

Table of Contents

Organizers**Committees****Preface**

I. Microgravity Effect

Beginning of the Hungarian Space Metallurgy Activity: The BEALUCA Project

E.G. Fuchs 1

The "EÖTVÖS" Program in Space Research – 1979-1986

J. Gyulai and I. Gyúró 11

The Development of a Microgravity Experiment Involving Columnar to Equiaxed Transition for Solidification of a Ti-Al Based Alloy

F. Lemoisson, S. Mc Fadden, M. Rebow, D.J. Browne, L. Froyen, D. Voss, D.J. Jarvis, A.V. Kartavykh, S. Rex, W. Herfs, D. Groethe, J. Lapin, O. Budenkova, J. Etay and Y. Fautrelle 17

Detailed Numerical Simulation of Short-Term Microgravity Experiments to Determine Heat Conductivity of Melts

V. Bánhidi and T.J. Szabo 23

Melt Structural Self-Organization and Viscosity within the Transient Layer during a Single Crystal Growth in Microgravity

A.V. Kartavykh and V.P. Ginkin 29

II. Rapid Solidifications, Glasses

Martensite and Nanocrystalline Phase Formation in Rapidly Solidified Ni₂MnGa Alloy by Melt-Spinning

R.V.S. Prasad and G. Phanikumar 35

The Solidification in the Presence of a Metastable Miscibility Gap: The Case of Co-Cu and Co-Cu-X Alloys

L. Battezzati, E. Johnson, N. Pryds, A. Penna and S. Curiotto 41

Phase Selection in Undercooled Melts of Peritectic Cu-Ge Alloys

J.R. Gao, G. Luo and X.H. Luo 47

Benefits of Modeling of Melting for the Understanding of Solidification Processes

M. Rettenmayr 53

In Situ Produced MMC Layer by Laser Melt Injection

Z. Kálazi, V. Janó and G. Buza 61

Identification of Bulk Metallic Forming Compositions through Thermodynamic and Topological Models

J. Bhatt and B.S. Murty 67

Analysis of Cu-Zr-Ag Amorphisable Alloys Produced by Centrifugal Casting

D. Janovszky, M. Svéda, K. Tomolya, J. Sólyom, N. Hegman and A. Roósz 75

Investigation of the Solidified Structure of Cu-Hf-Ti Alloys

V. Rontó, E. Nagy, M. Svéda, F. Tranta and N. Hegman 81

Investigation of Amorphous/Crystalline State in Cu-Hf-Al Alloys

E. Nagy, V. Rontó, J. Sólyom and A. Roósz 87

Analysis of Cu-Zr-Al Amorphisable Alloys Produced by Centrifugal Casting

K. Tomolya, D. Janovszky, M. Svéda, N. Hegman and A. Roósz 93

Ni Content Surface Layer Produced by Laser Surface Treatment on Amorphisable Cu Base Alloy

M. Svéda, D. Janovszky, K. Tomolya, J. Sólyom, Z. Kálazi, G. Buza and A. Roósz 101

The Effect of the Laser Surface Treatments on the Wear Resistance

E. Bitay and T. Kovács 107

III. Single Crystal, Semi Solid

Oscillatory Structure of the Zn-Cu-Ti Single Crystals

G. Boczkal, B. Mikułowski and W. Wołczyński 113

Investigation on the Production of Thixotropic Semisolid Ti Alloys	119
W.W. Batista, R.J. Contieri, E.J. Zoqui, M.H. Robert and R. Caram	
Control of the Single Crystal Reinforcement by the Intermetallic Compound Layers	125
W. Wołczyński, B. Mikułowski and G. Boczkal	

IV. Microstructure Evolution of Eutectic, Peritectic and Monotectic

Regular Structure Formation of Hypermonotectic Al-In Alloys	131
H. Yasuda, S. Kato, T. Shinba, T. Nagira, M. Yoshiya, A. Sugiyama, K. Umetani and K. Uesugi	
Monotectic Alloys and their Growth Morphologies	137
L. Ratke, A. Müller, M. Seifert and G. Kapserovich	
Influence of Undercooling on the Kinetics of the Peritectic Transition in an Fe-4.2wt%Ni Alloy	143
D. Phelan	
In Situ Investigation of Liquid-Liquid Phase Separation in Hypermonotectic Alloys	149
P.L. Schaffer, R.H. Mathiesen and L. Arnberg	
In Situ Observation of Solidification in an Organic Peritectic Alloy System	159
J.P. Mogeritsch, S. Eck, M. Grasser and A. Ludwig	
Alignment of Primary Al_3Ni Phases in Hypereutectic Al-Ni Alloys with Various Compositions under High Magnetic Field Gradients	165
T. Liu, Q. Wang, Z.Y. Wang, D.G. Li and J.C. He	
Effect of Alloying Elements on Graphite Morphology in CGI	171
M. Selin, D. Holmgren and I.L. Svensson	
Characterization of the Morphology of Si in the Modified Al-Si Alloys	177
G. Gergely and Z. Gácsi	
Effects of Composition on Solidification Microstructure of Cast Titanium Alloys	183
P.N. Andrade, A.A. Coelho, C.R.M. Afonso, R.J. Contieri, M.H. Robert and R. Caram	

