MAYO
CLINIC

SYMPOSIUM ON THE BRAIN INITIATIVE

Mission Statement:

The Mayo Symposium highlights the dual promise of the BRAIN Initiative to drive public/private collaboration toward developing revolutionary tools to aid our basic understanding of the brain and to quickly translate this foundational understanding into transformed clinical practice and robust economic and job growth in the high-tech medical industry.

Meeting Organizers

Kendall Lee, M.D., Ph.D., is the Director of the Neural Engineering Lab at the Mayo Clinic in Rochester and a full professor in the departments of Neurosurgery, Physiology and Biomedical Engineering, and Physical Medicine and Rehabilitation. His research interests include developing neuromodulation techniques and devices for the treatment of Parkinson's disease, tremor, depression, obsessive-compulsive disorder, epilepsy, and spinal cord injury. His lab is currently working on a chronically implantable closed-loop smart DBS system using electrochemical and electrophysiological feedback to change stimulation parameters in real time. Dr. Lee's clinical practice focuses on implantation of deep brain stimulation systems for the treatment of neurodegenerative movement disorders and psychiatric disease. Dr. Lee received his M.Phil., M.D., and Ph.D. in neurobiology from Yale University. He is a permanent member of the NIH BNVT study section and serves on the editorial board for several peer-reviewed journals, including *Neuromodulation, Neurosurgery*, and the *Journal of Neural Engineering*. Dr. Lee holds the rank of Commander in the U.S. Navy Reserve and has deployed as an active-duty Navy neurosurgeon in support of Operation Enduring Freedom.

Kevin Bennet, B.S.Che., M.B.A., is the chair of the Division of Engineering at the Mayo Clinic in Rochester and the co-director of the Mayo Neural Engineering Laboratory. His division provides engineering design and production support for all Mayo Clinic departments and is a major part of the Neural Engineering Laboratory's team science efforts. The Mayo Division of Engineering has developed three generations of neuromodulation recording and stimulation devices in conjunction with the Neural Engineering Laboratory. Kevin Bennet is also an assistant professor in the Department of Neurosurgery. He received his B.S. in Chemical Engineering from the Massachusetts Institute of Technology and earned his M.B.A. from the Harvard Graduate School of Business Administration.

Sam Rudolph is the research program coordinator for the Mayo Neural Engineering Laboratory. He provides project management, organizational, communications, and administrative support to the NEL. He is a U.S. Army veteran and earned a B.A. in Mass Communications from Winona State University in 2008.

Keynote Speaker
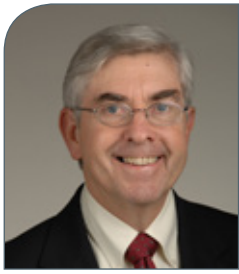
Walter J. Koroshetz, M.D. is the Director of the National Institute of Neurological Disorders and Stroke. He joined NINDS in 2007 as deputy director and served as interim director after the retirement of Dr. Story Landis. He has held multiple leadership roles in NIH and NINDS programs, including the Traumatic Brain Injury Center collaboration between the NIH and the Uniformed Health Services University. Before he joined the NIH, he served as the vice chair of the Neurology Service and the director of Stroke and Neurointensive Care Services at Massachusetts General Hospital. Dr. Koroshetz was also a professor at Harvard Medical School and led neurology resident training at MGH from 1990 until 2007. Dr. Koroshetz earned his medical degree from the University of Chicago.

Mayo Clinic Leadership

Gregory J. Gores, M.D., is the Executive Dean for Research at the Mayo Clinic. He is responsible for leading and managing all of Mayo Clinic's research activities. He is also chair of the Division of Gastroenterology and Hepatology. His Liver Pathobiology Laboratory conducts research on the cellular and molecular mechanisms by which dysregulation of cellular apoptosis results in disease development. Dr. Gores has been a pioneer in understanding the role of lysosomal permeabilization in mediating cellular apoptosis and the mechanistic process of lipoapoptosis. Dr. Gores received his M.D. from the University of North Dakota.

