

ASM International

FY14 Solid Oxide Fuel Cells Peer Review Panel

April 16–18, 2014

Ravi Prasad, Ph.D. – Panel Chair

Helios-NRG, LLC—President

- PI of DOE STTR Phase 2 project developing step-change technology to recover He from low purity sources using a new separation technology in a hybrid process.
- PI of new algae technology for CO₂ mitigation, bio-fuel production, and water remediation applications
- Consulted with DOE in application reviews for “CCS from Industrial Sources and Innovative Concepts for Beneficial CO₂ Use,” “Clean Coal Power Initiative–Round 3,” and “Large-Scale Industrial CCS Projects”
- Panelist in 10 NETL peer reviews and Chair of 4
- Consultant to Praxair on sustainability initiative

Provided consultation services to industrial clients in clean energy, natural gas processing, CO₂, He recovery, membrane technology, cryogenic, and other gas separation processes.

A former Praxair Corporate Fellow with over 60 patents and 30 years of broad industrial experience in developing and commercializing new technologies. Recognized technical expert in separations and extensive business development experience. Spearheaded Praxair's major new technology programs in the \$2–50 million range, scouted external technologies to drive growth, and established over 25 alliances for development and commercialization. Developed Praxair's skill center in ceramic ion transport membranes, led programs in IGCC, combustion, oxygen, and SOFC afterburner. Recruited, mentored, and led world-class team of 35 scientists and engineers. Established and managed Praxair's polymeric membrane process skill center and helped assess and later integrate new acquisition. A founding member of a major international alliance involving Praxair and five Fortune-500 companies to develop step-change syngas technology for GTL. Instrumental in negotiations, roadmap development, program planning, IP strategy development, and implementation. PI on completed NSF Phase 1 SBIR entitled “Integrated Algal Platform for Bio-Diesel and H₂.”

Dr. Prasad has a B.S. in mechanical engineering from the Indian Institute of Technology in Kanpur, India; and an M.S. and Ph.D. in mechanical engineering and chemical engineering from the State University of New York, Buffalo.

Thomas L. Cable, Ph.D.

Dr. Cable is a specialist in solid oxide fuel cells (SOFCs), regenerative fuel cells, and catalytic reforming, with 30 years of laboratory and project management experience. His areas of expertise include anode and cathode compositions and nanostructures, solid electrolytes, sulfur tolerant anodes and catalysts for steam reforming of heavy hydrocarbons (JP8 and diesel), and mixed ionic/electronic-conducting ceramic membranes for oxygen separation. Dr. Cable is currently consulting through his company TLCCell, LLC.

Most recently Dr. Cable was a Senior Development Professional at Praxair, developing oxygen transport membranes (OTM), a technology he co-invented at BP in the late 1980s. Prior to his position at Praxair, Dr. Cable was Chief Scientist in Solid Oxide Fuels Cells for the Ceramics Branch at NASA Glenn/U. Toledo, from 2003 to 2011. In this position, he served as the technical lead in the development of all-

ceramic SOFC designs for aeronautic applications. Prior to this position, Dr. Cable was Chief Scientist at SOFCo (McDermott Technology, Inc.) from 1999 to 2003, where he was principal investigator in cell development of the SOFCo fuel cell stack design. In addition, he was co-director of the U.S. Department of Energy, Solid State Energy Conversion Alliance (SECA), a 10-year, \$75 million contract for the development of a 10-kW auxiliary power unit. Dr. Cable was a research scientist at BP Chemicals from 1997 to 1999; a group leader in materials research at Technology Management, Inc., from 1993 to 1997; a Senior Project Leader at BP America, Inc., from 1987 to 1992; and a Senior Project Engineer at Standard Oil Co. of Ohio from 1984 to 1987.

Dr. Cable holds 28 U.S. patents for inventions related to SOFC and mixed ionic-electronic conducting membranes. Dr. Cable has presented at numerous conferences, has published eight reports and journal articles, and is a member of the American Ceramic Society (Electronics Division). Dr. Cable received a B.S. in chemistry and chemical engineering and a Ph.D. in chemical and fuels engineering from the University of Utah. He completed a post-doctoral fellowship at Brigham Young University, studying Fischer-Tropsch Catalysis for the conversion of carbon monoxide and hydrogen to gasoline, under the direction of Professor Calvin Bartholomew. His current research focus is in fuel processing and reforming catalysis.

Minking K. Chyu, Ph.D.

Dr. Chyu is chair of the Department of Mechanical Engineering and Materials Science and the Leighton Orr Endowed Professor of Engineering at the University of Pittsburgh. Dr. Chyu's primary research focus is thermo-fluid issues related to power and propulsion system, material processing, microsystem technology, transport phenomena, energy and power systems, gas turbines, and fuel cells. Major projects he has conducted include convective cooling of gas turbine airfoils, thermal control of rotating machinery, thermal measurement and imaging techniques, and transport phenomena in adaptive flow control and fabrication of microstructures.

