritus and the Founder and Director of the world-renowned Musculoskeletal Research Center (MSRC), a diverse multidisciplinary research and educational center in the University of Pittsburgh where over 500 orthopaedic surgeons, bioengineering students, faculty and staff have studied and worked. He also spent 20 years at the University of California, San Diego as a Professor of Surgery and Bioengineering. Dr. Woo is a pioneer in bioengineering and is renowned for his 50 years of translational research in healing and repair of tissues. Together with his team, their work has had a significant impact on the management of ligament and tendon injuries including clinical paradigm shifts to improve patient outcome. More recently, Dr. Woo and his team's research has focused on two areas: 1) measurement of the forces in the ligament and tendon and their contribution to joint function using robotics technology and 2) using functional tissue engineering (FTE) approach to facilitate ligament healing and regeneration including the use of biodegradable magnesium (Mg) and Mg alloys. Dr. Woo is a member of the National Academy of Medicine (1991), the National Academy of Engineering (1994), and the Academia Sinica (1996). In 1998, he received the Olympic Prize for Sports Science from the International Olympic Committee and the first Olympic Gold Medal in Nagano, Japan. Many professional societies have given him their highest honors that include the Kappa Delta Award (AAOS/ORS), the Herbert R. Lissner Medal (ASME), the O'Donoghue Sports Injury Research Award (AOSSM), the Giovanni Borelli Award (ASB), the Muybridge Medal (ISB), and the Gold Medal for Innovation in Healthcare Technology (IEEE).





### **Dr. Lisa X. Xu**

Chair Professor in Biomedical Engineering  
Vice President for Graduate Education and International Affairs  
Shanghai Jiao Tong University

Dr. Lisa X. Xu received her Ph.D. degree in 1991 from University of Illinois at Urbana-Champaign, USA. She was on the faculty of The City University of New York, and promoted to associate professor with tenure in 1996. She then moved to Purdue University and took the tenured associate professor position in Mechanical Engineering in 1997 and a joint faculty position in Biomedical Engineering in 1998. Dr. Xu became the “Chang Jiang Scholar” Distinguished Professor in Biomedical Engineering at Shanghai Jiao Tong University awarded by Chinese Ministry of Education in 2003, and received the “Outstanding Youth Award” by Chinese Natural Science Foundation (CNSF) in 2007. She was the recipient of Natural Science Award from Chinese Ministry of Education (2nd place) in 2010. Her research interests encompass fundamental study of bio-thermal physics, cancer thermal therapy, and medical device supported by NCI and NSF in US, and subsequently by Chinese NSF, key national center grants from Chinese Ministry of Science and Technology. She has published nearly 200 peer reviewed journal papers and conference proceedings, and five book chapters. She is an elected ASME Fellow, AIBME Fellow and a senior member of IEEE EMBS. She was the technical program chair for The 2005 EMBC in Shanghai, China and the AdCom Member of EMBS (2011-2013). She had served as the President of Shanghai Society of Biomedical Engineering (2010-2018). She is currently serving as Vice President of Shanghai Association for Science & Technology, Vice president of Shanghai Federation of Returned Overseas Chinese, Vice Director of Association of Chinese Graduate Education.



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