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Preface to the Special Issue on “Cutting Edge of Computer Simulation of Solidification, Casting and Refining”

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Seventeen years ago, “The 1st International Symposium on Cutting Edge of Computer Simulation of Solidification and Casting (CSSC1999)” took place at Osaka University in Osaka, Japan (Chair: Itsuo Ohnaka). However, thereafter the conference was discontinued. During the first decade of this century, the phase field method, the cellular automaton method, and the in-situ synchrotron X-ray imaging remarkably evolved as general tools for the investigation of solidification, casting and resulting micro-structure formation [1, 2]. Based on this progress, the conference was resumed and the second symposium (CSSC2010) was held on February 3 to 5, 2010 at Hokkaido University in Sapporo, Japan (Chair: Keiji Nakajima) [3]. The success of the second symposium initiated the development of a scientific tradition of this symposium, namely to regularly hold it every 3 years and to alternate between the East and the West part of the globe. Then, the third symposium (CSSCR2013) was held on May 20 to 23, 2013 at Aalto University in Helsinki, Finland and at the Royal Institute of Technology (KTH) in Stockholm, Sweden (Chairs: Keiji Nakajima, Seppo Louhenkilpi, Pär G. Jönsson) [4].

This time, the fourth International Symposium on Cutting Edge of Computer Simulation of Solidification, Casting and Refining (CSSCR2016), was held on May 11 to 15, 2016 by Northeastern University and Xi'an University of Architecture and Technology in Xi'an, China (Chairs: Qiang Wang, Kuaishe Wang, Keiji Nakajima), as shown in **Figure 1**. The specific purpose was to enhance the activities in the field concerning simulation of solidification, refining and microstructure and experimental techniques for simulation validations.

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Furthermore, it was also to promote active discussions between experimentalists and modelers within these disciplines. In cooperation with Prof. Hiroyuki Fukuyama, Editor-in-Chief of “High Temperature Materials and Processes”, it was decided to make a special issue to gather the symposium proceedings. More specifically, it was decided that the special issue should focus on the recent development within following methodological fields, which are related to solidification, and consequent micro-structure formation:

1. Ladle and tundish metallurgy modeling,
2. Casting process modeling (ingot casting and continuous casting), and macro- and microsegregation modeling,
3. Numerical techniques (phase field methods, cellular automaton method, front-tracking method and Monte Carlo method, etc.),
4. Experimental techniques for simulation validations (*in-situ* synchrotron X-ray imaging, *in-situ* observations using confocal scanning laser microscope (CSLM), etc.).
5. Solidification and casting under externally applied fields (high magnetic fields, electromagnetic fields, etc.).

Papers that have been accepted, is mostly published in this special issue (Volume 36(2017), Issue 4 (April)), and the rest will be published specially in other normal issue.

It is important to realize that the metallic materials production has increased in the twentieth century and that the demand for metallic materials will continue in the twenty-first century as long as metallic materials are used as major engineering material. In addition, it is of utmost importance to realize that a continued metallic materials research of the highest quality is necessary to sustain metallic materials as important materials in the future. Therefore, we hope that this special issue is useful for many researchers engaged in metallic material production to update their knowledge in the research fields.

Finally, on the behalf of the editor of this special issue, we are grateful to all the authors for their



Figure 1: The fourth International Symposium on Cutting Edge of Computer Simulation of Solidification, Casting and Refining (CSSCR2016) on May 11 to 15, 2016 by Northeastern University and Xi'an University of Architecture and Technology in Xi'an, China.

contributions. We are also indebted to CSSCR2016 Co-Chair, Prof. Kuaishe Wang, Local Organizing Committee-in-Chief, Prof. Hongwei Zhang, Local and International Organizing Committee members for their contributions in submitting and reviewing the manuscripts for the special issue.

References

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