

Guest Editorial

Special Issue on Vacuum Discharge Plasmas

Wang Jimei, André Anders, and Raymond L. Boxman

From September 18 to 22, 2000, Xi'an Jiaotong University in Xi'an, China, hosted the 19th International Symposium on Discharges and Electrical Insulation in Vacuum (ISDEIV), a conference technically co-sponsored by the IEEE Dielectrics and Insulation Society since 1980. The symposia are held biennially at different locations around the world; the last symposia were held in Eindhoven (1998) and Berkeley (1996)

There were 161 participants from 15 different nations attending this symposium, 53% from Asia, 41% from Europe and 6% from America. A total of 184 papers were submitted and presented, with a total of 408 contributing authors. Twelve invited and 22 submitted papers were presented in 7 oral sessions; and about 130 posters were presented in 6 poster sessions. In addition, two minicourses were presented: "Vacuum Switches" and "Writing Technical Papers In English"; they drew wide attention from the attendees.

Two technical visits were arranged during the symposium, to the Xi'an High Voltage Apparatus Research Institute, the most authoritative official certification laboratory of high voltage electric apparatus in China, and to the Shaanxi Baoguang Electrical Corporation, the largest manufacturer of vacuum interrupters in China. Furthermore, a technical exhibition by four foreign and five domestic manufacturers

was organized in parallel with the symposium.

Another highlight of the symposium was the presentation of the Dyke Award, endowed by TOSHIBA corporation, Japan, and the Chatterton Young Investigator Award, provided by ABB Calor-Emag Schaltanlagen AG, Germany. The Dyke Award is given to a person identified by the Award Committee for an outstanding body of significant contributions or a singularly exceptional recent contribution in the field of electrical discharges or electrical insulation in vacuum. Professor Raymond Boxman, from Israel, was honored with the 2000 Dyke Award for “his outstanding body of work in the field of electrical discharges in vacuum, in particular for his contributions to the physics technology, and applications of vacuum arc plasmas”. The Chatterton Young Investigator Award recognizes the outstanding achievement of a young investigator based on the quality of a paper presented at the Symposium. The 2000 Chatterton Award was presented to Dr. George Yushkov, from Russia, for his contribution “Measurement of directed ion velocity in vacuum arc plasmas by arc current perturbation methods”.

The proceedings of 783 pages in two volumes were published both in conventional book format and on CD-ROM; they may be obtained from IEEE Publications Services (contact IEEE through its web site <http://www.ieee.org>).

Selected and revised papers from the symposium are being published in two special issues of IEEE Transactions. One is this one on *Vacuum Discharge Plasmas*, and the companion issue will be published in IEEE Transactions on Dielectrics and Electrical

Insulation, scheduled for early 2002.

Following a long tradition, a large number of researchers from Russia and Ukraine are engaged in this field. Being the host of this symposium, China was a particularly active symposium participant, contributing 34 papers. Many attendees from both academia and industry participated in the symposium and the minicourses. Particularly noteworthy was the presence of many young researchers who are at the beginning of their careers in this research area. Most of them were involved in vacuum switches. Japan continued their strong participation in this area as well.

Germany took the lead role of the research work in this field in Europe, presenting 17 papers, many by highly spirited young investigators. The enthusiastic participation of young investigators was especially welcome at a time of over-attraction of head-line-making high-tech fields such as computers and information technology.

Commercial companies were more active in this symposium, providing a large numbers of high quality contributions, lectures at the minicourse, and attractive technical exhibitions. The Local Organizing Committee was very grateful for their financial support to the symposium.

Some researchers attempted to develop MHD models of the vacuum arc plasma, a development which should be greatly encouraged. A well-developed theoretical model for the vacuum arc, which can aid product development, will be a significant contribution to the field.

Research expanded in the field of vacuum arc plasma deposition of thin films. This

application will undoubtedly become widespread.

The guest editors would like to thank the authors of this issue and the referees for their hard work and cooperation, with particular thanks to Dr. Shenli Jia and Jing Wang.

The next ISDEIV will take place in Lyon, France, in 2002. Further information will be available on the web site of the ISDEIV Permanent International Scientific Committee <http://isdeiv.lbl.gov>.

