

Table of Contents

| | |
|--|-----|
| Metallurgy in Space | |
| D.J. Jarvis and O. Minster | 1 |
| A Transition to Diffusionless Growth of Crystal Microstructure in Rapid Solidification | |
| P.K. Galenko | 19 |
| Grain Boundary Influence on the Electrical Properties of Tellurium Microstructure Ingots and Nanocluster Crystals | |
| V.A. Berezovets, I.I. Farbshtein, R.V. Parfeniev, S.V. Yakimov and V.I. Nizhankovskii | 25 |
| Formation of the Microstructure in a Rapid Directionally Solidified Immiscible Alloy | |
| J.Z. Zhao and L. Ratke | 31 |
| Microstructure Evolution in Rapidly Solidified Immiscible Alloys | |
| M. Reuß, L. Ratke and J.Z. Zhao | 37 |
| Monotectic Growth: Unanswered Questions | |
| J.B. Andrews, D.A. Downs and Q.Q. Liu | 45 |
| Microstructures Observed during Directional Solidification along the Univariant Eutectic Reaction in a Ternary Al-Cu-Si Alloy | |
| J. De Wilde and L. Froyen | 51 |
| Eutectic Solidification of Ternary Al-Cu-Ag Alloys: Coupled Growth of α(Al) and Al_2Cu in Univariant Reaction | |
| U. Hecht, V.T. Witusiewicz, A. Drevermann, B. Böttger and S. Rex | 57 |
| Solidification of Hypereutectic Thin Wall Ductile Cast Iron | |
| K.M. Pedersen and N. Tiedje | 63 |
| X-Ray Monitoring of Solidification Phenomena in Al-Cu Alloys | |
| R.H. Mathiesen and L. Arnberg | 69 |
| In Situ and Real Time Investigation of Directional Solidification of Al - Ni Alloys by Synchrotron Imaging | |
| G. Reinhart, H. Nguyen-Thi, J. Gastaldi, B. Billia, N. Mangelinck-Noël, T. Schenk, J. Härtwig and J. Baruchel | 75 |
| Metastable Phase Formation in Undercooled Nd-Fe-B Alloys Investigated by In Situ Diffraction Using Synchrotron Radiation | |
| J. Strohmenger, T. Volkmann, J.R. Gao and D.M. Herlach | 81 |
| Examination of the Eutectic Crystallization of Cast Iron by Thermal Analysis | |
| J. Dúl and L. Varga | 87 |
| On a Morphological Transition in Monotectic Solidification | |
| A. Müller and L. Ratke | 93 |
| Formation of Lead Bearing Surface Layers on Aluminum Alloys by Laser Alloying | |
| M. Svěda, A. Roósz and G. Buza | 99 |
| Three-Dimensional Single Crystal Morphologies of Diffusion Limited Growth in Experiments and Phase Field Simulations | |
| H.M. Singer and J.H. Bilgram | 105 |
| Modeling of Unidirectional Growth in a Single Crystal Turbine Blade Casting | |
| Q.Y. Xu, B.C. Liu, Z.J. Liang, J.R. Li, S.Z. Liu and H.L. Yuan | 111 |
| Crystal Growth of CdTe by Gradient Freeze in Universal Multizone Crystallizer (UMC) | |
| C.H. Su, S.L. Lehoczky, C. Li, B. Raghathamachar, M. Dudley, J. Szőke and P. Bárczy | 117 |
| Producing a Heusler Alloy Single Crystal | |
| Z. Veres and A. Roósz | 125 |
| MICAST – Microstructure Formation in Casting of Technical Alloys under Diffusive and Magnetically Controlled Convective Conditions | |
| L. Ratke, S. Steinbach, G. Müller, M. Hainke, A. Roósz, Y. Fautrelle, M.D. Dupouy, G. Zimmermann, A. Weiß, H. Diepers, J. Lacaze, R. Valdes, G.U. Grün, H.-. Nicolai and H. Gerke-Cantow | 131 |
| Interaction of Interdendritic Convection and Dendritic Primary Spacing: Phase-Field Simulation and Analytical Modeling | |
| H. Diepers and I. Steinbach | 145 |

| | |
|--|-----|
| Simulation of ESA's msl Furnace Inserts and Sample-Cartridge Assemblies Using the Thermal Modeling Tool Crysfun | |
| M. Hainke, J. Dagner, J. Friedrich and G. Müller | 151 |
| Experimental Observation of Convection during Equiaxed Solidification of Transparent Alloys | |
| S. Eck, J.P. Mogeritsch and A. Ludwig | 157 |
| Control of the Macrosegregations during Solidification of a Binary Alloy by Means of a AC Magnetic Field | |
