CODEN: MPCACD

Materials Performance and Characterization

Contents:

Special Issue on Recent Advances in Hot Deformation of Materials, Part 1

Guest Editor: Dr. S. V. S. Narayana Murty

(Contents continued on back cover)

ASTM INTERNATIONAL

Published by ASTM International | 100 Barr Harbor Drive | PO Box C700 | W. Conshohocken, PA 19428-2959

ASTM INTERNATIONAL
Helping our world work better

ISSN: 2379-1365
Stock #: MPC1905

www.astm.org

CO-EDITORS

Dr. Richard W. Neu
Georgia Institute of Technology
Atlanta, GA, USA

Dr. George E. Totten
G. E. Totten Associates, LLC
Seattle, WA, USA

EDITORIAL OBJECTI VES

Materials Performance and Characterization (MPC) 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.

Contributions are peer reviewed prior to publication.

EDITORIAL SERVICES

Sara Welliver
Supervisor, Peer Review Services
J&J Editorial Services
201 Shannon Oaks Cir #124
Cary, NC 27511, USA
tel +1.919.650.1459, ext. 210
astm@jjeditorial.com

POSTMASTER send address change to:
ASTM International—MPC
100 Barr Harbor Drive
P.O. Box C700
West Conshohocken, PA 19428-2959

PURPOSE AND SCOPE

The journal publishes high-quality, original articles, including full papers, review papers, and technical notes, on both theoretical and practical aspects of the processing, structure, properties, and performance of materials used in mechanical, transportation, aerospace, energy systems, and medical devices. These materials include metals and alloys, glass and ceramics, polymers, composite materials, textiles, and nanomaterials. The journal covers topics related to the integrity of materials which encompasses mechanical testing, fatigue and fracture, corrosion, wear, and erosion, as well as the integrity of components and systems such as rolling element bearings, piping and pressure vessels, fasteners, space technology, and nanotechnology. The journal publishes articles on both qualitative and quantitative methods used to characterize materials including all forms of microscopy, chemical analysis, and nondestructive evaluation.

Printed in the USA.

INFORMATION FOR AUTHORS

For details regarding paper submission go to http://mc04.manuscriptcentral.com.

The subject matter must not be of a speculative nature and the contents must not include materials of an advertising nature. The paper must not be seriously defective as to literary form and structure, continuity of thought, and clarity of expression. The substance of the paper should not have been published previously in the open literature.
Authors preparing papers for submittal should observe the conventions of style explained in the ASTM Style Manual. Since the journal does not request page charges, the author is expected to conform to these standard conventions for style. SI units are to be used throughout; if data were not measured in SI units, a note should appear to that effect and the original units should be included in parentheses after the SI units.

IN APPRECIATION OF THE REVIEWERS

The high quality of the papers that appear in this publication is a tribute not only to the obvious efforts of the authors represented but to the unheralded, though essential, efforts of their reviewers. It is to the reviewers' dedication to upholding the high standards of their profession that this note pays tribute. On behalf of ASTM International and the authors as well, we acknowledge with appreciation their important contribution to the success of this journal.

Materials Performance and Characterization (Print ISSN 2379-1365; E-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.

Subscriptions

Individual subscriptions
1 year online access $252.00

Institutional subscriptions (one geographic site via IP access)
1 year online access $422.00

Single copies $55.00

Multi-site subscription and pricing
sales@astm.org
tel +1.877.909.ASTM

To subscribe
please send prepaid order to ASTM International, Customer Service, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959 or visit www.astm.org.

Overview: Special Issue on Recent Advances in Hot Deformation of Materials

Hot deformation processing is a critical step in the manufacturing sequence of industrial components, because it not only gives the required shape, but also imparts the desired microstructure to the material. As the microstructure of the material controls the mechanical properties, hot deformation assumes considerable significance and attracts attention of researchers from multiple disciplines involved in manufacturing. When the alloy systems were simple, selection of processing parameters such as deformation temperature, strain rate, strain, and number of reheats for achieving the desired shape used to be primarily based on *trial and error* technique and the technical know-how was more of a trade secret. With the ever-increasing demand of structural designers for advanced materials meeting challenging applications, many complex, tailor-made alloys were designed. These complex alloys needed to be produced in different forms and shapes and demanded science based deformation processing techniques as identifying the thermo-mechanical processing conditions that produce defect-free products became more complex. In order to optimize the thermomechanical processing parameters and obtain defect-free products on a repeatable basis in a manufacturing environment, science based processing techniques were developed. With the advent of powerful computing systems, the laboratory generated test data on standard test specimens could be used to predict the likelihood of flow localization or fracture during thermomechanical processing using various failure criteria for different materials.

It has been a great honor, and a real pleasure, to be asked by the Co-Editors of ASTM International's journal *Materials Performance and Characterization*, Dr. Richard W. Neu and Dr. George E. Totten, to act as a guest editor for the two-part special issue on *Recent Advances in Hot Deformation of Materials*. We were able to attract a large number of excellent papers written by leading scientists and engineers in the area of hot deformation from all over the world for these special issues.

The first part of this two-part special issue includes 24 papers that were submitted and subjected to the peer review process performed by experts from the respective fields. The first article, by Prof. Kashyap, is an authoritative review on the constitutive relationships during superplastic deformation. I have worked under his supervision for my doctoral thesis and he has more than 40 years of experience in the area of superplasticity. The second paper is a review on the hot deformation of 18 percent Nickel maraging steels widely used in several performance critical aerospace applications. The lead author, Dr. Nageswara Rao, has immense experience in the industrial processing of maraging steels and other aerospace products prior to taking up teaching career. The third article on the hot deformation of Magnesium alloy composite is from the group of Prof. Prasad, a highly accomplished researcher in the hot deformation of materials and the man who proposed the concept of *Dynamic Material Modeling* for optimization of hot workability and to control microstructure during hot deformation. I had the good fortune of working under his supervision for my master's thesis. The following 21 papers study the hot deformation behavior of several classes of engineering materials like stainless steels, aluminum, magnesium, titanium and zirconium alloys. Papers related to high temperature phenomena like diffusion bonding, creep of single crystals and constitutive relationships during high temperature deformation were also included in this issue covering many interesting technologies for the readers of this special issue.

The articles here describe the latest advances in the high temperature deformation processing of materials. We sincerely thank both the authors and reviewers for their hard work and dedication.

I wholeheartedly thank the ASTM staff dealing with the issues related to the process of publishing an outstanding journal.

We sincerely hope that you enjoy these papers and look forward to the second part of this special issue that is currently under processing.

S. V. S. Narayana Murty, PhD.
Vikram Sarabhai Space Centre
Trivandrum, India
Editorial Board Member, *Materials Performance and Characterization*