

## PREFACE

Since the finding of synthetic process at high pressure and temperature (HP/HT) of diamond by the research group of General Electric Research and Development Center (1955), synthetic diamond became an important industrial materials for the cutting and grinding of hard materials such as ceramics, stones and concrete, and hard alloys such as tungsten carbide. In the later decade of the 70s, Spitsyn and other researchers at the Institute of Physical Chemistry of Moscow developed rapid a growing method of diamond by chemical vapor deposition (CVD). The CVD technique promoted a new area of research and application of synthetic diamond.

New applications of the optical window, semiconductor devices, and wear resistance coatings are developing in many countries using various CVD techniques. Diamond research and technology are widely spread in the areas of chemistry, physics, geoscience and various phases of advanced technology.

In Japan, a diamond and high pressure research group at the NIRIM (National Institute for Research in Inorganic Materials) was established in 1972. This group contributed continuously in the HP/HT diamond and cubic boron nitride research and CVD diamond synthesis. In the past decade (1964–1970), Toshiba, Kobe Steel and other industries studied high pressure diamond and cubic boron nitride. They developed various types of high pressure apparatus mainly of the multi-anvil type. These apparatus have contributed to the research of material synthesis and geophysical experiments.

In the late of 70's, Sumitomo Denko and Showa Denko started the production of boron nitride cutting tools and abrasives by the HP/HT technique. In the early period of the 80's, after the announcement of CVD diamond by NIRIM, many research groups joined the new community of diamond research. In 1985, Shinroku Saito, Professor Emeritus at Tokyo Institute of Technology, organized the JNDF (Japan New Diamond Forum) to promote the exchange of knowledge in science and technology of diamonds and related materials. JNDF organized seminar and discussion meetings several time per year.

Regarding the few opportunities to meet with scientists and engineers who have interest in the research and development in the new area of diamonds, JNDF decided to organize the First International Conference of New Diamond Science and Technology. In October 1988, 400 participants from 20 countries met in Tokyo for three days. Some of them lengthen their stay in Japan to visit laboratories. We believe that the first meeting was successful and offered a good opportunity to know and become intimate with each other. At the moment, we asked for the organization of the second conference to US colleagues for 1990 in Washington D.C.

Recent development of CVD film technique is remarkable. However, hetero-epitaxial growth and n-type semiconducting diamond are still underway of the research. We have many problems to overcome in the science and technology of the new diamond area. In the conference, many fruitful experimental data were presented at the oral and poster sessions. This volume will provide more detailed information of the conference. Unfortunately, the publishing of this volume is delayed much but we believe the content of this volume is quite impressive for all scientists and engineers concerned with the new diamond science and technology.

This volume is, of course, a collective result of the conference and also a good references of the recent developments of the new diamond research. In writing this paper, authors contributed much. The editors deeply appreciate the authors and reviewers who contributed with many helpful and constructive suggestions to the authors to improve the quality of the papers and volume.

Grateful acknowledgement is also expressed to Yoshida Science and Technology Foundation and Nippon Plate Glass Science Promotion Foundation for their financial support during the conference and for the publication of this volume.

Shinroku Saito  
Osamu Fukunaga  
Masanori Yoshikawa