Agenda • October 9, 2015

4:40 p.m.	Neural Engineering Lab staff member to pick up guests from the Hilton Garden Inn and Hilton Doubletree lobbies and escort them to the shuttle drop.
4:50 p.m.	Neural Engineering Lab staff member to pick up guests from the Kahler Grand Hotel lobby and escort them to the shuttle drop.
5:00 p.m.	Shuttle to Mayowood departs from the Gonda North entrance on West Center Street.
5:30 p.m.	**Faculty Reception** Mayowood Mansion, 3720 Mayowood Road SW, Rochester, MN 55902
6:00 p.m.	**Faculty Dinner**
7:30 p.m.	First shuttle departs from Mayowood to the Gonda building.
8:15 p.m.	Second shuttle departs from Mayowood to the Gonda building.

Agenda • October 10, 2015

7:00 a.m.	**Continental Breakfast/Poster Setup**
8:00 a.m.	**Welcome** *Kendall H. Lee, M.D., Ph.D.* and *Kevin Bennet, B.S.Che., M.B.A.*, Mayo Clinic Neural Engineering Laboratory
8:10 a.m.	**Mayo Clinic Welcome** *Gregory J. Gores, M.D.*, Executive Dean for Research
8:20 a.m.	**Keynote Address** **The Present and Future Promise of the BRAIN Initiative** *Walter J. Koroshetz, M.D.*, Director, National Institute of Neurological Disorders and Stroke
8:45 a.m.	**Q&A Session** with Dr. Koroshetz
9:00 a.m.	**Break/Poster Viewing**
9:30 a.m.	**Current BRAIN Initiative Grant Awardee Panel** Moderator: *Kip Ludwig, Ph.D.*

9:35 a.m.	**Optogenetic Therapy: From Visual Restoration to Circuit Manipulation** *Serge Picaud, Ph.D.*, Institut de la Vision, Paris, France
9:50 a.m.	**Modular High-density Optoelectrodes for Local Circuit Analysis** *Euisik Yoon, Ph.D.*, University of Michigan
10:05 a.m.	**In vivo Multiphoton Imaging of Mouse Brain** *Chris Xu, Ph.D.*, Cornell University
10:20 a.m.	**Development of Protein-Based Voltage Probes** *Vincent Pieribone, Ph.D.*, John B. Pierce Laboratory, Inc.
10:35 a.m.	**Advancing MRI and MRS Technologies for Studying Human Brain Function and Energetics** *Qing Yang, Ph.D.*, Penn State University
10:50 a.m.	**Panel Discussion: Bleeding-Edge Technologies to Build the Scientific Foundation for New Therapies**

11:05 a.m.   **Government Panel**
Moderator: *Kendall Lee, M.D., Ph.D.*

    11:10 a.m.   **NIH**
Walter Koroshetz, M.D., Director, National Institute of Neurological Disorders and Stroke

    11:20 a.m.   **DARPA**
Michael B. Wolfson, Ph.D., Independent Consultant, DARPA Biological Technologies Office

    11:30 a.m.   **IARPA**
Alexis Jeannotte, Ph.D., Program Manager, TRUST (Tools for Recognizing Useful Signals of Trustworthiness) and SHARP (Strengthening Human Adaptive Reasoning and Problem-solving)

    11:40 a.m.   **NSF**
Keith Roper, Ph.D., Program Leader, Engineering Research Centers / Network for Computational Nanotechnology

    11:50 a.m.   **FDA**
FDA Representative

    12:00 p.m.   **Panel Discussion: Public/Private and Trans-Agency Collaborations to Catalyze Breakthrough Discoveries**

12:20 p.m.   **Lunch and Social Break/Poster Viewing**

1:50 p.m.   **Industry Panel**
Moderator: *Kevin Bennet, B.S.Che., M.B.A.*

    1:55 p.m.   **Medtronic**
Lothar Krinke, Ph.D., Vice President and General Manager, Deep Brain Stimulation