| X.D. Wang, A. Ciobanas, F. Baltaretu, A.M. Bianchi and Y. Fautrelle | 163 |
| The Effect of Melt Flow on the Dendrite Morphology | |
| C. Póliska, Z. Gács and P. Barkóczy | 169 |
| Segregation with Spongy Deformation of the Mushy Zone during Solidification of the Skin of Steel Cast Products | |
| N.T. Niane, C. Gandin and G. Lesoult | 175 |
| Influence of Forced Convection on Columnar Microstructure during Directional Solidification of Al - Ni Alloys | |
| H. Nguyen-Thi, B.H. Zhou, G. Reinhart, B. Billia, Q.S. Liu, C.W. Lan, T. Lyubimova and B. Roux | 181 |
| Macrosegregation Caused by Deformation of the Mushy Zone | |
| L.C. Nicoll, C.L. Martin, A. Mo and O. Ludwig | 187 |
| Gravity-Induced Convection during Directional Solidification of Hypermonotectic Alloys | |
| A. Ludwig, M.H. Wu, M. Abondano and L. Ratke | 193 |
| Solidification of AlSi Alloys in the ARTEMIS and ARTEX Facilities Including Rotating Magnetic Fields – A Combined Experimental and Numerical Analysis | |
| M. Hainke, S. Steinbach, J. Dagner, L. Ratke and G. Müller | 199 |
| Solidification and Melting – Asymmetries and Consequences | |
| M. Rettenmayr and M. Buchmann | 205 |
| Motion of Fine Particles under Interfacial Tension Gradient in Relation to Solidification of Steel | |
| K. Mukai, M. Zeze and T. Morohoshi | 211 |
| Effect of Travelling Magnetic Field on the Directional Solidification of Refined Al-3.5 wt%Ni Alloys | |
| K. Zaidat, T. Ouled-Khachroum, N. Mangelinck-Noël, G. Reinhart, M.D. Dupouy and R. Moreau | 221 |
| Microstructure Formation in AlSi7 Alloys Directionally Solidified with Forced Melt Flow | |
| G. Zimmermann and A. Weiß | 227 |
| Macrosegregation in CC Slabs | |
| M. Réger, B. Verő, Z. Csepeli and Á. Szélig | 233 |
| Ensemble Averaged Two-Phase Eulerian Model for Columnar/Equiaxed Solidification of a Binary Alloy | |
| A. Ciobanas, F. Baltaretu and Y. Fautrelle | 239 |
| Estimation of the Cooling Rate on the Basis of Secondary Dendrite Arm Spacing in Case of Continuous Cast Steel Slab | |
| C. Hoo, I. Teleszky, A. Roósz and Z. Csepeli | 245 |
| Evaluation of Permeability of Interdendritic Channels for Al-Cu and Sn-Pb Alloys | |
| M.L.N.M. Melo and R.G. Santos | 251 |
| Marangoni Convection and Fragmentation in LASER Treatment | |
| J.M. Drezet and S. Mokadem | 257 |
| Effect of a Rotating Magnetic Field on the Solidified Structure of Al-Si Alloys | |
| J. Kovác, A. Roósz and J. Szőke | 263 |
| On the Temperature Gradient Induced Interfacial Gradient Force, Acting on Precipitated Liquid Droplets in Monotectic Liquid Alloys | |
| G. Kaptay | 269 |
| Liquid-Metal Foams – Feasible In Situ Experiments under Low Gravity | |
| N. Babcsán, F. Garcia-Moreno, D. Leitlmeier and J. Banhart | 275 |
| EBSD Study of ZnAl25 Alloy Inoculated with ZnTi4 Master Alloy | |
| W.K. Krajewski and A.L. Greer | 281 |
| Study of the Eutectoid Transformation in the As-Cast Spheroidal Graphite Cast Iron with 'in Situ' Dilatation Analysis – Method for Quality Control | |
| P. Mrvar, M. Tribžan, J. Medved and A. Križman | 287 |

| | |
|--|-----|
| Ceramic Particle Dispersion Analysis in LASER Surface Alloying | 295 |
| E. Bitay | |
| Investigation of Phenomena Taking Place in LASER Surface Alloying Steels of WC-Co | 301 |
| E. Bitay and A. Roósz | |
| Embedding of Ceramic Particles in Metals Using Different Techniques for Undercooling of Metallic Melts | 307 |
| T. Lierfeld, M. Kolbe, D.M. Herlach and G.F. Eggeler | |
| A Brief History of the Science of Dendritic and Eutectic Growth until 1980 | 313 |
| W. Kurz | |
