

Powering the U.S. Army of the Future

Committee

John J. Koszewnik

Co-Chair

Mr. John Koszewnik (NAE) retired chief technical officer for Achates Power where his team has been responsible for the design and development of advanced diesel and gasoline opposed piston internal combustion engines. Among these is the Advanced Combat Engine (ACE) that is being jointly developed with Cummins, providing a leap-ahead capability in power density, fuel efficiency, and low heat rejection for the U.S. Army Ground Combat Fleet. Initial tests in the Bradley fighting vehicle are planned as pathways to the Next Generation Combat Vehicle. Prior to joining Achates Power in 2011, Koszewnik worked at Ford Motor Co. for 30 years, most recently as director of North American Diesel where he led engineering and business responsibilities for Ford diesel offerings within North America. Prior to that assignment Koszewnik was responsible for forward model engine engineering of all Ford's gasoline V6, V8, and V10 engines leading an organization of approximately 1200 employees. Koszewnik held a variety of other assignments while at Ford, including Manager of Worldwide Product Strategy and Manager of North American Marketing Product Plans. Following his distinguished career at Ford, Koszewnik was senior vice president of construction equipment product development at Case New Holland, where he managed 10 engineering centers worldwide and 650 employees. Additionally, he was director of production development at FEV Inc., an engineering services and consulting company, responsible for ensuring achievement of all functional requirements, quality, cost, and timing of production programs. He also supported product development and strategic study projects for the automotive, heavy truck, locomotive, and powertrain component supply industries. Koszewnik earned a bachelor's degree in engineering from Stevens Institute of Technology and a Master in Business Administration from Harvard University. He is a member of the National Academy of Engineering, elected in 2016 based on his past and present work in engine design.

John Luginsland

Co-Chair

Dr. John W. Luginsland is a Senior Scientist and Principle Investigator at Confluent Sciences, LLC. Additionally, he is an Adjunct Professor of Electrical and Computer Engineering at Michigan State University and a member of the Intelligence Science and Technology Experts Group (ISTEG) of the National Academy of Sciences. Previously, he served as a professor at Michigan State University in the Departments of Computational Mathematics, Science, and Engineering and Electrical and Computer Engineering, and various roles at the Air Force Office of Scientific Research including Acting Division Chief, Division Technical Advisor, Acting Branch Chief, Program Manager for Plasma Physics, and Program Manager for Laser Science. While at AFOSR, he also served as the program element monitor for Air Force Basic Research in the office of the Assistant Secretary of the Air Force for Acquisition. Additionally, Dr. Luginsland was a staff member at NumerEx LLC, Science Applications International Corporation, and the Air Force Research Laboratory, where he was also a National Research Council Postdoctoral Researcher. He is a past chair of the IEEE's Plasma Science and Applications Committee, and a previous guest editor of IEEE Transactions on Plasma Science Special Issue on High Power Microwave Sources. Dr. Luginsland holds degrees from the University of Michigan in Nuclear Engineering. He is a fellow of the IEEE and the Air Force Research Laboratory, and received the IEEE Nuclear and Plasma Science Society's Early Achievement Award. His research interests are in accelerator design, coherent radiation sources, dense kinetic plasmas, laser physics, serious games including agent-based models and wargames, as well as computational modeling including high-performance computing and machine learning techniques. He has previously worked on operational energy issues, including compact modular nuclear fission reactors, magneto-inertial fusion energy concepts, directed energy electromagnetic power beaming for Stirling cycle engines, and plasma-based chemistry enhancements to combustion engines (Carnot, Brayton, and Otto cycles).

John G. Kassakian

Member

Dr. John Kassakian (NAE) is Professor of Electrical Engineering at the Massachusetts Institute of Technology (MIT) and former director of the MIT Laboratory for Electromagnetic and Electronic Systems. His field of expertise is power electronics and automotive electrical systems. He received his undergraduate and graduate degrees from MIT, and prior to joining the MIT faculty, he served a two-year tour of duty in the U.S. Navy. Dr. Kassakian was the founding president of the Institute of Electrical and Electronic Engineers (IEEE) Power Electronics Society, served as the U.S. representative to the European Power Electronics Association, and is the recipient of the IEEE Centennial Medal, the IEEE William E. Newell Award, the IEEE Power Electronics Society's Distinguished Service Award, the IEEE Millennium Medal, the European Power Electronics Association Achievement Award, and the Kabakjian Science Award. In 1989 he was elected a fellow of the IEEE and in 1993 he was elected to the National Academy of Engineering. In 1993 he was also awarded an IEEE Distinguished Lectureship through which he has lectured internationally. He has published extensively in the areas of power electronics, power systems, education and automotive electrical systems, co-chaired the MIT study "The Future of the Electric Grid" and is a co-author of the textbook Principles of Power Electronics. Prof. Kassakian is a member of the Scientific Advisory Board of Lutron Electronics, and a former member of the boards of directors of ISO New England (the independent system operator of the New England electric utility system), Marvell Semiconductor, American Power Conversion Corp., Sheldahl Inc., and the Scientific Advisory Boards of the AMP Automotive Business Unit and Tyco Electronics..