    2:05 p.m.   **Boston Scientific**
Stephen Carcieri, Ph.D., Principal Research Scientist

    2:15 p.m.   **Greatbatch/NeuroNexus**
Daryl Kipke, Ph.D., NeuroNexus Executive Director

    2:25 p.m.   **Cyberonics**
Bryan Olin, Ph.D., Vice President (Clinical, Quality, Regulatory)

    2:35 p.m.   **IBM**
John Knickerbocker, Ph.D., IBM Distinguished Engineer, T.J. Watson Research Center

    2:45 p.m.   **Cirtec**
Heather Dunn, Senior Director (Technology)

    2:55 p.m.   **GSK**
Roy M. Katso, Ph.D., Director, Open Innovation and Funding Partnerships

    3:05 p.m.   **Siemens**
David Carpenter, Ph.D., Manager of Emerging Technologies

    3:15 p.m.   **Panel Discussion: Perspectives on Technology Adoption for Patient Care**

3:30 p.m. **Break/Poster Viewing**

4:00 p.m. **Current BRAIN Initiative Grant Awardee Panel**
Moderator: *Chuck Blaha, Ph.D.*

    4:05 p.m. **Classification of Cortical Neurons by Single Cell Transcriptomics**
John Ngai, Ph.D., University of California at Berkeley

    4:20 p.m. **Establishing a Comprehensive and Standardized Cell Type Characterization Platform**
Hongkui Zeng, Ph.D., Allen Institute for Brain Science

    4:35 p.m. **Remote Regulation of Neural Activity**
Sarah Stanley, M.B., B.Chir., Ph.D., Mount Sinai School of Medicine

    4:50 p.m. **New Nano Tools for Real-Time Imaging of Single Live Cells**
Nancy Xu, Ph.D., Old Dominion University

    5:05 p.m. **Cortical Circuits Underlying Perceptual Decisions**
Gerald Pho, Massachusetts Institute of Technology

    5:20 p.m. **Detection of Neurotransmitter Absolute Concentrations with Diamond Electrodes**
Kendall Lee, M.D., Ph.D., Mayo Clinic Neural Engineering Laboratory
Kevin Bennet, B.S.Che., M.B.A., Mayo Clinic Division of Engineering

    5:35 p.m. **Panel Discussion: From Single Cell to Neural Circuits: Classification, Regulation, and Imaging**

5:50 p.m. **Conclusion**
Kendall Lee, M.D., Ph.D.

6:00 p.m. **Dinner and Social Break/Poster Viewing**

Panel Moderators

Charles W. Blaha, Ph.D., is a distinguished professor in the field of neurochemistry and systems neuroscience. His research contributions span several themes of both basic and clinical research that include the neurobiological bases of Autism Spectrum Disorder and neurophysiological mechanisms of deep brain stimulation in the treatment of neurological and psychiatric disorders. To gain an understanding of these mechanisms, over the last three decades Dr. Blaha has developed novel electroanalytical (neurochemical) recording procedures, together with micro-biosensors, to measure neurotransmission of dopamine and other important neurochemicals in the central nervous system in animal models of human disorders and disease and patients with neurological disorders, such as Parkinson's disease. Prior to joining the Mayo Clinic Neural Engineering Laboratory, Dr. Blaha was on faculty in the Department of Psychology at the University of Memphis. Dr. Blaha earned his Ph.D. in neurochemistry and psychopharmacology in the Institute of Neuroscience at the University of Oregon.

