

Table of Contents

Preface

Chapter 1: Metallurgy of Steel

The Application of Physical Simulation in Hot and Cold Rolling of Steels F. Siciliano	3
Development and Application of a Thermal Microstructure Model of Laminar Cooling of an API X70 Microalloyed Steel J.B. Wiskel, R. Karl, M. Emakpor, F. Fazeli, C. Cathcart, T. Zhou, S. Yu, D.G. Ivey and H. Henein	9
Characterization and Separation of Damage Mechanisms of Extruded Case-Hardening Steel AISI 5115 under Cyclic Axial-Torsional Loading L.A. Lingnau and F. Walther	15
Effect of Mo and Mo+Nb Additions on the Phase Transformation and Microstructure of a Developed Low-Carbon CrNiMnB Ultrahigh-Strength Steels with a Preceding Hot Deformation M. Ali, T. Alatarvas, T. Nyo and J.I. Kömi	21
Effect of Rapid Induction Tempering on the Mechanical Properties and Microstructure of Ultra-High Strength Steel O. Haiko, A. Kaijalainen, T. Iso-Junno, M. Jaskari and J.I. Kömi	30
Effect of Nitrogen Impurity on the Tensile Ductility and Impact Toughness of Al-Bearing DQP Steels P.K. Kantanen, S. Pallaspuro, M.C. Somani, H. Tervo, A. Kaijalainen and J.I. Kömi	36
Microstructural Characteristics and Mechanical Properties of Nanostructured Bainite Processed through High and Low Temperature Ausforming and Isothermal Holding near Ms in a Medium Carbon Steel S. Ghosh, P. Kaikkonen, M.C. Somani and J.I. Kömi	42
Assessment of Mechanical Properties and Microstructure of EUROFER97 Steel after Thermo-Mechanical Treatments G. Stornelli, A. Di Schino, R. Montanari, C. Testani and A. Varone	47
Impact of Ultra-Flash Tempering Treatment on the Microstructure and Mechanical Properties of High-Strength Carbon Steel A.S. Hamada, M. Jaskari, M. Ali, A. Kaijalainen and A. Järvenpää	53
Phenomenon-Based Model for Virtual Hot Strip Rolling J. Ilmola, J. Paananen, O. Seppälä, J. Pyykkönen and J. Larkiola	60
Hot Stamping of Heavy-Gaged - Full Development and the Effect of Press Hardening Process on the Microstructure and Mechanical Properties of 22MnB5 + NbMo Alloyed V. Braga, E.J.M. Taiss, D.T. de Almeida and A.L.V. da Costa e Silva	79
Grain Refinement in 441 Ferritic Stainless Steel: High Versus Low Ti/Al Ratio after Casting and Hot Rolling C.W. Siyasiya, J. Asante and R. Matengaifa	85
Back-Annealing of Hot Dip Galvanised Strip Steel Microalloyed with Vanadium J.S. Steyn, K.M. Banks and C.W. Siyasiya	91
Comparative Study of Quench and Partition Processes in High Si and High Al Steels V. Kurup, C.W. Siyasiya and R. Mostert	97
Thermomechanical Processing of V-N Structural Plate Steels in Low Temperature Austenite K.M. Banks and D.R.N. Maubane	103
Influence of Hot Rolling Practice and Furnace Residence Time on the Strength and Toughness of Normalised Nb-Ti-V Structural Steel Plate D.R.N. Maubane, K.M. Banks and V. Kurup	109
Medium Carbon Q&P Steel with High Product of Strength and Elongation R. Mishnev, Y. Borisova, A. Pikina, S. Gaidar and R. Kaibyshev	115
Delamination Fracture in a Medium-Carbon Low-Alloy Steel Subjected to Tempforming V. Dudko, D. Yuzbekova, S. Gaidar, S. Mironov and R. Kaibyshev	121

