

## PREFACE

Until 1974, only a few halide glass forming systems - primarily  $\text{ZnCl}_2$  and those based on  $\text{BeF}_2$  - were known. These were mainly of academic interest. In March 1974 Michel Poulain, then a research technician at the Université de Rennes, produced quite by accident the first known heavy metal fluoride glass while attempting to synthesize a fluorozirconate single crystal. An extensive research effort in these materials was started at the Université de Rennes, partly because of the practical implications of their broad range of I.R. transparency and partly because of their novelty. A large number of published papers on heavy metal fluoride glasses, starting in 1975, resulted from this work. However, it was not until about 1978 that the French work began to be noticed and similar research efforts were commenced in laboratories in England, the United States and Japan. In 1979, it was realized that heavy metal fluoride glasses had real potential as materials for fiber optic waveguides which might exhibit losses orders of magnitude lower than those of silica based fibers.

In 1980 Martin Drexhage and C.T. Moynihan met with Jacques Lucas in the Boston area to discuss mutual research interests. During this meeting, the opinion was jointly ventured that there was now sufficient activity in halide glasses to warrant a small informal conference. At that time, it was thought such a meeting might attract perhaps twenty-five participants. It was nearly two years later, in March 1982, that this event actually occurred, after prevailing upon John Gannon to organize and chair it. The meeting was held at Cambridge University in the U.K. and entitled the "First International Symposium on Halide and Other Non-Oxide Glasses". The major portion of this conference was devoted to halide glasses, and by that time interest in the field had picked up to the point that 39 papers were presented on halide glasses and 96 conferees took part in the meeting.

The first Symposium was so successful that it was immediately decided to hold a second meeting, restricted now to halide glasses only. The "Second International Symposium on Halide Glasses", at which 60 papers were presented, took place in August 1983 at Rensselaer Polytechnic Institute in the U.S.A. This meeting was followed by the Third, Fourth and Fifth Symposia on Halide Glasses, held respectively at the Université de Rennes in France in June 1985, at Monterey, California in the U.S.A. in January 1987, and at the Fuji Institute of Training and Education in Japan in May/June 1988. Approximately one hundred papers were presented at each of these meetings, which were collected and published in Volumes 5/6, 19/20 and 32/33 of Materials Science Forum.

In this volume are collected the papers given at the Sixth International Symposium on Halide Glasses, organized by G. H. Frischat and held at the Technical University of Clausthal, F.R. of Germany, October 1-5, 1989. During this four day meeting, 94 papers were presented and 143 persons were in attendance.

As will be evident to the readers, our knowledge of halide glasses is now well developed, particularly with regard to the fluorozirconate glasses. Interesting and significant new fundamental results were reported at this meeting in the areas of ionic mobilities and ion exchange, the effect of oxide impurities on glass properties, and luminescence and lasing of rare earth doped glasses in bulk and fiber form. On the more applied side, some interesting preliminary studies of glass formation via chemical vapor, droplet spray and e-beam deposition were described. The record low loss in fluoride glass fibers, 0.7 dB/km at 2.5  $\mu\text{m}$  set in 1986, remained unbroken and far from the predicted intrinsic minimum of 0.02 dB/km. However excellent progress in understanding and controlling extrinsic scattering losses in fluoride fibers from crystallites and inclusions continued to be made. Fabrication and characterization of optical fibers made from the novel tellurium halide glasses was reported.

The Seventh International Symposium on Halide Glasses will be held in Australia in March, 1991. In the meantime we hope that this volume will give the reader a comprehensive picture of recent halide glass science and engineering.

Organization of this Symposium would not have been possible without the help of many colleagues and coworkers. To them are extended heartfelt thanks. Likewise, with regard to the always important financial side, implementation of the Symposium could not have been accomplished without support from private companies and government agencies in Germany, "Deutsche Forschungsgemeinschaft, Bonn-Bad Godesberg", "Niedersächsischer Minister für Wissenschaft und Kunst, Hannover", "Deutsche Spezialglas AG, Grünenplan", and "Schott Glaswerke, Mainz". Sincerest thanks to them also.

G. H. Frischat

C. T. Moynihan