

Conference Report

GASEOUS DIELECTRICS VIII (EIGHTH INTERNATIONAL SYMPOSIUM ON GASEOUS DIELECTRICS) Virginia Beach, VA June 2-5, 1998

Report prepared by

**Loucas G. Christophorou and
James K. Olthoff**

Electricity Division,
Physics Laboratory,
National Institute of Standards and Technology,
Gaithersburg, MD 20899-0001

Available online: <http://www.nist.gov/jres>

1. Purpose

Gaseous dielectrics is a multi-disciplinary field of science and technology which aims at understanding the electrical breakdown in gases and the development of special gases for use as high-voltage insulation. The electric power industry uses dielectric gases for electrical insulation in power generation, transmission, distribution, and substation equipment. Other technologies use gaseous dielectrics for a multiplicity of purposes such as in pulsed power generation, gas lasers, particle accelerators, plasma processing, and environmental cleanup.

Gaseous dielectrics used as insulating gases in the electric power industry must have desirable physical and chemical properties, be compatible with other materials used in the system, and be economically and environmentally acceptable. Continuing research in gaseous dielectrics generates knowledge needed to understand the physical, chemical, and electrical properties of high-voltage insulating gases under laboratory and industrial conditions, as well as material compatibility and environmental acceptability of high-voltage gaseous insulation. Ultimately this research provides the fundamental basis for understanding how gases can be effective insulators and arc/current interrupters for the power industry's needs and allows industry to transmit and distribute electrical energy in more efficient, safe, and environmentally acceptable ways.

Following the tradition of the previous seven symposia, the Eighth International Symposium on Gaseous Dielectrics brought together leading individuals from universities, research laboratories, government agencies, industrial centers, and funding agencies from throughout the world. It provided an international forum for review and discussion of the progress and problems of current interest in gaseous dielectrics and their use, especially as insulators in high-voltage equipment and substations.

2. Organization and Functions

The Eighth International Symposium on Gaseous Dielectrics took place from June 2-5, 1998, in Virginia Beach, VA. It was attended by over 100 participants from 18 countries. The Symposium was organized by staff of the Electricity Division of the National Institute of Standards and Technology (Loucas G. Christophorou, chairman and James K. Olthoff, co-chairman). It was hosted by NIST and the Old Dominion University with Technical Sponsorship by the IEEE Dielectrics and Insulation Society. The

symposium was sponsored by NIST, Old Dominion University, Wright Laboratory, ABB (Switzerland), Hitachi, Ltd (Japan), Kansai Electric Power Company (Japan), Mitsubishi Electric Corporation (Japan), Tokyo Electric Power Company (Japan), and Toshiba Corporation (Japan).

Altogether 77 papers—of which 9 were invited—were presented in 10 nonparallel oral presentation sessions and one poster session. In addition there were two Discussion Panels, one organized and chaired by Dr. Alan Cookson on “SF₆ Substitutes” and the other organized and chaired by Dr. Alan Garscadden on “Other Industrial Applications of Gaseous Dielectrics and Databases.” A special session dealing with Partial Discharges and Diagnostics was devoted to the memory of the late Professor A. Pedersen and the invited talk in this session was given by Pedersen’s long-time collaborator, Dr. I. W. McAllister. A luncheon talk on “Twenty Years of Gaseous Dielectrics Symposia” was given by Dr. Alan Garscadden. The banquet speaker was Dr. Alan Clark who spoke on “Pursuing the Dragons of Precision,” a light overview of the needs and challenges of precision electrical measurements.

3. Highlights

The Symposium began with fundamental contributions to the Basic Physics of Gaseous Dielectrics and the understanding of Basic Gas Discharge Mechanisms. The sessions dealing with these topics were followed by reports on Simulations and Breakdown in Gases, Partial Discharges and Diagnostics, High-Pressure Gas Dielectrics (focusing in particular on SF₆/N₂ gas mixtures), Gas Decomposition, and the Effects of Particle Contamination on the gas dielectric properties. Subsequent sessions dealt with issues relating to recent environmental concerns regarding the designation of SF₆ as one of the most potent greenhouse gases and also with issues relating to the recycling of used SF₆ and the reduction of its leak rates into the environment from high-voltage SF₆-insulated equipment. The subjects of discussion then proceeded to more practical areas that included Surface Discharges, Design Engineering, and Gas-Insulated Equipment.

The main theme of the meeting was SF₆ replacements and in particular SF₆/N₂ mixtures. The use of such mixtures in gas-insulated transmission lines, gas-insulated transformers and gas-insulated arc and current interrupters was debated and so were the issues related to recycling and handling of such mixtures. New results were presented regarding the industrial suitability of such mixtures especially on their dielectric properties, heat transfer properties, and decomposition under practical conditions.

In light of the recent environmental issues relating to the use of SF₆, this meeting was an invaluable forum for a broad discussion of the many issues relating to this problem, the understanding of the various aspects of the problem, and the formulation of sound solutions, including the development of substitute dielectrics. The meeting was unique in another distinct way: it was attended by some of the world’s foremost authorities in the basic and applied aspects of gaseous dielectrics, as well as in the engineering and industrial aspects. The strong interaction between this diverse group of scientists, engineers, manufacturers, and users of gas-insulated equipment was of great mutual benefit and will certainly influence future developments in the field.

4. Proceedings

Copies of all papers received by the time of the meeting were distributed. Besides these “working proceedings,” all papers presented at the Symposium, along with the discussion that followed the oral presentations, and the presentations and discussion during the two discussion panels, will be published later in the year and will be available for purchase from Plenum Press.

5. Gaseous Dielectrics IX

There was a strong recommendation to have The Ninth International Symposium on Gaseous Dielectrics in 2001.