Effects of Pre-Strain and Tempering on Mechanical Properties in High-Strength Martensitic Steels	
N. Tsuchida, R. Ueji, W. Gong, T. Kawasaki and S. Harjo	127
Effect of Pressure on High-Temperature Oxidation of Ferritic Stainless Steels	
R. Spotorno and P. Piccardo	132
Tribological Behaviour of Low Temperature Plasma Assisted Carburized 316 L Steel Produced by L-PBF Technique	
A. Lanzutti, F. Sordetti, M. Magnan, E. Vaglio, A. Varone, R. Montanari, C. Verona and E. Pakhomova	137
Recent Development of Hot-Rolled AHSS for Lightweight Chassis	
J. Lee, S.I. Kim and Y. Im	143
Effect of Thermomechanical Rolling on Mechanical Properties of TRIP-Aided Steel Sheet	
J. Kobayashi, T. Kimura, S. Kudo, G. Kojima, T. Hojo, S. Kuramoto and G. Itoh	148
Prediction of TTR Diagrams via Physically Based Creep Simulations of Martensitic 9-12% Cr-Steels	
L. Witzmann, F. Riedlsperger, J. Mergl, G. Zuderstorfer, B. Krenmayr and B. Sonderegger	154
Influence of the Holding Thickness and Process in the Microstructure and Mechanical Properties of a Microalloyed 380 MPa Structural Steel	
J.A.C. Cohn, A.L. de Souza, N. Isasti, P. Uranga, P. Haddad, M.A. Rebellato and A.A. Gorni	161
Application of CALPHAD for the Prediction of Matrix Phase Transformations in Steel	
J. Kreyca, A. Schwarz-Gsaxner and S. Zamberger	167
Towards High Strength-Ductility Balance Using Double Annealing Cycles	
A. Arlazarov, J.M. Pipard, N. Kabou, P. Targy and M.O. Thénot	172
Quench and Bainite (Q&B) Thermal Cycle as an Alternative to Standard Quench and Partitioning (Q&P) Annealing to Produce AHSS	
A. Arlazarov, J.M. Pipard, N. Kabou, P. Targy and M.O. Thénot	178
Importance of through Hardening of Low-Alloy High Performance Martensitic Steels for Large Section Applications	
M.C. Rupinen, A.J. Clarke and J.G. Speer	184
Effects of Substrate Microstructure and Chemical Composition on Liquid Metal Embrittlement in Galvanized 3rd Generation AHSS	
J.G. Speer, D. Bhattacharya, J.A. Colburn and J. Klemm-Toole	192
Double Soaking of Medium Manganese Steels	
E. De Moor, A. Glover, J. Mueller, J.G. Speer and D.K. Matlock	199
On High Performance Steels for Fasteners	
H.C. Lu, J. Hu, X.L. Yang, C.D. Hu, W. Shi and H. Dong	205
Design and Properties of Hot Rolled Tough Carbide Free Bainitic Steels	
R. Rana, E. Cordova-Tapia, L. Morales Rivas and C. Garcia-Mateo	211
Low Temperature Hot Press Forming of a Zinc Coated Third Generation Advanced High Strength Steel	
R. Rana, T. Kop, P. Beentjes and E. van der Aa	217

Chapter 2: Structural Alloys

Mechanical Properties and Microstructure Evolution of an AA5083 via Introducing 0.33%Sc and Cryorolling	
T.A. Bah, F. Waqas and H.L. Yu	225
Effect of Core Hole Diameter on Tensile and Fatigue Properties of the Helically Formed Internal Thread in AlSi10MnMg Cast Alloys	
Y. Sarafraz, N. Felinks, D. Biermann and F. Walther	233
Study on the Deformation Mechanism of a Nonequiatomic AlCrMnFeNi High-Entropy Alloy at Cold and Warm Temperatures	
A.W. Abdelghany, M. Jaskari, A.S. Hamada, M.A.H. Gepreel and A. Järvenpää	240
Unusual Precipitation at Grain Boundaries in Non-Equiatomic CoCrFeMnNi High Entropy Alloys	
H.Y. Yasuda, M. Horiguchi, K. Cho, T. Masuda and T. Nagase	246
Manufacturing Method and Thermal Properties of Open-Cell Type Aluminum Foam by Replication Casting Process	
J.M. Kim, T.K. Ha, B.S. Han and Y.J. Kim	252

Ultrafast Laser Fabrication of Microchannels on Aluminium Alloy Substrate A. Cholkar, S. Chatterjee, D. Kinahan and D. Brabazon	258
Effect of Cu on the Precipitation of α-Al(Mn,Cr)Si Dispersoids in an Al-Mg-Si-Mn-Cr Alloy F.Z. Liu, Q.P. Dong, J. Qin, Z. Li and H. Nagaumi	267
Effect of Heating Rate on the Annealing Behavior of Aluminium Alloys P. Chakravarty and J.J. Sidor	273
Effect of Distributions of Low Angle Grain Boundary and Dislocation Density on Strength of Al-3mass%Mg by SPD A. Kozaki, T. Morishige and T. Tanaka	279
Constitutive Model and Impact Induced Fragmentation of W-Zr Alloy Y.Z. Yang, C.T. Wang, Y.S. Yang, Y. He, L. Guo and Y. He	284
Microstructure Observation of Al-Zn-Mg Alloy with High Mg Content A. Ahmed, S.W. Lee, T. Tsuchiya, K. Matsuda, K. Nishimura, N. Nunomura, H. Toda, K. Hirayama, K. Shimizu, M. Yamaguchi, T. Tsuru and M. Itakura	291
Eta Phase Precipitation at Equilibrium and in Strain Free ATI 718Plus B. Hassan, Y. Jansen, S. Nouveau and J. Corney	296
Factor for Improvement of Plastic Workability in Magnesium Alloy Pipes through Processing by Torsion and Back-Torsion H. Okazaki, T. Kato and M. Furui	302
Effect of Process Condition and Test Environment on Tensile Properties in Cold-Rolled Al-Cu-Mg Alloys Y. Ishii, J. Kobayashi, E. Kobayashi, M. Ohnuma, S. Kuramoto and G. Itoh	308
Mass Production and Vast Application States of Bulk Metallic Glasses A. Inoue, F.L. Kong, X.G. Zhu and K. Gao	314
Microstructure Based Flow Stress Modelling of Superalloy 718 N. Kumar and S.D. Yadav	320
Crystal-Defect-Associated Transformation Strain Paths of Electric Current Pulse (ECP) Induced α to β Transformation in Cu-40Zn M.S. Liu, C. Esling, Y.D. Zhang, B. Beausir, X.L. Wang, X. Zhao and L. Zuo	326
Developments of Cost Affordable Titanium Alloys in Japan M. Ikeda, M. Ueda and Y. Yamanishi	332
Breaks in Hall-Petch Relationship in Magnesium A.P. Carvalho and R.B. Figueiredo	338
Micro-Alloying Effect on the Inter-Critical Grain Coarsened Heat Affected Zone of a S355 Steel Welded Joint A. Di Schino, M. Sgambetterra, R. Schmidt, G. Stornelli and A. Tselikova	345