Michael MacLachlan

Member

Dr. Michael MacLachlan, Chair, Emerging Technologies and Geostrategic Resources, National Intelligence University, is a physicist with experience in intelligence analysis, research and development, and counterproliferation, and topical background in space and missile systems, artificial intelligence, quantum information science, power and energy, energetics, international relations, and development, evaluation, and sustainment of advanced weapons. Dr MacLachlan was a nuclear counterproliferation proliferation analyst for DIA and the Department of Energy for ten years. During Operation Iraqi Freedom, he led the nuclear inspection team of the Iraq Survey Group in Baghdad. The rest of his career has been spent in research, development, test, and evaluation for the U.S. Air Force and the U.S. Army. He led a material-science research branch for the Air Force Research Laboratory, served as deputy chief of the laboratory's advanced rocket-propulsion division, and managed development and sustainment projects in the Air Force's ICBM and Space Shuttle programs. For the Army, he solicited, evaluated, and facilitated international basic-research projects, conferences, and scientific exchanges and was associate chief of the Army Research Laboratory's Signal and image Processing Division.

Paul E. Roege

Member

Paul Roege (Col. USA, retired), Partner, Creative Erg, LLC, works with technology developers, communities, and national security leaders to build resilience with energy as a central focus. Paul leads strategic initiatives for Typhoon-HIL, Inc, a leading-edge power system modeling and simulation startup, and technology development for EthosGen, LLC, a heat harvesting innovator. He researches and publishes on energy and resilience topics, with more than 15 papers, articles and book chapters. Partnering with his wife, Colonel Roege is active in youth STEAM and leadership programs. He has nearly 40 years of experience as an engineer and leader in engineering, construction, and research, primarily in the energy field. As a U.S. Army engineer officer, Colonel Roege built military infrastructure and led combat engineering capabilities in Europe, Asia, Africa and Central America. He planned and coordinated reconstruction of Iraqi oil production systems in 2003; later, he developed energy requirements and strategies for military operations, and was an early advocate within the Department of Defense for resilience as a guiding principle for community and national security. In his civilian career, Colonel Roege led engineering efforts associated with management and decommissioning of U.S. nuclear weapons production facilities, and disposition of plutonium from U.S. and former Soviet weapons programs. Paul is a registered professional engineer and a West Point alumnus with graduate degrees from Boston University (MBA) and the Massachusetts Institute of Technology (SM and Nuclear Engineer).

Debra R. Rolison

Member

Dr. Debra Rolison heads the Advanced Electrochemical Materials section at the U.S. Naval Research Laboratory in Washington, D.C. Her team designs, synthesizes, characterizes, and applies three-dimensionally structured, ultraporous, multifunctional, hold-in-your-hand nanoarchitectures for such rate-critical applications as catalysis, energy storage and conversion, and sensors. Dr. Rolison was a Faculty Scholar at Florida Atlantic University (1972–1975; B.S. in chemistry). She received her Ph.D. in chemistry from the University of North Carolina at Chapel Hill in 1980 after demonstrating the Pt-like character of RuO₂ electrodes in nonaqueous electrolytes, helping to establish polymer-modified electrodes. She joined NRL as a staff scientist in 1980. Dr. Rolison is a fellow of the American Association for the Advancement of Science, the Association for Women in Science, the Materials Research Society, and the American Chemical Society. Among her major awards, she received the William H. Nichols Medal (2018), the E.O. Hulburt Award (2017; NRL's top science award and the only female recipient in its 65 years of bestowal), the Department of the Navy Dr. Dolores M. Etter Top Scientist & Engineer Team Award (2016), the ACS Division of Analytical Chemistry Award in Electrochemistry (2014), the Charles N. Reilley Award of the Society for Electroanalytical Chemistry (2012), the ACS Award in the Chemistry of Materials (2011), and the Hillebrand Prize of the Chemical Society of Washington (2011). Her editorial advisory board service includes Chemical Reviews, Analytical Chemistry, Langmuir, Journal of Electroanalytical Chemistry, Advanced Energy Materials, and the inaugural boards of Nano Letters, the Encyclopedia of Nanoscience and Nanotechnology, Annual Review in Analytical Chemistry, and ACS Applied Energy Materials. She also writes and lectures widely on issues affecting women (and men!) in science, including proposing Title IX assessments of science and engineering departments. She is the author of over 230 articles and holds 39 U.S. patents.

