

# Table of Contents

## Preface

## Invited Lectures

<b>Boronizing of AISI 316L Stainless Steel Using Spark Plasma Sintering Technique</b> A. Nishimoto and T. Kubo	3
<b>Novel Cost-Efficient Method of Producing Ausferritic Steels Displaying Excellent Combination of Mechanical Properties</b> P. Rubin, R. Larker, E. Navara and M.L. Antti	11
<b>The Copper-Arsenic Eutectic and the Cu<sub>3</sub>As Phase</b> R. Haubner and S. Strobl	19
<b>Metallographic Documentation of the Degradation of Iron and Nickel Based Alloys in HCl and H<sub>2</sub>S Containing Environments, between 480 – 680 °C</b> A. Schmid, G. Mori and R. Haubner	26
<b>Characterisation of Chemical Vapour Deposited AlHfN Coatings</b> E. Rauchenwald, M. Lessiak, R. Weissenbacher, S. Schwarz and R. Haubner	33

## Chapter 1: Process Simulation and Metallographic Methods

<b>The Influence of Surface Dipping and Bulk Filling Agents on Properties of High-Speed Grinding Wheels: Materialographic-Based Numerical Modelling</b> L. Čelko, P. Skalka, K. Slámečka, D. Jech, L. Klakurková, I. Ročňáková, J. Švejcar, D. Holemý and J. Kaiser	43
<b>A Thermomechanical Model of Retention of a Diamond Particle in Matrices Based on Fe</b> J. Borowiecka-Jamrozek and J. Lachowski	48
<b>Investigation of the Diffusion Couple Ductile Cast Iron / Iron</b> S. Strobl and R. Haubner	54
<b>SEM Imaging of <i>In Situ</i> Tensile Testing of 27CrNiMoV Steel</b> M. Bystrianský, L. Kučerová and Z. Bunda	60
<b>Nanomechanical Characterization of Iron Borides in Fe-Mn-B Ternary Alloys</b> I. Kirkovska, V. Homolová, L. Čiripová and I. Petryshynets	66

## Chapter 2: Solidification and Solid State Transformation

<b>Simultaneous Fabrication of Multiple Castings Using Frozen Mold Casting Method</b> Y. Hoshiyama, K. Nakashima and H. Matsumoto	75
<b>The Effect of Heat-Treatment on the Phase Stability of Fe-28Al-15Si-2Mo Alloy</b> V. Vodičková, M. Švec, P. Hanus and P. Pazourková Prokopčáková	80
<b>The Microstructure Evolution of Fe-28Al-15Si-0.2Zr Alloy during Different Heat-Treatment</b> M. Švec, V. Vodičková, P. Hanus and V. Keller	86
<b>Structural Nature of ZnAl<sub>4</sub>Cu<sub>1</sub> Alloy Plasticity Affected by Various Technological Treatments</b> M. Longauerová, M. Hodur, M. Vojtko, P. Zubko, M. Glogovský, M. Demčáková, M. Matvija and T. Kvačkaj	92
<b>Microstructural and Fractographic Analysis of CuAlNi Shape Memory Alloy before and after Heat Treatment</b> I. Ivanić, M. Gojić, S. Kožuh and B. Kosec	100

## Chapter 3: Interrelationship between Microstructure and Material Properties

<b>Inclusion Engineering in Structural Steels with Enhanced Machinability</b> S. Pytel	109
<b>Texture Evolution during Cold Drawing of Steel Tube with Respect to the Stress - Strain State</b> L. Parilák, P. Burik, P. Bella and P. Kejzlar	115
<b>Microstructure Influenced by Controlled Rolling, Cooling and Thermal Processing of Seamless Tubes Made of Steel 25CrMo4</b> P. Kawulok, I. Schindler, S. Ruzs, R. Kawulok, P. Opěla, H. Navrátil, R. Turoň and R. Jurča	121
<b>Microstructure, Substructure and Mechanical Properties of 9CrNB Steel after Tempering</b> P. Bekeč, L. Parilák, P. Beraxa, M. Fujda and M. Matvija	127
<b>Comparison of Microstructure and Mechanical Properties of Additively Manufactured and Conventional Maraging Steel</b> L. Kučerová, A. Jandová and I. Zetková	133
<b>Structure and Properties of Bakelite Bonded Grinding Wheels</b> V. Bednaříková, D. Jech, L. Klakurková, L. Čelko and D. Holemý	139
<b>The Influence of Secondary Phase on Impact Toughness of Alloyed Iron Aluminides</b> M. Švec, A. Hotař, V. Vodičková and V. Keller	145
<b>Biodegradable Iron-Based Foams for Potential Bone Replacement Material</b> M. Hrubovčáková, M. Džupon, M. Kupková and R. Oriňáková	151

## Chapter 4: Welding

<b>On the Surface Welding of Pearlitic Rails: The Control of Dilution and Microstructure</b> P. Suwanpinij, M. Hübner, P. Choeychom, T. Thonondaeng, B. Suksawat, P. Kumma and G. Lothongkum	159
<b>Analysis of the Cause of Damage to the Steam Generator Cold Collector's Dissimilar Weld Joint at Slovak Nuclear Power Plant</b> M. Kapusňák, M. Hajas and M. Adamech	165
<b>Possibilities for Using New Types of Additive Materials for Hardfacing</b> J. Brezina, J. Brezinová and J. Víňáš	171
<b>Analysis of Causes of Baby Stroller Construction Damage</b> L. Klakurková, M. Juliš and P. Gejdoš	179