Kip A. Ludwig, Ph.D., is a senior faculty member in the Mayo Clinic Neural Engineering Laborotory. Prior to joining the Mayo Clinic, Dr. Ludwig was the Program Director for Neural Engineering at the National Institute of Neurological Disorders and Stroke. He served as the co-lead for the Translational Devices Program at NINDS, led the NIH BRAIN Project Team responsible for developing and executing programs to catalyze implantable academic and clinical devices to stimulate and/or record from the central nervous system, and led a trans-NIH planning team in developing and initial execution of the ~250 million dollar S.P.A.R.C. Program to stimulate advances in neuromodulation therapies for organ systems. Previously Dr. Ludwig worked in Industry as a research scientist, where his team conceived, developed and demonstrated the chronic efficacy of a next-generation neural stimulation electrode to treat blood pressure and heart failure in both pre-clinical studies and clinical trials. Through his industry work he oversaw Good Laboratory Practice (GLP) and non-GLP studies enabling clinical trials in Europe and the United States, as well as participated in the protocol development and execution of those trials, leading to approval for sale in the European Union and a U.S. Pivotal trial. His electrode concept is now for sale in seven countries around the world. Dr. Ludwig earned his M.S. and Ph.D. in biomedical engineering from the University of Michigan.

Panel Members

Stephen Carcieri, Ph.D., is a Principal Research Scientist at Boston Scientific Neuromodulation (BSN), with research interests in neuromodulation, neural prostheses, and neuroengineering. He received his Ph.D. in neuroscience from UCLA, where his research focused on neural coding in the retina, and performed post-doctoral research at USC in support of an implantable retinal prosthesis. He joined the emerging indications group at BSN in 2008, where he supported clinical studies in occipital nerve stimulation for migraine, and spinal cord stimulation for chronic pain. Since 2009 his focus has been on deep brain stimulation for movement disorders, and he has worked on pre-clinical studies, clinical research, and product development for the BSN DBS device, called Vercise. In his current role he is focused on exploratory research and development for next-generation DBS systems as the DBS Technical Lead for BSN.

David Carpenter, Ph.D., is the Manager of Emerging Technologies at Siemens Healthcare, where he has also been the product manager for MR imaging. Prior to his work at Siemens, he was the director of the Image Analysis Core at Mount Sinai School of Medicine from 2004 until 2013. Dr. Carpenter earned his Ph.D. in neuroscience from the Mount Sinai School of Medicine of New York University after completing his B.S. in electrical and computer engineering at the University of Virginia.

Heather Dunn is the Senior Director of Technology at Cirtec, where she is responsible for the development of new technology and technical support for business development activities. She has fifteen years of experience with medical device design, product development, and manufacturing and has also worked in advanced composite materials research and semiconductor test equipment. Heather earned a B.S. in mechanical engineering from Case Western Reserve University in 1998 and an M.S. in mechanical engineering from MIT in 2000.

Alexis Jeannotte, Ph.D., is the program manager for the TRUST (Tools for Recognizing Useful Signals of Trustworthiness) and SHARP (Strengthening Human Adaptive Reasoning and Problem-solving) programs at IARPA. These programs focus on human cognition and intelligence, social psychology, and neuroscience, where researchers explore methods to assess trustworthiness and increase human adaptive reasoning and problem-solving in information-rich environments through behavioral study. Dr. Jeannotte earned her Ph.D. in neuroscience from Georgetown University and was previously an AAAS Science and Technology Fellow for the Department of Homeland Security.

Roy Katso, Ph.D., is the Director of Open Innovation and Funding Partnerships at GlaxoSmithKline, where he is responsible for identifying top talent and developing multidisciplinary partnerships to enhance the technology and delivery of implantable medical devices. He previously served as Innovation Challenge Manager, where he worked to create global teams building an open access research platform capable of understanding neuronal language in visceral organs. Dr. Katso has worked as a scientist or leader at GSK since 2001. Dr. Katso earned a Ph.D. in cell signaling from the University of Oxford in 1999 and also completed a fellowship at the Ludwig Institute for Cancer Research.