Chapter 3: Composite Materials

Hybrid Carbon Fiber Reinforced Laminates with Interlaminar Nanofibers L. Iorio, F. Quadrini, D. Bellisario, A. Proietti, N. Gallo and L. Santo	353
Additive Layer Manufacturing of Carbon Fiber/PEKK Composites for Aeronautic Application F. Quadrini, D. Bellisario, L. Iorio, A. Proietti and L. Santo	359
Graphite- and Graphene-Based Polymer Nanocomposites for Flexible Sensors and Actuators in Health Care and Soft Robotics Applications S. Schintke, B. Mujovi, D. Loiko and S. del Rossi	364
Preparation, Microstructure, and Mechanical Properties of Aluminum Matrix Composite by Accumulating Roll Bonding Method G. Sasaki, W.C. Liu and K. Sugio	370
Relation between Process Parameters and Pressure during Friction Stir Forming in the Development of a Superplastic Composite Steel Sheets H.M. Tabatabaei, T. Ohashi and T. Nishihara	375
Influence of Green Plantain Peel Ash and Alumina Reinforcement on the Physio-Mechanical Properties of Aluminium Matrix Hybrid Composites F. Ben, F.R. Amodu and P.A. Olubambi	381

Chapter 4: Powder Metallurgy

A Unique Hall-Petch Relation of Harmonic Structure Designed Pure Ni D. Matsuzaka, K. Nagano, T. Kambara, M. Kawabata, T. Kuno, H. Fujiwara and K. Ameyama	397
High Temperature Deformation Behavior and Microstructure Evolution of Harmonic Structure Composites with WC-Co and High Speed Steel A. Koiso, T. Kuno, M. Kawabata, K. Ameyama and H. Fujiwara	403
Misorientation of Grains in Fatigue of Harmonic Structured Steel Observed by Diffraction Contrast Tomography Using Ultrabright Synchrotron Radiation Y. Nakai, D. Shiozawa, S. Kikuchi, I. Mishima, M. Kawabata and K. Ameyama	408
High Temperature Deformation of Harmonic Structure Designed CrMnFeCoNi High Entropy Alloy S. Hosogi, S. Onoue, T. Kuno, M. Kawabata, H. Fujiwara, K. Isonishi and K. Ameyama	414
Microstructure Evolution and Unique Deformation Behavior of a CrMnFeCoNi Harmonic Structure High Entropy Alloy at Elevated Temperatures S. Onoue, S. Hosogi, T. Kuno, M. Kawabata, H. Fujiwara, K. Isonishi and K. Ameyama	420
Effect of Hot-Pressing Pressure on the Microstructure and Thermal Conductivity of Copper/Ti-Coated Diamond Composites J.N. Ma, R. Torrens, L. Bolzoni and F. Yang	426

Chapter 5: Additive Manufacturing

Buckling Mechanism Simulation for Thin-Wall Components Made by Laser Powder Bed Fusion R. Tangestani, A. Chakraborty, T. Sabiston, L. Yuan and É. Martin	435
316L-Si Austenitic Stainless Steel Elaborated by Additive Manufacturing Process: Porosity and Dislocation Density Estimation S. Aberkane, B. Mehdi and R. Badji	441
Effect of Isothermal Annealing on Residual Stresses and Fatigue Properties of LPBF 316L Steel M. Jaskari, A.S. Hamada, T. Gundgire, A. Järvenpää and P. Karjalainen	446
Fatigue Life and Impact Toughness of PBF-LB Manufactured Ti6Al4V and the Effect of Heat Treatment T. Rautio, M. Araya, M. Jaskari, H.A. Bhatti and A. Järvenpää	452
Overview: Additive/Subtractive Hybrid Manufacturing of Heat Resisting Materials P. Wanjara, S. Atabay, S. Sarafan, J. Gholipour, J. Soost and M. Brochu	459
The Influence of the Deposition Speed during Friction Screw Extrusion Additive Manufacturing of AA6060 S.S. Rezaeinejad, S. Strik, T.C. Bor, M. Luckabauer and R. Akkerman	465
Production of a Ti6Al4V Automobile's Lower Control Arm with EBM D. Mirabile Gattia, A. Palombi, A. Coglitore, F. De Pascalis, M. Nacucci, F. Palano, A. Tati, G. Barbieri, M. Richetta and U. De Angelis	473
Design Strategies towards the Optimization of 3D Additive Manufactured Lattice Structures C. de Crescenzo, M. Richetta, A. Fava, I. Papallo, A. Lanzotti, M. Martorelli and A. Gloria	479
Processability and Solidification Microstructure of Al-10Si-4.5Mg Alloy Fabricated by Laser Powder Bed Fusion Y. Otani, N. Takata, A. Suzuki, M. Kobashi and M. Kato	485
Process Parameter Prediction in Laser Powder Bed Fusion Using an Artificial Neural Network N. Nudelis and P. Mayr	491
Advantages of Hybrid Neural Network Architectures to Enhance Prediction of Tensile Properties in Laser Powder Bed Fusion F. Funcke, T. Forster and P. Mayr	497
Low-Environmental Impact Surface Treatment on SLM-Produced AlSi10Mg Aluminium Alloy A. Acquesta, A. Manzo and T. Monetta	504

