

Semi-Solid Processing of Alloys and Composites (S2P)

Selected peer-reviewed extended articles
based on abstracts presented at the
17th International Conference on
Semi-Solid Processing of Alloys and Composites
(S2P)

Aggregated Book

Edited by

Annalisa Pola, Marialaura Tocci and Ahmed Rassili

■ *Scientific.Net* ■

Copyright © 2023 Trans Tech Publications Ltd, Switzerland

All rights reserved. No part of the contents of this publication may be reproduced or transmitted in any form or by any means without the written permission of the publisher.

Trans Tech Publications Ltd
Seestrasse 24c
CH-8806 Baech
Switzerland
<https://www.scientific.net>

Volume 81 of
Scientific Books Collection
ISBN 978-3-0364-0180-5

Full text available online at <https://www.scientific.net>

Distributed worldwide by
Trans Tech Publications Ltd
Seestrasse 24c
CH-8806 Baech
Switzerland
Phone: +41 (44) 922 10 22
e-mail: sales@scientific.net

Printed with permission by
Curran Associates Inc. (2023)

CURRAN ASSOCIATES INC.
proceedings
.com

Additional copies of this
publication are available from:

Web: www.proceedings.com/70812.html

Table of Contents

Preface	v
Committees, Organisers, Sponsors	vi
Chapter 1: Materials Development and Characterization	
Variation of Semi-Solid Microstructure and Mechanical Properties of Mg_{98.5}Ni_{0.5}Y_{1.0} Alloy with Solidification Pressure	
S.S. Wu, S.L. Lü, X. Yang and W. Guo	3
Heat-Treatment Characteristics and Structure-Property Relationships of Thixomolded AZ91 and Ultralight LAZ771 Magnesium Alloys	
T.Y. Lai, S.Y. Hu, Y.Y. Kuo and T.C. Su	10
Fatigue Properties of Thixoformed Al-6wt%Si-2.5wt%Cu	
W.L. Beil and E.J. Zoqui	16
Comparison of Solidification Microstructure Evolution of Al-10Si and Recycled Aluminium Beverage Can Strips Made in a Strip Caster	
A. de Pádua Lima Filho, L. Veronez Goulart Ferreira, P.B. de Oliveira Neto, R.A. Nunes de Oliveira, F. Hois and M. Borodiak	22
Characterisation of Residual Stresses of Rheocast Al Alloy	
E. Fracchia, I. Gattelli and M.A. Grande	29
Influence of Reinforcement Particle Parameters on the Homogeneity of Particle Distribution in Semi-Solid Formed Aluminium Matrix Composites	
M. Speth, K.R. Riedmüller and M. Liewald	36
Mechanical and Microstructural Investigations on a Symmetric Mould Processed with Semi-Solid Aluminum RheoMetal™: Analysis of the As-Cast Properties	
V. Magrin, Z. Li, A.E.W. Jarfors and F. Bonollo	43
A Comparative Study on Microstructure, Mechanical Property, and Electrical Conductivity of Al-7Si-0.6Mg Alloy Produced by High Pressure Die Casting and Semisolid Die Casting	
J. Feng, S. Zhu, S. Chen, Y.D. Sui and D.Q. Li	49
A Comparison of Microstructure and Casting Defects of Rheocasting and Thixocasting Al-Si-Mg Alloy	
J.H. Li, I. Spacil, J. Winklhofer, F. Hofstätter and S. Griesebner	56
Effect of Mn Addition on Microstructure, Mechanical Properties and Die Soldering of Rheocasting Al-7Si-0.3Mg Alloys	
J.H. Li, I. Spacil, J. Winklhofer, F. Hofstätter and S. Griesebner	62
Abrasive Wear Properties Evaluation of the Thixoformed A380/NbC Composite	
B.E. Arendarchuck, L.A. Lourençato, D.V. Tamayo, E.J. Zoqui and H.D.C. Fals	69
Preliminary Investigation on the Use of Recycled A356 Alloy for Semi-Solid Processing	
A. Mantelli, R. Arcaleni, L. Girelli, L. Toninelli, L. Montesano and A. Pola	76