Daryl Kipke, Ph.D., is the Executive Director of NeuroNexus, Inc. He was the lead founder of NeuroNexus in 2004 and served as its CEO until it was acquired by Greatbatch, Inc., in 2012. His responsibilities and research interests are centered on developing and commercializing advanced neural interface systems for high-value, strategic business opportunities across clinical and scientific neurotechnology markets. Dr. Kipke has more than 25 years of experience in academic and entrepreneurial neurotechnology ventures. His research has centered on advanced neural interfaces to directly communicate with precisely targeted regions of the brain, spinal cord, and peripheral nervous system. Dr. Kipke was formerly a professor of Biomedical Engineering at the University of Michigan where he directed the Neural Engineering Laboratory and the Center for Neural Communication Technology, an NIH National Biotechnology Resource Center. Dr. Kipke also founded and served as director of an earlier successful neurotechnology company spun out of his lab. Dr. Kipke has over 200 scientific publications and numerous patents. He is a Fellow of the American Institute for Medical and Biological Engineering and serves on several university scientific advisory committees.

John Knickerbocker, Ph.D., is a Distinguished Engineer at IBM's T.J. Watson Research Center, where he is currently the manager of 3D Technology Integration. His recent research includes high-performance computing applications, portable

wireless microelectronics systems, and biomedical electronics. He has over 32 years of experience in electronics packaging technology at IBM. He has been in IBM Research since 2003, and worked in IBM Microelectronics from 1983 to 2003. Dr. Knickerbocker has authored or co-authored more than 200 patents or patent applications and more than 70 technical papers or publications. He is an active member of the IEEE Technical Society in Advanced Packaging Technology. Dr. Knickerbocker earned his Ph.D. in materials science and engineering from the University of Illinois in 1982.

Lothar Krinke, Ph.D., is the Vice President and General Manager of Deep Brain Stimulation Therapies for Medtronic. He has also worked at Medtronic since 2004 in the roles of Vice President of Research and Business Development and Senior Director of Bioscience Technology Development. Prior to Medtronic, he worked for biotech companies Celera Genomics and Endogeny Bio as well as management consulting companies A.T. Kearney and McKinsey & Company. Dr. Krinke earned a Ph.D. in molecular biology from SUNY Albany in 1989 and completed a postdoctoral fellowship in molecular biology at Caltech in 1991.

John Ngai, Ph.D., is the Coates Family Professor of Neuroscience at the University of California at Berkeley, where he directs the QB3 Functional Genomics Laboratory. His lab's research focuses on the molecular mechanisms underlying the development and function of the vertebrate olfactory system using molecular, genomic, computational, and behavioral approaches. His lab also develops genomics and genome engineering technology to characterize neuronal diversity in the cerebral cortex and other regions of the nervous system. Dr. Ngai has been a professor at UC Berkeley since 1993, and has previously been a Howard Hughes Fellow of the Life Sciences Research Foundation and a Pew Scholar in the Biomedical Sciences. He also received a McKnight Scholars Award in Neuroscience from 1993-1996. Dr. Ngai earned his Ph.D. in biology from Caltech in 1987 after completing a B.A. in chemistry and zoology at Pomona College in 1980.

Bryan Olin, Ph.D., is responsible for the Clinical, Quality and Regulatory functions at Cyberonics, including pre-clinical research and algorithm development. He joined Cyberonics as Vice President, Quality in May 2009. In August 2009, Dr. Olin assumed interim responsibility for Clinical Affairs, and in November 2009, he was named Vice President, Clinical Affairs & Quality. He joined Cyberonics from Zeltiq Aesthetics, Inc., a privately held medical technology company in the San Francisco Bay Area, where he served as Senior Director, Quality Assurance beginning in October 2007. Prior to Zeltiq Aesthetics, Dr. Olin was employed at the LifeScan and Cordis franchises of Johnson & Johnson from 1999 to 2007, holding several positions of increasing responsibility in quality assurance, statistics and clinical data management. Dr. Olin began his career with Procter & Gamble in 1993 after obtaining his Ph.D. in Statistics from Iowa State University.