Functionally Graded Steels Obtained via Electron Beam Powder Bed Fusion C. Botero, A. Koptug, W. Sjöström, E. Jiménez-Piqué, A. Şelte and L.E. Rännar	510
Towards Laser Metal Deposition of Modified PH 13-8Mo Powder G. Aydin, A. Şelte, J. Andersson and M.A. Valiente Bermejo	516
Triply Periodic Minimal Surfaces Manufactured by Electron Beam Powder Bed Fusion: Approaches and Challenges A. Koptug, D. Khrapov, M. Surmeneva and R. Surmenev	522
High Temperature Tensile Properties and Microstructure of Ni20Cr Alloy Fabricated by Laser Powder Bed Fusion S.S. Joshi, C. Keller, W. Lefebvre and E. Hug	528
Effect of Relative Weight on Compression Behaviour of 3D Printed Porous Structure Made of Aluminium Alloy K. Monkova, P.P. Monka, G. Pantazopoulos, A. Toulfatzis, S. Papadopoulou and M. Koroľ	534
Effective Strategies for Electron Beam Additive Manufacturing of Graded Metal Interfaces between Stainless Steel and Vanadium C.L. Hawk, L.B. O'Brien, R.A. Bloom and J.S. Carpenter	539
Themomechanical Response of an Additively Manufactured Hybrid Alloy by Means of Powder Bed Fusion C. Aranas Jr., K. Nyamuchiwa, K. Chadha, J. Pasco and T. McCarthy	546
Mechanical Behaviour of Maraging Steel Processed by Powder Bed Fusion via Laser Beam (PBF-LB) in Different Build Orientations N.C. Santhi Srinivas, K. Chattopadhyay and V. Jaydeep	552
High-Throughput Simulations of Phase Precipitation in Additively Manufactured Al Alloy N. Barschkett, S. Carrion Ständer, G. Matheson, A. Evirgen and E. Kablman	558
Laser-Powder Bed Fusion Additive Manufacturing of NiCrBSi Self-Fluxing Nickel Alloy, Material Health - Process Relationship A. Ty, M. Mokhtari, Y. Balcaen, O. Dalverny, J. Rigaud, J. Rocchi, A. Votié, J.M. Cloué and J. Alexis	564
High Volume 3D Printer and Developed of High-Volume Extruders for Gelatin and Liquids A. Engels, M.T. Hauschultz, H. Jacobs and A.H. Foitzik	571
Microstructural and Mechanical Characterization of Large Surfaces after Laser Cladding by Wavering of Nickel Coating on Cast-Iron Molds Used in Glass Industry F. Bourahima, T. Lauridant, C. Guasch, A.L. Helbert and T. Baudin	578
Laser-Based Directed Energy Deposition of Ceramic Nanoadditivated AA7075 Powder Alloys P. Rey Rodriguez, A. Lazaro Martinez, G. Castro Regal, R. Sanchez Cruz, C. Alleaume, C. Prieto Rio, T. Pabel and E. Kaschnitz	584
Alloy Design for AM: A Ferritic Alloy for Applications in Corrosive Alkaline Environment D. Mirabile Gattia, L. Pilloni and G. Corallo	590

Chapter 6: Welding Technologies

Effect of Ferrite/Austenite Phase Transformation on 475 °C Embrittlement in Duplex Stainless Steel Weld K. Saida, S. Yamashita and H. Hirata	597
Effect of High-Temperature Tempering on Microstructure and Mechanical Strength of Laser-Welded Joints between Medium-Mn Stainless Steel and High-Strength Carbon Steel A.S. Hamada, S. Ghosh, M. Ali, M. Jaskari and A. Järvenpää	606
Experience in the Fabrication of Tube Grade 7CrMoVTiB10-10 with Inconel 625 Weld Overlay for Use in Steam Superheaters Exposed to Highly Corrosive Environments M. Urzynecok, H. Purzynska and K. Kwiecinski	613
Microstructure and Mechanical Properties of A6061/GA980 Resistance Spot Weld T. Nonomura, T. Kosaka, T. Kobayashi, I. Shohji and M. Iyota	619
High Energy Density Welding of IN792 Ds Superalloy G. Barbieri, F. Cognini, C. de Crescenzo, A. Fava, M. Moncada, R. Montanari, M. Richetta and A. Varone	625
Effect of Cold Rolling on Bonding Interface of C1020/A1050 Butt Joints by Friction Stir Welding T. Nagaoka, M. Tada, T. Hagino, C. Okada, M. Ando and T. Miwa	631

