Preface to the Special Issue on “Development and Comprehension of Novel Experimental Technology for High Temperature Processing”

Ko-ichiro OHNO*

Department of Materials Science and Engineering, Faculty of Engineering, Kyushu University, 744 Motooka, Nishi-ku, Fukuoka, 819-0395 Japan.

In recent years, as represented by the keyword of “carbon-neutral steel”, social demands for low carbon in the steel industry have been increasing. In particular, in the high-temperature process field represented by the ironmaking and steelmaking fields, high carbon and high energy are required in the operation. For example, ironmaking division roughly occupies over 70% energy consumption in steel industry. Therefore, efforts to reduce carbon in them are positioned as issues to be addressed as soon as possible. In view of these tides, this special issue regularly summarizes various newly developed high-temperature experimental techniques and their analysis methods to solve various issues in high-temperature processes as seeds techniques. The knowledge of this special issue will be shared among high-temperature process researchers and that it will hopefully become a platform for creating new high-temperature experimental technologies.

This issue comprehensively gathers the latest research results from basic research to applied technology development on new high-temperature experimental techniques and analysis methods developed for low-carbon/energy saving in high-temperature processes in the ironmaking and steelmaking fields. The latest researches and review papers were widely invited. In addition to the general open call for papers, excellent papers were going to be chosen from those presented at the International Conferences which was scheduled in 2020. Although almost of all the conferences in 2020 was postponed or cancelled due to the stagnation of various activities under the influence of the global epidemic of the new pneumonia, we had a great chance to invite special papers from MOLTEN2021.

Accordingly, this special issue includes the latest researches within the following fields:

1) special review papers especially concentrated on steel-making slags fundamentals at high temperature processes from MOLTEN2021 attendee, 2) direct research technique at high temperature phenomena with unique methodologies, and 3) not only high temperature experimental methods but also in-direct research about high temperature phenomena with room temperature model and computer science techniques, etc.

This special issue will serve to find out the potential directions for the future progresses and world worldwide collaborations about “High Temperature Process Engineering for Iron and Steelmaking”. This opportunity based on the special issue will be regularly planed each several years, we hope to be submitted our future collaboration works will be reported in there.

Finally, I would like to express my gratitude to all the authors for their contributions, and to the entire editorial staff who supported the publication of this special issue. I am also indebted to Prof. Joonho Lee of Korea University and Prof. Hideki Ono of Toyama University for their cooperation in publishing this special issue.