Wang Jimei was born in Hangzhou, Zhejiang Province, China, on August 15, 1922. He graduated in Electrical Engineering from Shanghai Utopia University in 1946. He is a professor at Xi'an Jiaotong University and a Ph.D. supervisor authorized by the Academic Commission of State Council since 1978. Wang Jimei is a pioneer researcher on vacuum arcs theory and organized a research group on vacuum arc theory and their applications in China in 1958. He developed the first vacuum switch in China in 1964. He has published 12 monographs and more than 300 papers in China and abroad. He is a senior member of Chinese Electrical Engineering Society, a senior member of Chinese Electrotechnical Society and a senior member of IEEE. He was Chairman of 1st International Conference on Electric Contacts, Arcs, Apparatus and their Applications in Xi'an, China, in 1989. He is a member of the Permanent International Scientific Committee of the Symposia on Discharges and Electrical Insulation in Vacuum and a scientific member of International Conference on Electric Fuses and their Applications.

André Anders (M '94, S '98, F '01) is the Group Leader of the Plasma Applications Group at Lawrence Berkeley National Laboratory (LBNL), Berkeley, California. He studied physics in Wroclaw, Poland, Berlin, Germany, and Moscow, Russia. He holds an M.S. degree ('84) and Ph.D. degree ('87) in physics from Humboldt University, Berlin. He was a Staff Scientist at the Academy of Sciences in Berlin (1987-1991) and

is affiliated with LBNL since 1992. His research includes vacuum arc plasma and ion sources, gas plasma sources, ion implantation, plasma immersion ion implantation, and thin film synthesis. He is the author of *A Formulary for Plasma Physics* (Berlin: Akademie-Verlag, 1990) and the editor and co-author of the *Handbook of Plasma Immersion Ion Implantation and Deposition* (New York: Wiley, 2000). He has published more than 100 papers in refereed journals. He is the Secretary of the Permanent International Scientific Committee of the International Symposia on Discharges and Electrical Insulation in Vacuum and serves in several other international committees. He received the Chatterton Award (1994) and an R&D 100 Award (1997). He is a Fellow of IEEE, and a member of MRS, AVS, SVC and IoP (UK).

Raymond L. Boxman received his S.B. and S.M. degrees in Electrical Engineering in 1969 from the Massachusetts Institute of Technology, and his Ph.D. from M.I.T. in 1973. He was introduced to vacuum arcs which became his career specialty as a cooperative student at the General Electric Company in Philadelphia, and the subject of triggered vacuum gaps became the topic of his S.M. thesis, while laser interferometric measurement of electron and vapor densities in a vacuum arc became the topic of his Ph.D. thesis. Boxman worked as a Senior Research Engineer at GE where he investigated the behavior of vacuum arcs in high current switches from 1973 to 1975, at which time he took up a position on the Faculty of Engineering at Tel Aviv University. Boxman is the co-founder of the Electrical Discharge and Plasma Laboratory at TAU.

During the last decade Boxman has focused his research work on the application of the vacuum arc to the production of thin films. In 1984 Boxman and his colleagues were awarded the Joffe Foundation Award by the International Union of Surface Finishing for their breakthrough work on pulsed vacuum arc deposition. In 2000 Boxman received the Walter Dyke Award from the International Symposia on Discharges and Electrical Insulation in Vacuum for his outstanding body of work in the field of electrical discharges in vacuum, in particular for his contributions to the physics, technology, and applications of vacuum arc plasmas.

In 1989 Boxman was named a Fellow of the IEEE for his contribution to vacuum arc theory and applications. Boxman served as Secretary of the Permanent International Scientific Committee of the International Symposia on Discharges and Electrical Insulation in Vacuum, and as a member of the Program Committee and Session Chairman for the Hard Coatings and PVD Symposium of the International Conference on Metallurgical Coatings and Thin Films. He founded the Israel Plasma Science and Technology Association. Boxman also serves as Associate Editor of the IEEE Transactions on Plasma Science, served as its guest editor for special issues on vacuum discharge plasmas, and on plasma deposition, and is a member of the Editorial Board for Plasma Chemistry and Plasma Processing. He organized and edited the text "Handbook of Vacuum Arc Science and Technology" which involved the co-ordinated efforts of 24 authors in seven countries. In addition he has presented over 200 scientific papers at conferences or in technical journals, as well as seven patents. Prof. Boxman is married to Edith, an economist and manager at Bank Leumi, with whom he has four

children, ages 13-22. In his spare time he enjoys hiking, swimming, gardening and amateur radio.



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