

Preface

Significant progress has been made over the past 30 years in silicon-based ceramics such as silicon nitride, silicon carbide, SiAlON, silicides, and composites. Better understanding on processing parameters in various forming techniques and microstructure-property relationship has led to substantial improvement in thermomechanical performance and reliability as well as cost reduction. Increasing understanding on properties such as mechanical, thermal, and chemical in relation with harsh environments widens their potential applications in modern technologies. Novel materials such as α -SiAlON based materials are being intensively investigated seeking various potential industrial applications. Considerable efforts in nanostructure control instead of microstructure control are being initiated due to the anticipated breakthrough in material technology in the near future. The current state of the art on our understanding and up-to-date developments of these materials as well as the industrial case studies and applications have been addressed leading to the exploration of the new frontier.

This book presents the Proceedings of ISASC 2004 (International Symposium on New Frontier of Advanced Si-Based Ceramics and Composites). The symposium was held in Gyeongju, Korea, which was the capital of Shilla Dynasty (BC57–AD935), from June 20 to 23, 2004. There were 148 participants from 13 countries and 125 presentations including 21 invited lectures were made during 3 days conference. Presentations were grouped into 4 sessions.

The first session devoted to industrial applications. Both new and presently on-going applications were introduced. The second session presented various traditional and new techniques to process Si-based ceramics and composites. Some classical aspects in grain growth and sintering were presented as well as relatively new approach such as SPS process. The third session consisted of microstructure developments of various Si-based ceramics, particularly their effect on the mechanical performance and reliability. The fourth session comprised of thermo-mechanical and thermo-chemical behavior of Si based ceramics, especially, emphasis was placed on environmental barrier coating.

We would like to express our most sincere thanks to all members of the ISASC 2004 international and local advisory committee for their guidance and supports. We express our heart-felt thanks to the chairpersons, invited, and other participants for their stimulating presentations making the Symposium a great success. Furthermore, we would like to thank the members of Ceramic Material Group of Korea Institute Machinery and Materials (KIMM) as well as Sejong Convention Services, Inc. for their tremendous efforts on the preparations and organizations for such an outstanding program for the conference. Finally, we acknowledge the financial support of AFOSR/AOARD (Air Force Office of Scientific Research/Asian Office of Aerospace Research and Development), CAMP (Center for Advanced Materials Processing), KIMM (Korea Institute Machinery and Materials), KOSEF (Korea Science and Engineering Foundation), NRL (National Research Lab: Silicon Nitride Ceramics Lab), and ONRIFO (Office Of Naval Research International Field Office). This Symposium would not be possible without their generosity and financial support.

Hai-Doo Kim (Korea Institute of Machinery & Materials, Korea)
Hua-Tay Lin (Oak Ridge National Laboratory, USA)
Michael J. Hoffmann (University of Karlsruhe, Germany)