V. Modeling

Modeling of Heat and Solute Interactions upon Grain Structure Solidification	
C. Gandin, J. Blaizot, S. Mosbah, M. Bellet, G. Zimmermann, L. Sturz, D.J. Browne, S. McFadden, H. Jung, B. Billia, N. Mangelinck-Noël, H. Nguyen-Thi, Y. Fautrelle and X.D. Wang	189
Phase-Field Simulations of Dendritic Orientation Selection in Mg-Alloys with Hexagonal Anisotropy	
J. Eiken	199
Meshless Approach to Solving Freezing with Natural Convection	
K. Gregor and B. Šarler	205
A Meshless Approach in Solution of Multiscale Solidification Modeling	
B. Šarler, G. Kosec, A. Lorbicka and R. Vertnik	211
Modelling of Dendritic Growth during Unidirectional Solidification by the Method of Cellular Automata	
A.A. Burbelko, E. Fraś, W. Kapturkiewicz and D. Gurgul	217
Numerical Simulation of TiAl-Nb Alloy Solidification Experiment in TEM 01-3M Facility Aboard MAXUS 8	
A.V. Kartavykh, S. Ganina, D. Grothe, F. Lemoisson and W. Herfs	223
Influence of the Slag/Pool Interface on the Solidification in an Electro-Slag Remelting Process	
A. Kharicha, W. Schützenhöfer, A. Ludwig and G. Reiter	229
CAFE Modeling of Segregation and Structure in Levitated Droplets	
S. Mosbah, M. Bellet and C. Gandin	237
Combined Analytical and Numerical Front Tracking Approach to Modeling Directional Solidification of a TiAl-Based Intermetallic Alloy for Design of Microgravity Experiments	
M. Rebow, D.J. Browne and Y. Fautrelle	243

VI. Melt Flow, Effect of Magnetic Field

Microstructure Formation in AlSi6Cu4 Alloy with Forced Melt Flow Induced by a Rotating Magnetic Field	249
G. Zimmermann, V.T. Vitusevych and L. Sturz	

Morphological Transition in High Growth Rate in Constrained Solidification	255
Y. Miyata	
Effect of the High Rotating Magnetic Field (min. 30 mT) on the Unidirectionally Solidified Structure of Al₇Si0.6Mg Alloy	263
J. Kovács, A. Rónaföldi and A. Roósz	
Comparison between Simulation and Experimental Results of the Effect of RMF on Directional Solidification of Al-7wt.%Si Alloy	269
O. Budenkova, A. Noeppel, J. Kovács, A. Rónaföldi, A. Roósz, A.M. Bianchi, F. Baltaretu, M. Medina and Y. Fautrelle	
Revolution Number (RPM) Measurement of Molten Alloy by Pressure Compensation Method	275
A. Rónaföldi, J. Kovács and A. Roósz	
Undercooling of Pure Cu and Ge Melts in a Static Magnetic Field	281
Y.K. Zhang, Y.L. Zhou, J.R. Gao and J.C. He	

VII. Nucleation, Grain Refinement

Nucleation and Grain Refinement	
A.K. Dahle	287
About Ultrasonic Melt Treatment during Solidification and its Influence on Grain Size and Mechanical Properties of Magnesium Alloy AZ 91	295
K. Pranke and K. Eigenfeld	
Shear Enhanced Heterogeneous Nucleation in AZ91D Alloy	301
Z. Fan, M. Xia, Y. Wang, S. Arumuganathar and G.M. Scamans	
Silicon Particle Precipitation during DC Casting of Al-Si Clad Alloys	307
T. Carlberg	
Refinement of Solidification Microstructures by the MCAST Process	315
Z. Fan, M. Xia, Z. Bian, I. Bayandorian, L. Cao, H. Li and G.M. Scamans	

VIII. In Situ Observation

In Situ Observation of Solidification in Horizontal Centrifugal Casting Process	
H. Esaka, J. Hiramoto, S. Miyahara and K. Shinozuka	325
Measurement of Solute Profiles by Means of Synchrotron X-Ray Radiography during Directional Solidification of Al-4 wt% Cu Alloys	331
A. Buffet, H. Nguyen-Thi, A. Bognon, T. Schenk, N. Mangelinck-Noël, G. Reinhart, N. Bergeon, B. Billia and J. Baruchel	
Deformation Behavior of Aluminum Alloys during Solidification	337
A.K. Dahle and M. Suéry	