Gerald Pho, is a graduate student in Dr. Mriganka Sur's laboratory at MIT, which studies the development, plasticity, and dynamics of cortical circuits using novel approaches to record activity and analyze neural, synaptic, and circuit structures. Gerald's work uses two-photon calcium imaging and optogenetics in awake, behaving mice to probe the role of specific brain regions and cell types in sensorimotor decisions. He received his B.S. in Biomedical Engineering at Case Western Reserve University and is currently a Ph.D. candidate in neuroscience.

Serge Picaud, Ph.D., is the head of the Department of Visual Information Processing at the Vision Institute of the Université Pierre-et-Marie-Curie. His lab investigates cellular and molecular mechanisms underlying retinal information processing, where they have developed cellular and animal models of retinal diseases to assess the efficacy of neuroprotection and other therapeutic strategies. Recently, they have developed novel strategies for restoring vision in blind patients. Dr. Picaud co-founded the biotech companies Fovea, Pixium Vision, and Gensight Biologics. He

completed his Ph.D. in neuroscience at the University of Aix-Marseille in 1990 and also earned a master's degree in pharmacology with a neurobiology major at the University of Paris in 1984 followed by four years at UC Berkeley.

Vincent Pieribone, Ph.D., is a professor of Cellular and Molecular Physiology and Neurobiology at the Yale School of Medicine as well as a member of the John B. Pierce Laboratory, where he researches novel imaging techniques to study neuronal electrophysiology and genetically encoded fluorescent probes of membrane potential. He is currently working on screening DNA constructs, encoding fusions of voltage-sensing protein domains with fluorescent reporters, developing miniature fluorescence microscope systems for imaging fluorescent probes, and designing a complete head-mounted fast imaging system to image voltage signals in active rodents. Dr. Pieribone was an NSF and Fogarty International Fellow at the Nobel Institute of Neurophysiology at the Karolinska Institute in Sweden from 1990-1992. Dr. Pieribone received his Ph.D. in neuroanatomy and neurophysiology in 1992 and a B.A. in biology and chemistry in 1986, both from New York University.

D. Keith Roper, Ph.D., has been the NSF program leader for the Gen-3 Engineering Research Centers and the Network for Computational Nanotechnology since 2014 and served as the temporary director since 2012. Prior to this, he was an associate professor of chemical engineering at the University of Arkansas, where he retains his faculty membership as the Charles W. Oxford Endowed Professorship in Emerging Technologies. At the University of Arkansas, Dr. Roper directed the Nano-Bio Photonics Lab, where his research focused on the nanoscale interactions among particles and waves and translating that work into enhancing nanoscale architecture performance in biosensing, solar energy, optoelectronics, microthermal fluidics, spectroscopy, diagnostics, and therapeutics. Dr. Roper has over 80 publications, four patents, and four viral or bacterial vaccine products. He earned his Ph.D. in chemical engineering from the University of Wisconsin at Madison and a B.S. in chemical engineering from Brigham Young University.

Sarah A. Stanley, M.B., B.Chir., Ph.D., is an assistant professor at Mount Sinai School of Medicine with dual appointments in the Division of Endocrinology, Diabetes, and Bone Disease and the Department of Neuroscience. Her research focuses on remote regulation of neural activity by the use of radio waves or magnetic fields acting on nanoparticles. Prior to working at Mount Sinai, Dr. Stanley was a senior research associate in the Rockefeller University Laboratory of Molecular Genetics under Dr. Jeffrey Friedman. Dr. Stanley earned her degree in medicine and surgery from the University of Cambridge and her Ph.D. in biomedical sciences from the University of California at San Francisco. She was also a Helen Hay Whitney postdoctoral fellow at Harvard and MIT.

Michael Wolfson, Ph.D., is an independent consultant to DARPA's Biological Technologies Office, GlaxoSmithKline, and other customers. His research interests include non-traditional manufacturing technologies and translation of highly scalable neural interfaces. Prior to consulting, Dr. Wolfson worked for startups and established multinational companies to develop microelectromechanical systems (MEMS) for commercial products. Dr. Wolfson earned his Ph.D. in electrical engineering through Cornell University in 2001 after completing a B.Sc. in electrical engineering at Brown University in 1995.