High-Speed Laser Beam Welding of Magnesium Alloy AZ31 for Enhancing the Mechanical Properties S. Riekehr, N. Al-Hamdany, V. Ventzke, G. Rudenko and N. Kashaev	637
Friction Stir Welding of Various Aluminium Alloys to Titanium S.F. Grassel, L. Bergmann and B. Klusemann	643
Solute Enrichment in the Fusion Zone during Resistance Spot Welding of a Third Generation Advanced High Strength Steel D. Marshall, C. Schenck, L. Hines and J.G. Speer	649
Premium Rail Flash-Butt Welding Process Window Based on Phase Transformations H.B. Pereira, E.A.A. Echeverri, D.M.A. Centeno, L.H.D. Alves and H. Goldenstein	657
Resistance Spot Welding of QP Stainless Steels: Role of Heat Treatment and Microstructure on Joint Strength A. Smith, E. Macia, M. Muratori, A. Sierra-Soraluce and I. Sabirov	664
Phase Transformations in Layered Composites Based on Zr, Nb, Ta or Ti Sheet Explosively Welded to Stainless Steel Plate H. Paul, S. Puchlerska, M. Prazmowski, R. Chulist and M.M. Miszczyk	670
Evaluation on Joint Performances of Advanced Multi-Material Dissimilar Lap Joints H. Serizawa	676
<i>In Situ</i> TEM Observation of the Ultrasonic Bonding Process Y. Otani, C. Iwamoto and K. Hamada	684
Evaluation of Simulated Heat Affected Zone of Molybdenum- and Niobium Alloyed Ultra-High-Strength Steels J. Hannula, A. Kaijalainen and J.I. Kömi	690
Joining Aluminum Alloy and Steel by Friction Stir Forming from Steel Side T. Ohashi, H.M. Tabatabaei and T. Nishihara	696
Parallel Computing of Thermo-Fluid Modeling Related to the FSW Process A. Aoufi, F. Montheillet and C. Desrayaud	702
Gleeble Simulation of HAZ in S690QL Steel: Microstructural and Mechanical Properties D. Tomerlin, N. Gubeljak and D. Kozak	708

Chapter 7: Protective Coatings and Surface Engineering

Effect of Zirconium Conversion Coating on Corrosion Resistance of Small-Defected Auto Steel Sheets B.Y. Fang	717
Optimization of Anodizing Condition for Mg-14mass%Li-3mass%Al Alloy T. Morishige, S. Takiyama, Y. Ichigi and T. Takenaka	722
Numerical Modeling of In-Flight Molten Metal Droplet Dynamics and Particle Oxidation in Atmospheric Plasma Spraying M. Mahrukh, L. Zhang, S.H. Liu and C.J. Li	727
Microstructural Stability of a Metallic Thermal Barrier Coatings for Rocket Engine Y.S. Zhu, Y.Q. Sun, X.T. Luo and C.J. Li	733
Strategy to Generate Oxide-Free Molten Metal Droplets for Fully Dense Corrosion-Resistant Coatings by Atmospheric Plasma Spraying C.J. Li, X.Y. Dong, L. Zhang, X.T. Luo and Y.S. Zhu	740
Oxidation Behavior of Atmospheric Plasma Sprayed NiAl Coating at High Pressure Oxygen Atmosphere L. Zhang, X.J. Liao, X.T. Luo and C.J. Li	746
Crystallographic Textures of Al and Al-Mg Alloy Formed by Shot-Peening H. Sato, M. Mihara-Narita, Y. Watanabe and S. Motozuka	752
Effects of Shot Peening on Mechanical Properties and Microstructural Evolution of AMS 6265 Steel Surface Treated for Critical Aircraft Components N. erban, V.D. Cojocar, M.L. Angelescu, B.I. Vaduva, E. Panainte, D.M. erban and E.M. Cojocar	759
Investigation of Effects of Electroplating Conditions on TEMPO-Oxidized Cellulose Nanofiber Compositated Nickel Electroplated Films M. Iioka, W. Kawanabe, T. Kobayashi and I. Shohji	765

