



# Materials Performance & Characterization

## Contents:

*Special Issue on Acceleration of Alloy Design  
via Physical Process Simulation*

Guest Editor: Brian Allen

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iii Overview

---

293 Comparison of Two Physical Simulation Tests to Determine the No-Recrystallization Temperature in Hot Rolled Steel Plates—*C. N. Homsher and C. J. Van Tyne*

---

307 Analysis of Microstructure in Hot Torsion Simulation—*B. M. Whitley, A. L. Araujo, J. G. Speer, K. O. Findley, and D. K. Matlock*

---

322 Investigation of Austenite Evolution in Low-Carbon Steel by Combining Thermo-Mechanical Simulation and EBSD Data—*Stephan Weyand, Dominik Britz, Daniel Rupp, and Frank Mücklich*

---

341 Influence of Composition and Prior Deformation on Phase Transformation Temperatures and Hardness in Direct Quenching Using Physical Simulation—*M. C. Somani, J. M. Pyykkönen, D. A. Porter, L. P. Karjalainen, and J. I. Kömi*

---

365 Effect of Single and Multiple Thermal Cycles on Microstructure and Mechanical Properties of Simulated HAZ in Low Carbon Bainitic Steel—*Sanjeev Kumar, S. K. Nath, and Vinod Kumar*

---

381 Correlation of Microstructure With HAZ Welding Cycles Simulated in Ti-15-3 Alloy Using Gleeble® 3800 and SYSWELD®—*M. R. Rahul and G. Phanikumar*

---

399 Different Applications of the Gleeble® Thermal-Mechanical Simulator in Material Testing, Technology Optimization, and Process Modeling—*P. Berczki, B. Fekete, V. Szombathelyi, and F. Misjak*

---

421 Improving Steel Processing Through Thermo-Mechanical Simulation Studies—*Vinod Kumar*

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Materials Performance and Characterization is published online by ASTM International, a nonprofit technical organization that develops and publishes voluntary consensus standards and related information for materials, products, systems, and services.

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*Materials Performance and Characterization* (ISSN 2165-3992) is published online by ASTM International. The views expressed in this journal are not those of ASTM International. The data and opinions appearing in the published material were prepared by and are the responsibility of the contributors, not of ASTM International.

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Printed in the USA

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# Overview

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## Special Issue on Acceleration of Alloy Design via Physical Process Simulation

Materials producers and researchers are continually being pushed by intense competitive pressures to develop and manufacture new products that are stronger, lighter, more formable, and less expensive. To be successful in the marketplace, these new materials must also exhibit additional properties such as weldability, coatability, corrosion resistance, surface appearance, wear resistance, castability, fatigue resistance, energy absorption, and property repeatability. Unfortunately, many of these design goals tend to be mutually incompatible. Alloy and processing strategies which improve strength generally have a negative impact on formability and weldability, whereas strategies to improve mechanical properties typically have a negative impact on overall material cost.

This leaves the materials researcher the difficult task of optimally balancing material properties for each specific end use. Given the number of design goals and process inputs involved, designing a new material becomes a long, daunting, and expensive task. Physical Simulation allows the researcher to reduce the cost and increase the speed of the necessary development work while avoiding the risk and disruption of full scale mill trials.

The 8 peer reviewed articles in this Special Issue on Acceleration of Alloy Design via Physical Process Simulation present an overview and some of the most up to date research on the use of Physical Simulation to speed new and improved materials to market, while simultaneously reducing the cost required to do so. The material covered in this issue will help materials researchers the world over to understand the applications of Physical Process Simulation to material and process development challenges.

We wish to extend a sincere and heartfelt thank you to everyone who was involved in making this publication possible. The first thanks go to the authors who have agreed to freely share the results of their research efforts; however, we also wish to extend our sincere thanks to the reviewers, editors, and publication staff. This Special Issue would not have been possible without their hard work and dedication.

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