| Prediction of the Formation of an Equiaxed Zone Ahead of a Columnar Front in Binary Alloy Castings: Indirect and Direct Methods | 325 |
| S. McFadden, D.J. Browne and J. Banaszek | |
| Simple Analytical Models for Dendrite Arm Coarsening under High and Medium Temperature Gradients | 331 |
| A. Turkeli | |
| Effects of the Interface Curvature and Dendrite Orientation in Directional Solidification of Bulk Transparent Alloys | 337 |
| C. Weiss, N. Bergeon, N. Mangelinck-Noél and B. Billia | |
| Constitutive Equation for Thermal Strain in the Mushy Zone during Solidification of Aluminium Alloys | 343 |
| A. Stangeland, A. Mo and D.G. Eskin | |
| Modeling Microsegregation in Metal Alloys | 349 |
| V.R. Voller | |
| Microsegregation in Steels during Dendritic Columnar Growth and Peritectic Reaction Part I: Experimental Investigation of Fe-Ni-C Alloys | 361 |
| A. Addad, C. Bourgraft, H. Combeau and G. Lesoult | |
| Microsegregation in Steels during Dendritic Columnar Growth and Peritectic Reaction. Part II: Modelling and Numerical Simulation. Comparison with Experimental Results | 367 |
| L. Thuinet, H. Combeau and G. Lesoult | |
| Segregation Effects and Phase Developments during Solidification of Alloy 625 | 373 |
| C. Højerslev, N. Tiedje and J. Hald | |
| Effects of Liquid Core Reduction during Solidification of Pb2.5wt%Sb Thin Slabs | 379 |
| J.L. Peralta and R.G. Santos | |
| Segregation Profiles in Diffusion Soldered Ni/Al/Ni Interconnections | 385 |
| W. Wołczyński, J. Kloch, J. Janczak-Rusch, K.J. Kurzydlowski and T. Okane | |
| Columnar-to-Equiaxed Transition in SOLidification Processing (CETSOL): A Project of the European Space Agency (ESA) - Microgravity Applications Promotion (MAP) Programme | 393 |
| C. Gandin, B. Billia, G. Zimmermann, D.J. Browne, M.D. Dupouy, G. Guillemot, H. Nguyen-Thi, N. Mangelinck-Noél, G. Reinhart, L. Sturz, S. McFadden, J. Banaszek, Y. Fautrelle, K. Zaïdat and A. Ciobanas | |
| Nonequilibrium Kinetics of Phase Boundary Movement in Cellular Automaton Modelling | 405 |
| A.A. Burbelko, E. Fraś, W. Kapturkiewicz and E. Olejnik | |
| Modelling of the Mushy Zone Permeability for Solidification of Binary Alloys | 411 |
| P. Furmanski and J. Banaszek | |
| Investigations on Columnar-to-Equiaxed Transition in Binary Al Alloys with and without Grain Refiners | 419 |
| L. Sturz and G. Zimmermann | |
| The Application of Some Probability Density Functions on Heterogeneous Nucleation | 425 |
| E. Fraś, K. Wiencek, A.A. Burbelko and M. Górný | |
| Phase-Field Modeling of Dendritic Solidification in Undercooled Droplets Processed by Electromagnetic Levitation | 431 |
| P.K. Galenko, D.M. Herlach, G. Phanikumar and O. Funke | |
| Global Modeling of Directional Solidification of Aluminum Alloys Using the Software Package CrysVUN | 437 |
| J. Dagner, A. Weiß, M. Hainke, G. Zimmermann and G. Müller | |
| Back Diffusion of Manganese during Solidification of Carbon Steels | 443 |
| A. Turkeli and D.H. Kirkwood | |

| | |
|---|-----|
| Approximate Analytical Models for Microsegregation Considering the Effect of Dendrite Arm Coarsening | 449 |
| A. Turkeli | |
| Solidification of Co-Cu Alloys in the Metastable Miscibility Gap under Low Gravity Conditions | 455 |
| M. Kolbe, J.R. Gao and S. Reutzel | |
| Mushy Zone Melting Kinetics under Microgravity Conditions | 461 |
| M.E. Glicksman, A. Lupulescu and M.B. Koss | |
| Investigation on the Morphological Instability during Directional Solidification of a Transparent Alloy during Sounding Rocket Flights | 463 |
| A. Weiß, L. Sturz and G. Zimmermann | |
| The Effect of Fluid Convection on Microstructures of Directionally Solidified Castings | 473 |
