

Semi-Solid Processing of Alloys and Composites

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A quick look through the past two centuries tells us that we may be in our third industrial revolution. The first industrial revolution (19th century) was mainly due to the introduction of steam energy, while the second (20th century) was mainly due to inexpensive oil and gas—which, by the way, brought us some unwelcome consequences; the so-called greenhouse effect and subsequent global warming and unpredictable weather patterns. We are now embracing a third industrial revolution, which could be termed the green energy and communication era. As a result, our manufacturing technologies should also follow a similar pattern: “Green manufacturing” with less energy consumption. Semi-solid metal (SSM) processing may be branded as a step forward towards green manufacturing, as it consumes less energy than its conventional counterparts. However, in spite of the many advantages of SSM processing and its viable manufacturing route, including a reduction in energy consumption, its implementation in the metal industry has been very sluggish. As strong advocates within the SSM processing community, we believe such a delay in recognizing the benefits of SSM casting of light alloys is predominantly due to the lack of proper communication between research and development (R&D) investigators and industry leaders. The Editors have tried to close the communication gap through publication of a new book [1] and the introduction of the current special issue of the Metals Journal on SSMs as an extra effort to the biannual S2P conference. We hoped an invitation of key players to highlight the latest advancements in the field would contribute towards better usage of SSM processes in industrial applications.

This special issue is focused on the recent research and findings in the field, with the aim of filling the gap between industry and academia, and to shed light on some of the fundamentals of science and technology of semi-solid processing.

This special issue provides new researches on the two main routes of semi-solid metal processing: Rheo and Thixo - casting. In addition, a variety of alloying systems and composite materials are covered in this special issue, including interesting information on welding, tribology and corrosion of SSM-processed alloys. Rheology and the correlation between structure and properties have been covered in two outstanding review articles. We would like to thank all the authors for their contribution and consideration of the reviewers’ comments. Additionally, the continuous assistance of the Metals editorial staff is gratefully acknowledged.

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Reference

1. Nafisi, S.; Ghomashchi, R. *Semi Solid Processing of Aluminum Alloys*; Springer International Publishing: Basel, Switzerland, 2016.



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