Subhash C. Singhal

Member

Dr. Subhash Singhal (NAE) served as a Battelle Fellow and Director, Fuel Cells at PNNL from 2000 to 2013 and provided senior technical, managerial, and commercialization leadership to the laboratory's extensive fuel cell and clean energy programs. Before that, he worked for over 29 years, initially as a scientist and later as Manager-Fuel Cell Technology at the Westinghouse Electric Corporation. While at Westinghouse (that later became part of Siemens), he conducted and/or managed major research, development, and demonstration programs on advanced materials and energy systems including steam and gas turbines, coal gasification, and fuel cells. From 1984 to 2000, as manager of Fuel Cell Technology there, he was responsible for the development of solid oxide fuel cells for stationary power generation. In this role, he led an internationally recognized group in fuel cell technology and brought these cells from a few-watt laboratory curiosity to fully-integrated 200 kW size power generation systems. He has authored 100 scientific publications, edited 21 books, received 13 patents, and given over 340 plenary, keynote and invited presentations worldwide. Dr. Singhal is the recognized world leader in solid oxide fuel cells for power generation. He has served on the advisory boards of the Department of Materials Science and Engineering at the University of Florida, Florida Institute for Sustainable Energy, Division of Materials Science and Engineering at Boston University, Materials Research Science and Engineering Center at the University of Maryland, Center on Nanostructuring for Efficient Energy Conversion at Stanford University, and the Fuel Cell Institute at the National University of Malaysia. Dr. Singhal is a member of the U.S. National Academy of Engineering; a founding member and Past President of the Washington State Academy of Sciences; a fellow of American Ceramic Society, The Electrochemical Society, ASM International, and the American Association for the Advancement of Science; and a senior member of the Mineral, Metals & Materials Society. He served on the Electrochemical Society's Board of Directors during 1992-94; received its Outstanding Achievement Award in High Temperature Materials in 1994; its inaugural Subhash Singhal Award in 2019 in recognition and honor of seminal and long lasting contributions to the science and technology of solid oxide fuel cells; and was the chairman of its International Symposium on Solid Oxide Fuel Cells during 1989-2019. He served as president of the International Society for Solid State Ionics during 2003-2005. He received the American Ceramic Society's Edward Orton Jr. Memorial Award in 2001; an Invited Professorship Award from the Japan Ministry of Science, Education, and Culture in 2002; Christian Friedrich Schoenbein Gold Medal from the European Fuel Cell Forum in 2006; Fuel Cell Seminar Award for outstanding leadership and innovation in the promotion and advancement of fuel cell technology in 2007; and the prestigious Grove Medal in 2008 for sustained advances in fuel cell technology. Dr. Singhal served on the editorial board of the Elsevier's Journal of Power Sources and was an associate editor of ASME's Journal of Fuel Cell Science and Technology. He has also served on many national and international advisory panels including those of the National Academies, Materials Properties Council, National Science Foundation, U.S. Department of Energy, NATO Advanced Study Institutes and NATO Science for Peace Programs, United Nations Development Program (UNDP), United Nations Industrial Development Organization (UNIDO), International Energy Agency (IEA), and the European Commission.

John J. Szymanski

Member

Dr. John Szymanski is the Chief Scientist for Global Security at Los Alamos National Laboratory. Before that assignment he was the Chief Scientist for Threat Identification and Response at Los Alamos. As a member of the Air Force Scientific Advisory Board he was responsible for the SAB S&T reviews of the Air Force Research Lab. Before his present assignments, he was the acting deputy leader of the Defense Systems and Analysis Division at Los Alamos. From 2010 to May 2012 he was a member of the White House Office of Science and Technology Policy, where his portfolio included nuclear defense R&D, isotope supply, future computing, and national security space. Prior to joining the White House, Dr. Szymanski worked at Los Alamos as Program Director for Nuclear Nonproliferation, a portfolio of programs with funding exceeding \$300M. This portfolio included national security space programs, nuclear-materials safeguards and security, and nonproliferation and counterproliferation R&D. Previously he was program manager for nuclear nonproliferation research and development. In the past he led several research efforts at Los Alamos, including the development of the Multispectral Thermal Imager satellite data center and genetic algorithms used for automated feature extraction in images. His research interests include optical remote sensing, nuclear defense science and technology, and national-security policy issues. His technical experience includes the design and fabrication of high-speed digital electronics, radiation detectors, real-time data acquisition systems, algorithm development, applications of genetic algorithms, and large-scale simulations. Dr. Szymanski received his B.S., M.S., and PhD degrees in physics from Carnegie Mellon University, where his thesis research was in experimental nuclear physics. He continued working in nuclear physics research at Los Alamos National Laboratory and then as a faculty member at Indiana University. The Department of Energy, National Science Foundation, internal sources, and other U.S. Government agencies have funded his research. His activities have included the American Physical Society, Institute for Nuclear Materials Management, IEEE, and SPIE. He has organized workshops, several special conference sessions and served on many local and national committees. He is the author of 40 journal publications, many invited talks and numerous conference proceedings. His honors include an R&D 100 award, two Los Alamos Distinguished Performance awards, an INMM "support above and beyond" award, DOE/NNSA recognition for superior achievement, and several fellowships and teaching awards.