Semi-Solid Casting of AlN Reinforced Mg-Matrix Composites and their Thermophysical Properties	
L. Chen, J.A. Qin, J.Y. Li, S.L. Lü, W. Guo and S.S. Wu.....	83
Development of High Strength and High Thermal Conductivity Semi-Solid Magnesium Alloy by Thixomolding Process	
L.D. Gu, X.Q. Shang, J. Wang, J.J. Deng, Y.P. Liu, X.Q. Zeng and W.J. Ding.....	89
Microstructure Evolution during Cooling Slope Rheoprocessing of Novel Al-15Mg₂Si-4.5Si Composite	
P. Das	99
Evolution of Microstructure and Mechanical Properties of the Rheo-Diecast Mg-12Gd-3Y-1Zn-0.4Zr Alloy during Heat Treatment	
D.Q. Li, Z.Y. Chang, J. Feng, Y.J. Wu and L.M. Peng.....	105
 Chapter 2: Rheology, Modelling and Numerical Analysis	
Rheological Behavior in the Semisolid State of Al-Si-Cu Alloys Produced by ECAP	
L.V. Torres, C.T.W. Proni and E.J. Zoqui.....	113
Numerical Simulations of the Squeeze Flow of Thixotropic Semisolid Slurries	
G.C. Florides, G.C. Georgiou, M. Modigell and E.J. Zoqui.....	119
Semi-Solid Deformation Behavior, Flow Stress Prediction and Deformed Microstructure of GH3536 Superalloy	
M.J. Huang, J.F. Jiang and Y. Wang	125
On the Possibility of Replacing Scheil-Gulliver Modeling with Machine Learning and Neural Network Models	
Z. Li, H. Tan, L. Lattanzi, A.E.W. Jarfors and P. Jansson.....	134
Rheological Modeling of 7075 Aluminum Alloy Semi-Solid Slurry and its Application in the Simulation of SEED Rheocasting Process	
H.X. Lu, X.X. Meng, N. Bunnareksathya and Q. Zhu.....	141
CALPHAD Optimization of the Composition of EN AC-46000 Secondary Alloys for Semi-Solid Casting Processes	
S. Ferraro, A. Bongiovanni, I. Suarez Lopez, M. Palumbo, M. Baricco and A. Castellero.....	146
Comparison of Rheological Models to Simulate Die Filling Process of A356 Semisolid Alloy	
G. Sanjuan-Sanjuan, A. Galindo-Solano, I.J. Ramirez-Calera and Á.E. Chavez-Castellanos.....	152
Thixomolding of Magnesium - Efficient Process Industrialization by Combining a Digital Twin and Systematic Casting Trials	
H. Bramann, H. Rockmann, Y.X. Zhang and S. Yandamuri.....	158
Quality Control of Semi-Solid Die Casting by Filling Pressure Based on Machine Learning Method	
Z.Y. Wang, X.G. Hu, H.X. Lu and Q. Zhu.....	165
A Molecular Dynamics Study of Nucleation and Grain Growth of Novel Al-15Mg₂Si-4.5Si Composite during Rapid Cooling Based Semi Solid Slurry Preparation	
I. Mukherjee and P. Das.....	171
Rheological Behaviour of Secondary AlSi7Mg Alloy for Semi-Solid Processing	
M. Tocci, A. Pola and M. Modigell.....	178

Chapter 3: Technologies of Semisolid Metal Processing

Impact of Processing Conditions on the Fluidity and Consistency of GISS-Processed Semi-Solid Aluminum Alloys

S.P. Midson, X.K. Liang, H. Yao and A.M. Wei 187

High Speed Roll Casting of Al-5%Mg Strip at Semisolid Condition

T. Haga, K. Yamazaki and S. Nishida 193

Venting Systems in Semi-Solid Processing of Aluminium

M. Pammer, P. Hofer-Hauser and P. Jansson 201

Study on Processing Conditions for Semi-Solid Forging of Magnesium Alloys

S. Furuta, H. Nakagawa, T. Tanaka, M. Sasada, S. Nishida, S. Yasuhara and H. Ueno 207

Insert Molding of Aluminum Alloy A7075 and Alumina Plate by Semi-Solid Forging

S. Yasuhara, H. Ueno, S. Okubo, Y. Otake, S. Nishida, S. Furuta, T. Tanaka, M. Sasada and T. Haga 213

Microstructure Design of Semi-Solid Slurry for Metal Direct Writing

Z. Li, X.G. Hu, H.X. Lu and Q. Zhu 219

Flow Length Influence of Cores Made of High-Temperature Composite in Semi-Solid AZ91 Produced in Thixomolding

A. Schilling, C. Schütz, M. Stockmann, A.P. Fros and M. Fehlbier 225

A Study on Microstructure and Properties of Aluminum Alloy Bracket Produced by a New Semi-Solid Rheo-Diecasting Process

S. Chen, F. Zhang, J. Feng, F. Zhang, D.Q. Li and L. Chen 232

On the Liquid Portion Composition Deviation in the RheoMetal Process

A.E.W. Jarfors 239

New Addressable Applications for Rheocasting to Escape from an Oversupplied Market

F. Niklas 245

An Application of Injection Molding to Semisolid Processing of Metallic Alloys: A Role of SIMA in Feedstock Transformation

F. Czerwinski 252

Performance and Fundamental Differences between Rheocast and High-Pressure Vacuum Die Cast Al-Si-Mg Alloys

F. Breton and J. Fourmann 258

Producing Structural High Integrity Castings with Minimum Carbon Footprint with the Comptech-Rheocasting Process

M. Hartlieb, J.C. Tawil, S. Bergeron and P. Jansson 266

Gas Induced Superheated Slurry: Industrial Applicability, Energy Savings and Sustainability in High Pressure Die Casting

T. Botter, Y.F. He, J. Wannasin, D. Schiavon, S. Paramento and A. Mambretti 272

Keyword Index 281

Author Index 285