Effect of Special Plating Films on Galvanic Corrosion Behavior between Metal and CFRTP T. Kobayashi, K. Shimizu and I. Shohji	773
Investigation of Deposition Conditions and Basic Properties of CNF Composite Ni Plated Film by Electroless Plating Method W. Kawanabe, M. Iio, T. Kobayashi and I. Shohji	779
Electrolytical Coating of Inhomogeneous Structures Distributed on Metallic Surfaces A. Böhme, T. Döhler, M. Hofmann, J. Neumann, R. Bochem, U. Geißler and A.H. Foitzik	785
Formation Mechanism of Al₂O₃/HfO₂ Eutectic Coating on SiC Substrate Using Light Focusing Method S. Ueno, K. Seya and T. Sekino	791
Using Electropulsing to Control the Surface Quality of Casts R.S. Qin	796

Chapter 8: Materials for Radiation Protection and Nuclear Applications

Challenge to Performance Evaluation of Fusion Reactor Materials by Fission Neutron and Charged Particle Irradiation T. Muroga	803
Boron Nitride Filled Thermoplastics for Passive Shielding of Space Electronics A. Proietti, F. Quadri, D. Bellisario, L. Iorio and L. Santo	810
Recent Research on SiC/SiC Composites for PWR S.Y. Kong, H.F. Zhang, H.C. Liu, R. Tu, Z.Y. Feng and B. Chen	816
Ten-Year Recycling of Vanadium Alloy in Fusion Reactors T. Nagasaka, T. Tanaka, M. Kobayashi, K.I. Fukumoto, T. Toyama, T. Sugawara, R. Kasada, Y. Yamauchi, K. Katayama, M. Oya, K. Yabuuchi, S. Sakurai, K. Nomura and H. Yoshinaga	823

Chapter 9: Functional Materials

Sr Substitution Effect on Ca Site for 32522-Type Ca₃Al₂O_{5-y}Fe₂As₂ Superconductor H. Kitô and H. Ogino	835
Effect of CeO₂ Doped Zirconium Titanate with Various Temperatures by Solid-State Reaction Method M. Naga Sravanthi, S. Jothi and A. Selva Kumar	840
Development of Functionally Graded Metal-Ceramic Systems by Directed Energy Deposition: A Review D.C. Ratnala, J. Andersson and S. Joshi	852
Magnetic Semiconductors from Ferromagnetic Amorphous Alloys Y.Z. Jiao, X.C. Wang, T. Zhang, K.F. Yao, Z.J. Zhang and N. Chen	858
Effects of Thermomechanical Treatments on Tensile Properties of Pure Titanium Y. Harada, K. Ogawa and T. Aoki	864
Study of the Phase Transition from TbCu₇ Structure to ThMn₁₂ Structure in Newly Developed ThMn₁₂ Type Magnets Using a Numerical Analysis Method for X-Ray Diffraction Patterns T. Kuno, K. Kobayashi and H. Fujiwara	870
Development of Soft Magnetics Fe-B-C-Si Amorphous Alloys with High Magnetization and Sufficient Amorphous-Forming Ability T. Bitoh and S. Gohda	876
Development of Giant Magnetostrictive Materials for an Active Noise Control System in an Ultracompact Electric Vehicle T. Kato, H. Okazaki, I. Kobayashi, J. Kuroda, D. Uchino, K. Ogawa, K. Ikeda, A. Endo, H. Kato, T. Narita and M. Furui	882
Robust and Reconfigurable Waveguide Design in Valley-Topological Phononic Crystals M.S. Ali, Y. Hata, M. Kataoka, M. Misawa and K. Tsuruta	888

Chapter 10: Computational Approaches to Materials Properties Evaluation

Why Do Grains Remain Roughly Equiaxed during Steady State Discontinuous Dynamic Recrystallization?	
F. Montheillet and D. Piot	895
Diffusion in Metallic Glass-Forming Systems: A Description of the Kink Behavior Observed in the Temperature Dependence	
M. Aniya and M. Ikeda	901
The Role of Grain Size in the Mechanical Properties of Metals	
M. Kawasaki, R.B. Figueiredo and T.G. Langdon	907
A New Approach for Sintering Simulation of Irregularly Shaped Powder Particles	
M. Weiner, T. Zienert, M. Schmidtchen, J. Hubáľková, C.G. Aneziris and U. Prahľ	915
On the Application of some Plasticity Laws	
L. Hennocque, J. Favre, N. Meyer, T. Sourisseau, C. Maurice, D. Piot, L. Latu-Romain and G. Kermouche	920
Defects-Driven Plasticity: Rationalization Based on Notch Strengthening and Continuous Damage Mechanics	
G. Angella and F. Zanardi	926
A Modern Approach to the Complicated Line Integrals in Linear Elastic Dislocation Theory	
R. Schouwenaars	933

Chapter 11: Materials and Technologies for Hydrogen Production

High-Strength PPS-Polymer Composites for Hydrogen High-Pressure Applications	
M. Schöbel, M. Langela, T. Koch and A. Pöllinger	941
Damage Accumulation and Recovery Involving Vacancy-Type Defects Enhanced by Hydrogen in Tempered Martensitic Steel Showing Quasi-Cleavage Fracture	
K. Saito, T. Hirade and K. Takai	948
Hydrogen Embrittlement in as-Quenched Martensitic Steels - Application of Incremental Step Loading Technique with Novel Tuning-Fork Test	
R. Latypova, T.T. Nyo, J.I. Kömi and S. Pallaspuo	954
Microstructural Engineering of Mn-Alloyed Austenitic Steel for Hydrogen Storage and Delivery	
P. Kathayat, L. Cho, J.G. Speer, Y. Kong, C.W. San Marchi, J.A. Ronevich and K.O. Findley	960