| T.S. Lei, W.S. Chang and S.Y. Dong | |
| Single Crystal Growth – New Techniques on Old Base | 479 |
| P. Bárczy, J. Szőke, C.H. Su, S.L. Lehoczky, M. Schweizer, M.P. Volz and F.R. Szofran | |
| Experimental Performance within the SCA Prototype Test 1 Using ESA's Solidification and Quench Furnace (MSL-SQF) on Ground | 485 |
| S. Rex, U. Hecht and A. Drevermann | |
| In Situ Optical Determination of Fraction Solid of Al-Si-Mg Alloys | 491 |
| S. Steinbach and L. Ratke | |
| Mesh-Free Simulation of Transport Phenomena in Continuous Castings of Aluminium Alloys | 497 |
| B. Šarler and R. Vertnik | |
| The Effect of Fluid Flow on Heat Transfer and Shell Growth in Continuous Casting of Copper | 503 |
| S. Vapalahti, S. Louhenkilpi and T. Räisänen | |
| New Algorithm to Calculate Liquid – Solid Shrinkage and Graphite Expansion | 509 |
| K. Weiß and C. Honsel | |
| Melt Flow and Macrosegregation in DC Casting of Binary Aluminum Alloys | 515 |
| M. Založník and B. Šarler | |
| From Solidification Simulation to Virtual Product Development | 523 |
| R. Bähr, C. Honsel, K. Weiß and M. Todte | |
| Connections between the Crystallization Phenomenon of Cast Iron and the Strength Properties | 531 |
| J. Dúl and L. Varga | |
| Effect of the Segregation of Different FE-Phases on the Susceptibility to Cracks of AL-Cylinder Heads | 537 |
| G. Fegyverneki | |
| Computational Modeling of Macroscopic Transportation in Continuous Castings | 543 |
| H.X. Zhang, H.F. Shen and B.C. Liu | |
| The Effect of Superheat on Micro- and Macrosegregation and Crack Formation in the Continuous Casting of Low-Alloyed Copper | 549 |
| M. Mäkinen and M. Uoti | |
| Simulation of High Pressure Die Casting Solidification | 555 |
| D. Molnár, J. Dúl and R. Szabó | |
| Experimental Work on Possibilities to Predict Casting Defects in LPDC Brass Castings | 561 |
| A. Muikku, J. Hartikainen, S. Vapalahti and T. Tiainen | |
| Chemical Diffusion Experiments in AlNiCe-Melts | 567 |
| A. Griesche, F. Garcia-Moreno, M.P. Macht and G. Frohberg | |
| Surface Tension Measurements of Industrial Alloys | 573 |
| F. Schmidt-Hohagen and I. Egry | |
| Solid-Solid Phase Transformations in Aluminium Alloys Described by a Multiphase-Field Model | 579 |
| I. Kovačević and B. Šarler | |
| Measurement of the Kinetics of Thermal Effects during Phase Transformations in ADI | 585 |
| W. Kapturkiewicz, E. Fraš, J. Lelito and A.A. Burbelko | |
| Thermodynamic Properties of CMSX-4 Superalloy: Results from the ThermoLab Project | 591 |
| M. Palumbo, D. Baldissin, L. Battezzati, O. Tassa, R. Wunderlich, H.J. Fecht, R. Brooks and K. Mills | |

| | | |
|---|--|-----|
| Thermo-Mechanical Analysis of Directional Crystallisation of Multi-Crystalline Silicon Ingots | | |
| M. M'Hamdi, E.A. Meese, H. Laux and E.J. Øvrelid | | 597 |
| Thermal Analysis of the Mg-Al Alloys | | |
| J. Medved and P. Mrvar | | 603 |
| Calculation of the Equilibrium Phase Diagram of Fe-Ni Alloy System by the ESTPHAD Method | | |
| Z. Kövér and A. Roósz | | 609 |
| Determination of Al Site Preference in L1₂ TiZn₃ - Base Trialuminides | | |
| W.K. Krajewski | | 615 |
| Phase Equilibria and Solidification of Mg-Rich Al-Mg-Si Alloys | | |
| R. Valdes, A. Freulon, J.-. Deschamps, M. Qian and J. Lacaze | | 621 |
| Free Surface Flow Control and Electromagnetically-Driven Stirring by a Double-Permanent-Magnet-Driver | | |
| X.D. Wang, Y. Fautrelle, M.D. Dupouy, T.J. Li and J.Z. Jin | | 629 |
| Calculation of the Liquidus and Solidus Surface of Al Rich Corner of Al-Mg-Si Alloy System by ESTPHAD Method | | |
| J. Farkas and A. Roósz | | 635 |