Dr. Chyu has received numerous honors and awards, including four NASA Certificates of Recognition for his contribution on space shuttle main engine program, Air Force Summer Research Fellow, Department of Energy Oak Ridge Research Fellow, and DOE Advanced-Turbine-System Faculty Fellow. He is a Fellow of the American Society of Mechanical Engineers (ASME), Associate Fellow of American Institute of Aerospace and Aeronautics (AIAA), and a U.S. delegate to the Scientific Council of the International Centre of Heat and Mass Transfer (ICHMT). He was named the Engineer of the Year by the ASME Pittsburgh Chapter in 2002. He serves as an Associate Editor for the Journal of Heat Transfer, ASME, Advisory Board Member for the International Journal of Fluid Machinery and Systems, a Guest Editor for AIAA Journal of Propulsion, and a Foreign Editor for the International Journal of Chinese Institute of Mechanical Engineers. He has published nearly 300 technical papers in archived journals and conference proceedings.

Dr. Chyu has over 130 journal publications and over 150 symposium and conference papers, has been conference chair or organizer of nearly 30 conferences, served as an invited lecturer on more than 40 occasions, has won over 60 grants, and has graduated 14 Ph.D. and more than 20 M.S. students.

Dr. Chyu received a B.S. in nuclear engineering at the National Tsing Hua University in Taiwan, an M.S. in applied mechanics at the University of Cincinnati, and a Ph.D. in mechanical Engineering from the University of Minnesota.

Wayne Huebner, Ph.D.

Dr. Wayne Huebner is a Professor of Ceramic Engineering, and the Chairman of the Materials Science and Engineering Department at the Missouri University of Science and Technology in Rolla, MO. Prior to this position he served as the Vice Provost for Research from 2001–2007. The author of over 100 papers, monographs, and book chapters, he has been actively involved in the preparation and characterization of electronic ceramics. Much of his research is focused on the use of dielectrics, ionic and mixed conductors, piezoelectrics, electrostrictive materials for multilayer capacitors, solid oxide fuel cells, gas separation membranes, and phased linear array transducers for intravascular imaging. He has graduated 10 Ph.D. students and 15 M.S. students. Huebner has received S&T's Faculty Excellence Award five times, the Outstanding Teacher Award four times, and was named the Outstanding Faculty Member in Ceramic Engineering five consecutive years. He has been a continuous member of the Electronics Division of American Ceramic Society since 1983, serving in many capacities including all offices of the Ceramic Educational Council, an organizer of various symposia, and Associate Editor of the Journal of the ACS.

Dr. Huebner received his B.S and Ph.D. in ceramic engineering from the University of Missouri-Rolla.

Michael R. von Spakovsky, Ph.D.

Dr. von Spakovsky has over 27 years of teaching and research experience in academia and over 17 years of industry experience in mechanical engineering, power utility systems, aerospace engineering, and software engineering. He received his B.S. in Aerospace Engineering in 1974 from Auburn University and his M.S and Ph.D. in Mechanical Engineering in 1980 and 1986, respectively, from the Georgia Institute of Technology. While at Auburn he worked for 3½ years at NASA in Huntsville, AL, and from 1974 to 1984 and from 1987 to 1989 worked in the power utility industry first as an engineer and then as a consultant. From 1989 to 1996, Dr. von Spakovsky worked as both an educator and researcher at the Swiss Federal Institute of Technology in Lausanne, Switzerland, where he led a research team in the modeling and systems integration of complex energy systems and taught classes in the thermodynamics of indirect and direct energy conversion systems (including fuel cells).

In January of 1997, Dr. von Spakovsky joined the Mechanical Engineering faculty at Virginia Tech as Professor and Director of the Energy Management Institute (now the Center for Energy Systems Research). He teaches undergraduate and graduate level courses in thermodynamics and intrinsic quantum thermodynamics, kinetic theory and the Boltzmann equation, fuel cell systems, and energy system design. His research interests include computational methods for modeling and optimizing complex energy systems; methodological approaches (with and without sustainability and uncertainty considerations) for the integrated synthesis, design, operation, and control of such systems (e.g., stationary power systems grid/microgrid/producer/storage and district heating/cooling networks, high performance aircraft systems); theoretical and applied thermodynamics with a focus on intrinsic quantum thermodynamics applied to nanoscale and microscale reactive and non-reactive systems; and fuel cell applications for both transportation and centralized, distributed, and portable power generation and cogeneration. He has published widely in scholarly journals, conference proceedings, etc., (over 210 publications) and has given talks, keynote lectures, seminars, and short courses (e.g., on fuel cells and intrinsic quantum thermodynamics) worldwide. Included among his various professional activities and awards is senior member of the AIAA; *Fellow of the ASME*; the *2012 ASME Edward F. Obert Award*; the *2005, 2008, and 2012 ASME Advanced Energy Systems Division (AESD) Best Paper Awards*; the *ASME AESD Lifetime Achievement Award*; former Chair of the *Executive Committee* for the ASME AESD, elected member of Sigma Xi and Tau Beta Pi, Associate Editor of the *International Journal of Fuel Cell Science and Technology*, former Editor-in-Chief (11-year tenure) of the *International Journal of Thermodynamics*, and Chair of the *Executive Committee* for the *International Center of Applied Thermodynamics*.