Chapter 12: Materials and Technologies for Electronics Industry

Effect of Plating Potential on Three-Dimensional Structural Plating Films and their Adhesion to Epoxy Resin	
T. Kobayashi, T.A. Pham and I. Shohji	969
Fabrication of High-Temperature Solder by Zn Plating Films Containing Al Particles	
T. Kobayashi, Y. Abiko and I. Shohji	975
Effect of Sb Addition on Microstructure and Shear Strength of Sn-3.0Ag-0.5Cu Solder Ball Joints	
M. Oyama, T. Kobayashi, I. Shohji and M.A.A. Mohd Salleh	981
Ion Trajectory Control in Processing Plasmas for Nano-Fabrication	
H. Otomo, I. Nagao, K. Kamataki and M. Shiratani	988
Optical-Emission Properties of GaN-Based Nanopillar Light-Emitting Diodes Prepared on Non-Polished and Non-Single-Crystalline Substrates	
Y. Sato, H.Y. Xue, S. Taniguchi, S. Saito, A. Fujiwara and T. Saito	994
Effect of High Temperature and Humidity on Bond Strength of Al/Resin Adhesive Joints	
I. Watanabe, T. Kobayashi and I. Shohji	999

Chapter 13: Materials for Biomedical Applications

Carbon Dots Release from Biodegradable Coatings Deposited by Aerosol-Assisted Open-Air Plasma	
G. Morand, P. Chevallier, R. Naccache, M. Tatouliau and D. Mantovani	1007

Plasma Immersion Ion Implantation of a Fe-Mn-C Based Steel for Biomedical Applications: Effect of Gases and Treatment Times on the Surface Properties	
L. Marin de Andrade, P. Chevallier, C. Paternoster, F. Copes and D. Mantovani	1014
Neural Network Regressor for Designing Biomedical Low Elastic Modulus Ti-Zr-Nb-Mo Medium Entropy Alloys	
N.M. Eldabah, A. Shoukry, W.M. Khair-Eldeen, S. Kobayashi and M.A.H. Gepreel	1023
Development and Characterisation of New Hydrogels for Medical Science Education	
S. Speck, C. Verona, A. Böhme and A.H. Foitzik	1029
Effects of C Doping on the Structure and Functional Characteristics of Fe-Mn Alloys after Equal Channel Angular Pressing	
O.V. Rybalchenko, N. Martynenko, G. Rybalchenko, N. Tabachkova, I. Shchetinin, D. Prosvirnin, E. Lukyanova, A. Kolygin, A. Raab and S.V. Dobatkin	1034
Effect of Rotary Swaging on Mechanical and Corrosion Properties of Zn-1%Mg and Zn-1%Mg-0.1%Ca Alloys	
N. Martynenko, O.V. Rybalchenko, G. Rybalchenko, D. Prosvirnin, D. Temralieva, E. Lukyanova, V. Yusupov, A. Sannikov, A. Kolygin and S.V. Dobatkin	1040
Improvement of Work-Hardening Behavior of Co-Cr-W-Ni Alloy by Adding Mn/Fe for Balloon-Expandable Stents	
K. Ueki, K. Ueda, M. Nakai, T. Nakano and T. Narushima	1047
Status and Challenges in Biomedical Applications of LDHs	
M. Richetta, C. de Crescenzo, R. Narducci, R. Montanari and A. Varone	1053
Can Multifunctionality of Bioresorbable BMGs be Tuned by Controlling Crystallinity?	
S.M. Yang, J. Hufenbach, S. Scudino, P.P. Conway and C. Torres-Sanchez	1063
Magnesium-Based Biomedical Devices Degradation Control by Means of Multilayer Coatings	
T. Monetta and A. Acquesta	1069
Effect of Heat Treatments on Microstructure and Mechanical Properties of Nitinol Prototype Stents Produced by Laser Powder Bed Fusion	
M.B. Abrami, M. Tocci, K. Tamilselvam, D. Brabazon and A. Pola	1075
New Powder Metallurgy Titanium Alloys with Built-In Antibacterial Capability	
B. Manogar, L. Peters, F. Yang and L. Bolzoni	1082
Binder Based Processing of Magnesium Alloy WE43 towards Biomedical Application Using Metal Injection Molding (MIM)	
M. Wolff, E. Nidadavolu, W. Limberg, T. Ebel and R. Willumeit-Römer	1088
Microstructure, Mechanical, and <i>In-Vitro</i> Characterization of a Novel Biodegradable Zinc-Based Composite Fabricated at Room Temperature	
M.M. Castro, M. Balog, P. Křížik, P. Švec Jr., E. Švastová, M. Takáčová and J. Kubásek	1095
Interactive Evaluation of Interfacial Damages on Loosening Behavior of Acetabular Cup Loosening Using AE and IR Method	
Y. Otsuka, T. Sakonju and Y. Miyashita	1101