Chris Xu, Ph.D., is a full professor and the Director of Undergraduate Studies at Cornell University's School of Applied and Engineering Physics. His research focuses on biomedical imaging and fiber optics. His lab explores new concepts and techniques for in vivo imaging, develops new endoscopes for medical diagnostics, and designs novel optical fibers and fiber-based devices for biomedical imaging and optical communications. Dr. Xu worked for Bell Labs for five years before returning to teach at Cornell in 2002. Dr. Xu has

published more than 100 papers and holds 28 patents. He has won the NSF CAREER award as well as the Bell Labs Team Research Award, and is a fellow of the National Academy of Inventors and the Optical Society of America. Dr. Xu earned his Ph.D. in applied physics from Cornell University in 1996 and a B.S. in physics from Fudan University in 1989.

X. Nancy Xu, Ph.D., is an AAAS Fellow and professor of Chemistry and Biochemistry at Old Dominion University. Dr. Xu has directed NSF- and NIH-funded nanoscale interdisciplinary research programs and developed cutting-edge nanobiotechnologies, including photostable single nanoparticle probes, single molecule nanoparticle optical biosensors, and photostable optical nanoscopy (PHOTON) for molecular imaging of single live cells at nanoscale in real time. Dr. Xu is the recipient of 2008 Nano 50 Innovator award and 2007 Nano 50 Technology award. The objective of her NSF BRAIN EAGER award is to develop a novel sensing and imaging platform for multiplexing imaging of multiple types of individual neurotransmitters at individual live synapses in real time with single-molecule sensitivity, aiming to understand how individual neurons communicate. Dr. Xu received her Ph.D. from the University of Mississippi in 1992 and pursued her postdoctoral research at the University of Texas at Austin (1993-95) and the Ames Lab at Iowa State University (1996-98). She began her academic career as an assistant professor at ODU in 1998 and has held the rank of professor in Chemistry and Biochemistry since 2009.

Qing X. Yang, Ph.D., is a professor of Radiology, Bioengineering, Engineering Sciences, and Neurosurgery at Penn State University. His lab's research is focused on high-field MR imaging, particularly improving T2*-based MRI contrast-enhancing methods for brain research and clinical examination. The Yang lab is also working on developing a reliable olfactory fMRI technique to assess olfactory deficits in early-stage Alzheimer's patients. Dr. Yang earned his Ph.D. in physics and biophysics at Georgia Tech in 1991.

Euisik Yoon, Ph.D., is a professor of Electrical Engineering, Biomedical Engineering, and Computer Science at the University of Michigan, where he is also director of the Lurie Nanofabrication Facility. His research is focused on building self-contained microsystems to combine and process natural and electrical signals on a single chip by integrating MEMS/nanostructures with low-power wireless VLSI circuits and systems. His other research interests include neural probes, neural interfacing, microfluidics, and CMOS image sensors. Dr. Yoon earned his Ph.D. in electrical engineering from the University of Michigan at Ann Arbor in 1990, following completion of B.S. and M.S. degrees in electronics engineering from Seoul National University in 1982 and 1984, respectively.

Hongkui Zeng, Ph.D., has been an investigator at the Allen Institute for Brain Science since 2006, leading multiple research projects on unraveling the mechanisms of brain circuitry and identifying potential approaches for treating brain diseases. Currently, her team is working on developing technologies to identify, label, monitor, and manipulate different neuronal cell types and using a combined molecular, genetic, and physiological approach to analyze their diversity, connectivity, and composition. Her team was also responsible for the Nature-published Allen Mouse Brain Connectivity Atlas project that produced the first brain-wide mesoscale connectome for a mammalian species. Dr. Zeng earned her Ph.D. in molecular and cell biology from Brandeis University.

Sponsor Acknowledgments

Acknowledgements