IX. Columnar Equiaxed Transition

CET by Fragmentation during the Solidification under Natural and Forced Convection of Non-Refined Al-Based Alloys	343
H.J. Jung, N. Mangelinck-Noël, H. Nguyen-Thi, N. Bergeon, B. Billia, A. Buffet and J. Baruchel	
Columnar to Equiaxed Transition During Ingot Casting Using Ternary Alloy Composition	349
L. Könözsy, A. Ishmurzin, M. Grasser, M.H. Wu, A. Ludwig, R. Tanzer and W. Schützenhöfer	
Macroscopic Model for Predicting Columnar to Equiaxed Transitions Using Columnar Front Tracking and Average Equiaxed Growth	355
W. Mirihanage, S. McFadden and D.J. Browne	
Analysis of a Microgravity Solidification Experiment for Columnar to Equiaxed Transitions with Modeling Results	361
S. McFadden, D.J. Browne, L. Sturz and G. Zimmermann	
Numerical and Experimental Investigation of NH₄Cl Solidification	367
L. Könözsy, M.S. Kharicha, S. Eck, M.H. Wu and A. Ludwig	
A Sensitivity Study of Grain Growth Model For Prediction of ECT and CET Transformations in Continuous Casting of Steel	373
A.Z. Lorbiecka and B. Šarler	
Columnar to Equiaxed Transition in Al-Cu-Ag	379
E. Nagels and L. Froyen	

X. Foam, Composites

Role of Oxide Particles in Aluminum Melt toward Aluminum Foam Fabrication by the Melt Route

K. Kadoi, N. Babcsán and H. Nakae 385

Foam Evolution and Stability at Elevated Gravity Levels

B.M. Somosvári, P. Bárczy, P. Szirovicza, J. Szőke and T. Bárczy 391

XI. Mushy Zone, Dendritic Structure

Permeability in the Mushy Zone

R.G. Erdmann, D.R. Poirier and A.G. Hendrick 399

Flow Effects on Mush Coarsening

G. Kasperovich, S. Steinbach and L. Ratke 409

Effect of Two-Liquid Casting on the Microstructure of Sn-Pb Alloys

Y.K. Kim and R.S. Qin 415

Micro-Segregation: Issues of Growth Rate and the Peritectic

A.A. Howe 419

Microstructural Response to Growth Rate and Mg Additions during Directional Growth of Al-Cu-Mg Alloys

A. Berkdemir and M. Gündüz 425

XII. Continuous and Mould Castings

The Influence of the Solidification Process to the Dimensional Accuracy of Castings

D. Molnár and J. Dúl 431

Experimental and Simulation Researches about „U” Section Castings Solidification

S.I. Munteanu, I. Ciobanu, A. Crișan and M. Masnita 437

On the Problems of a Migrating Hot Spot

L. Elmquist and A. Diószegi 443

Solidification Circumstances in Case of Al-Si Cylinderhead Castings

G. Fegyverneki 449

Crystallization of Iron Slags Found in Eraly Medieval Bloomery Furnaces

B. Török and Á. Kovács 455

Centreline Segregation of CC Slabs

M. Réger, H. Kytönen, B. Verő and Á. Szélig 461

Solidification Time Estimation and Simulation - In Case of HPDC

G. Leranth 467

Effect of Temperature on the Properties of High Pressure Die Casting

J. Dúl, R. Szabó and A. Simcsák 473

XIII. Thermophysical and Physical Properties

Interdiffusion and Thermodynamic Forces in Binary Liquid Alloys

A. Griesche, B. Zhang, J. Horbach and A. Meyer 481

Determining Thermal Properties of Insulating Sleeves

W.K. Krajewski and J.S. Suchy 487

Comparison of Thermal Analysis and Differential Thermal Analysis for Evaluating Solid Fraction Evolution during Solidification of Al-Si Alloys

A.I. Fernández-Calvo, A. Niklas and J. Lacaze 493

Regression Model Describing the Thermal Conductivity of Various Cast Irons

D. Holmgren and M. Selin 499

The Effects of Solidification Conditions and Heat Treatment on the Microstructure and Mechanical Properties of EN-AC 44400 Alloy

S. Mohsen Sadrossadat and S. Johansson 505

Effects of Carbon Content on the Ultimate Tensile Strength in Gray Cast Iron

V. Fourlakidis, V.L. Diaconu and A. Diószegi 511

Fracture Mechanics of Gray Cast Iron

A. Diószegi, V. Fourlakidis and I.L. Svensson 517

Assessment of the Al Corner of the Ternary Al–Fe–Si System	
L. Eleno, J. Vezelý, B. Sundman, M. Cieslar and J. Lacaze	523
Dilatometer Study of Aluminium-Silicon Based Alloys with Metastable Structures	
B. Varga, E. Fazakas and L.K. Varga	529
Heat Balance of the Model Ingot Head	
W.K. Krajewski	533