Guest Editorial
Special Issue on Plenary and Invited Papers From ICOPS 2006

THE 33rd International Conference on Plasma Science (ICOPS) was held in Traverse City, MI, in June 2006. It was chaired by Prof. Jes Asmussen and cochaired by Prof. Timothy Grotjohn with over 400 attendees from around the world. Over 400 papers were presented at the conference. This special issue focuses on the Plenary and Invited Papers presented at ICOPS. Contributed and poster papers at ICOPS are encouraged to submit regular papers to IEEE TRANSACTIONS ON PLASMA SCIENCE.

Thirteen referred papers from the plenary and invited talks are in this Special Issue. The papers are from a range of plasma science topics including high-energy density plasmas, atmospheric pressure plasmas, microwave generation, thermal plasma torches, and applications of plasmas to biomedical, nanotechnology, displays, lighting, and plasma-assisted combustion. In the area of Z-pinch and high-energy density plasmas, Bott *et al.* present an experimental study using imaging and X-ray diagnostics of the precursor column formation in wire array Z-pinches. Ottinger and Schumer present a model of the power flow in a Z-pinch-driven inertial fusion energy system that utilizes a recyclable transmission line. Drake presents a study of radiative shocks in optical thick media by looking at the fluid theory and using a model for the radiative transfer that yields a description of the shock structure. In the area of atmospheric pressure plasma discharges, the paper by Hopfe and Sheel examines the use of atmospheric plasmas for coating and etching applications. Plasma sources they consider include microwave chemical-vapor deposition (CVD), linear-shaped plasma dc ArcJet CVD, and dielectric barrier glow discharge CVD. Shi, Liu, and Kong examine the operation and properties of dielectric-barrier radio-frequency atmospheric pressure glow discharges. Roth *et al.* examine several applications of atmospheric pressure discharges based on the One Atmosphere Uniform Glow Discharge Plasma technology. In the area of thermal plasmas, Tanaka *et al.* present a study of independently controlling the atomic nitrogen flux and the enthalpy flow, from an induction thermal Ar–N2 plasma torch, by modulating the coil current. In the area of microwave generation, Thumm *et al.* present experimental results on a new megawatt class design for a gyrotron operating at 140 GHz. This gyrotron is designed for use as the millimeter-wave power source for heating plasmas to high temperatures for fusion reactions.

Several of the papers in this Special Issue present studies of the application of plasmas. Chu presents a paper on plasma-treated biomaterials that looks at the use of atmospheric pressure plasma spraying and plasma immersion ion implantation. Applications discussed include orthopedic implants, biocompatible coatings, and antibacterial coatings. Ostrikov overviews the ways that plasmas are used in nanoscience areas. Examples from nature and nanofabrication in the laboratory are discussed. Park *et al.* present work on making 20×20 and 50×50 addressable arrays of microcavity discharges that are built based on dielectric barrier designs. Paul *et al.* developed a 3-D model for high-intensity discharge lamps. The model results are validated by comparison to experimental temperature measurements of a test lamp. Vincent-Randonnier *et al.* describe a study and experimental test bench for plasma-assisted combustion using a dielectric barrier discharge to assist a methane diffusion flame.

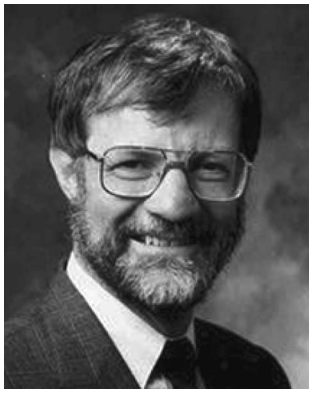
We would like to thank all the referees for the papers in this Special Issue. A special thanks is also due to Dr. S. Gitomer, Editor-in-Chief of the IEEE TRANSACTIONS ON PLASMA SCIENCE, for his guidance and support during the formation of this Special Issue.

JES ASMUSSEN, *Guest Editor*
Department of Electrical and Computer Engineering and Fraunhofer Center for Coatings and Laser Applications
Michigan State University
East Lansing, MI 48824 USA

TIMOTHY A. GROTJOHN, *Guest Editor*
Department of Electrical and Computer Engineering
Michigan State University
East Lansing, MI 48824 USA

THOMAS SCHUELKE, *Guest Editor*
Fraunhofer Center for Coatings and Laser Applications
Michigan State University
East Lansing, MI 48824 USA

Digital Object Identifier 10.1109/TPS.2007.894921



Jes Asmussen (S'66–M'67–SM'87–F'92–LF'04) received the B.S., M.S., and Ph.D. degrees in electrical engineering from the University of Wisconsin, Madison.

He has held a tenure track appointment at the Department of Electrical and Computer Engineering (ECE), Michigan State University (MSU), East Lansing, for more than 30 years. He served as the MSU ECE Department Chairperson from 1989 to 2000, and from February to August 2002, he was a Guest Professor of Advanced Technology for Electrical Engineering (Endowed) Chair at the Department Electrical and Computer Engineering, Kumamoto University, Kumamoto, Japan. In 2002, he helped establish a collaborative research endeavor between MSU and Fraunhofer Gesellschaft, Germany, establishing the Fraunhofer Center for Coatings and Laser Applications, MSU, where he presently serves as the Executive Director. His research is concerned with the invention, diagnosis, and application of microwave plasma free radical sources, microwave broad-beam ion sources, microwave plasma thin-film deposition and microwave plasma etching techniques, microwave ion engines and microwave electrothermal engines for spacecraft propulsion, and specialized microwave applicators for processing layered polymeric and/or composite materials.

Timothy A. Grotjohn (S'81–M'86–SM'98) received the B.E.E. and M.S. degrees in electrical engineering from the University of Minnesota, Minneapolis, in 1982 and 1983, respectively, and the Ph.D. degree in electrical engineering from Purdue University, West Lafayette, IN, in 1986.

In 1987, he joined the Department of Electrical and Computer Engineering, Michigan State University, East Lansing, as an Assistant Professor and is currently a Professor of Electrical and Computer Engineering. His scholarly interests include the modeling, design, diagnostics, and control of plasma-assisted material processes and processing machines.

Dr. Grotjohn served for two years as the Secretary of the Executive Committee of the IEEE Plasma Science and Applications Committee. He also served as the Cochair of the 2006 International Conference on Plasma Science.

Thomas Schuelke (M'00) received the M.Sc. and Ph.D. degrees in physics from the Technical University, Dresden, Germany.

He was with Chartered Semiconductor Manufacturing Ltd., Singapore, as a Research and Development Engineer, where he worked on submicrometer CMOS processes. He was with the Fraunhofer Society for more than 13 years in Germany and the United States. His expertise is in the areas of plasma-based processes for thin-film deposition and etching, surface analysis, and equipment design. For the last nine years, he has been with Fraunhofer Center for Coatings and Laser Applications, Michigan State University, East Lansing, where he has held responsibility for activities in the area of advanced industrial coating technologies. He is managing applied research and development projects in machine tool, automotive, and other industries in close cooperation with American and German research laboratories with the major field of activity being surface engineering and materials.