Chapter 14: Measurement and Testing Methods and Devices

Actual Stress Analysis of Welded Part Using a Quantum Beam Hybrid Method	
K. Suzuki, Y. Miura, A. Shiro, H. Toyokawa, C. Saji, S. Morooka and T. Shobu	1109
A Unified Representation for Fundamental Equations of Various X-Ray Stress Measurement Methods	
S. Ejiri, H. Ohba and T. Sasaki	1115
Numerical Simulation of Jominy End Quench Test Using Coupled Heat Transfer and Phase Transformation Model	
A. Pohjonen, J. Ilmola and J. Larkiola	1120
Mechanical Spectroscopy Investigation of Defective Structures in Metals	
A. Fava, R. Montanari, M. Richetta and A. Varone	1126
<i>In Situ</i> ALD-TEM System to Study Atomic Nucleation Phenomena - Enabled by Ultrathin Large Aspect Ratio Free-Standing Shell Structures	
S. Burgmann, A. Afif, M.J. Lid, K. Baglo, S. Chaikasetin, A.T.J. van Helvoort, F.B. Prinz, B. Haugen and J. Torgersen	1136

A Study on Inclusion Characterisation of Steel Using a Novel Inclusion Characterisation Tool	
H. Tervo, O. Seppälä, T. Alatarvas, J. Hannula, S. Pallaspuuro and J.I. Kömi	1144
Design and Evaluation of an Automated System for the Preparation of Samples	
M.H. Friedo, F. Welzel, H. Jacobs, A. Engels and A.H. Foitzik	1150
Conceptual Design of a Fluid Handling System with Dosing and Mixing for PCR Applications	
F. Welzel, M.T. Hauschultz, E. Krumnow, M. Richetta and A.H. Foitzik	1156
Dynamic Modulus Anomaly in Metallic Alloys Prepared by Additive Manufacturing	
M. Cabibbo, C. de Crescenzo, A. Fava, R. Montanari, A. Palombi, A. Pola, M. Tocci and A. Varone	1162
Conception of a Multi-Component Water System with Individually Adaptable Modules for Measuring Diverse Parameters and a Variability of the Purification Output Quality	
M.P.P. Heinrich, M.T. Hauschultz, M.L. Di Vona, R. Pizzoferrato and A.H. Foitzik	1169
Development of a Thermal Cycler for a Low-Cost Real-Time PCR Application	
V.M. Just, F. Welzel, H. Jacobs, G. Gau, M.T. Hauschultz, M.H. Friedo and A.H. Foitzik	1176
Assessment of Powder Solidification Structures in Tool Steels Using State-of-the-Art Microstructural Characterization Techniques	
S. Benito and S. Weber	1183
Evaluation of Interfacial Thermal Resistance of Al-Si Alloy by Using Image-Based Simulation	
K. Sugio, T. Ishii and G. Sasaki	1189

Chapter 15: Operation Research and Industrial Engineering

Data Analysis of Production Data for Continuous Casting of Aluminum Rolling Ingots	
M. Schreyer, A. Gerber and S. Neubert	1197
Determination of the (New) Product Dimensional Window	
P. Gelten	1204
Statistical Methods for Predicting of the Quality of Aluminum Ingots	
M.J. Tschimpke, A. Gerber, S. Neubert, M. Schreyer and W. Trutschnig	1210
Intelligence Press Brake for Aircraft Skin Bending	
H. Okada, T. Wada, H. Oribe, T. Kimura, K. Kitahara, T. Kitahata, N. Hirano and S. Azami	1218
Data Analysis and Visualization of Mechanical Properties of Aluminium Coils, Focusing on Chemical Composition, Annealing Temperatures and Holding Time	
P. Pfeiffer, J. Berneder, A. Haidenthaler and P. Schulz	1224
From Material Requirements to the Rolling Schedule - Fast Material-Oriented Roll Pass Design for Long Products with the Open Source Framework PyRoll	
M. Schmidtchen, M. Weiner, C. Renzing, M. Stirl and U. Prah	1230
ECCC History and Value of Work Done for the Introduction and Use of Newer Materials	
A. Di Gianfrancesco	1236
Proper Material Tracking for a Continuous Aluminum Production Process	
A. Haidenthaler, P. Pfeiffer, M. Schreyer and K. Schiestl	1254
Sustainability and Life Cycle Analysis of 3D Printing Industries	
Y.W.D. Tay and M.J. Tan	1262
High-Pressure Torsion: From Miniature Earthquake to the Origin of Life	
K. Edalati, I. Taniguchi, R. Floriano and A. Ducati Luchessi	1268
The Effect of the Artificial Sand on the Gas Emission for Aluminum Casting	
T.K. Ha, J.M. Kim, J.I. Youn and Y.J. Kim	1275