## Chapter 5: Fractures, Defects and Material Degradation

<b>Fractography of Additively Manufactured Titanium Alloy: Influence of Post-Processing Treatment</b> M. Roudnická and D. Vojtech	187
<b>Influence of Boric Acid Solution and Gamma Irradiation on Selective Sorbents</b> D. Marušáková, P. Kůs, L. Szatmary and I.A. Prokúpková	193
<b>Surface Chemistry-Based Surface Defects Situated on Steel Strips Edges</b> M. Gabániová	199
<b>The Failure of Carbon Fiber Reinforced Composite Analyzed by Acoustic Emission</b> V. Mára, J. Krčil, L. Michalcová and E. Čižmárová	205
<b>Size Effect in Plastic Deformation and Failure of Metallic Glasses</b> J. Miškuf, K. Csach, A. Juríková, M. Demčáková, M. Demčáková and V. Ocelík	212
<b>Analysis of Causes of Defects Appearance in Wire Drawing</b> J. Švejcar, M. Juliš, L. Klakurková, P. Gejdoš and T. Zikmund	217
<b>Metallographic Analysis of Stainless Steel Inner Shaft of Centrifugal Pump</b> P. Gejdoš, L. Klakurková and M. Juliš	223
<b>Investigation of Screw Failed During Installation</b> M. Demčáková, A. Mašlejová, L. Hrabčáková, P. Zubko, S. Hockicková, P. Vranec, P. Kalmár, A. Drotár and P. Prislupčák	229
<b>Rarely Occurring Defects on Tinplates</b> P. Vranec, S. Hockicková, A. Mašlejová, M. Demčáková, L. Hrabčáková, P. Zubko, P. Kalmár and A. Drotár	234

<b>Defects of Steel Sheets Joined by Laser Welding</b> A. Drotár, P. Zubko, A. Mašlejová, P. Kalmár, P. Vranec, S. Hockicková, M. Demčáková and L. Hrabčáková	240
<b>Analysis of Corrosion Resistance of Heat Exchanger Plates Made of AISI 316L Steel</b> M. Juliš, L. Klakurková and P. Gejšoš	245
<b>Microstructural and Chemical Analysis of Military Steel from World War II as Part of Sculpture</b> M. Machciník, P. Hornák, M. Halama, J. Bartusz and K. Koval	251

## Chapter 6: Fatigue and Creep

<b>3D Textural Analysis of Fatigue Fracture Surfaces</b> H. Lauschmann, K. Tesař and T. Vronková	259
<b>Character of Fatigue Damage under Axial, Torsional and Biaxial Loading of 316L Stainless Steel</b> A. Chlupová, L. Poczkán, J. Man, V. Mazánová, M. Heczko and T. Kruml	264
<b>The Effect of Prior Surface Roughness on Fatigue Life of Nitrided Specimens</b> M. Kianicova, P. Šandera, J. Horníková, D. Kottfer and J. Pokluda	271
<b>Detection of Early Stage of Fatigue Changes in Non-Alloy Steel Using Residual Magnetic Field Method</b> P. Antonik-Popiołek, J. Głód, Z. Jurasz and J. Juraszek	277
<b>Estimating of the Size of the Maximum Non-Metallic Inclusions in Martensitic Steels and their Influence on Fatigue Properties</b> J. Kasl, M. Matějová and Z. Špirit	282
<b>The SEM and TEM Analysis of IN718 Alloy after Fatigue Push-Pull Loading at 700°C</b> J. Belan, L. Kuchariková, A. Vaško, E. Tillová, M. Chalupová and M. Matvija	288
<b>Characterization of Microstructure of Crept Samples of Dissimilar Weld Joint Using Standard and Advanced Electron Microscopy Techniques</b> J. Kasl, D. Jandová, Š. Mikmeková and O. Ambrož	294
<b>Evaluation of Cavitation Damage in a Pipe Bend Made of 0.5Cr-0.5Mo-0.3V Steel by Optical Metallography and Replica Method</b> Z. Kuboň, J. Kosňovská and G. Rožnovská	300
<b>Near-Surface Structure and Fatigue Crack Initiation Mechanisms of As-Built SLM Inconel 718</b> R. Konečná and G. Nicoletto	306
<b>Fatigue Behavior of Titanium Endoprosthesis</b> P. Hanusová, P. Palček, M. Chalupová and M. Uhrčík	312
<b>Influence of Cyclic Loading on the Internal Friction Measured on Magnesium Alloys AZ31, AZ61 and AZ91</b> M. Uhrčík, Z. Dresslerová, P. Palček, T. Oršulová and P. Hanusová	318
<b>SnO<sub>2</sub> Nano/Microfibers for Gas Sensors</b> E. Mudra, I. Shepa, A. Kovalcikova, O. Milkovič and J. Dusza	324

## Chapter 7: Nonferrous Alloys

<b>Effects on Microstructure and Corrosion Behavior of a Heat Treated CuZn36Pb2 Brass</b> R. Haubner, S. Strobl and P. Linhardt	333
<b>Small Scale Plastic Yielding of Mg Alloys Assessed with Nanoindentation</b> J. Němeček, J. Maňák and J. Němeček	339
<b>Magnesium Alloy WE43 Produced by 3D Printing (SLM)</b> P. Křištofová, M. Roudnická, J. Kubásek, A. Michalcová, D. Vojtech, J. Suchý, D. Paloušek and E. Alzubi	345
<b>Experimental Verification of Phase Diagram Calculations of Zr-Based Alloys after High-Temperature Oxidation</b> P. Gávelová, P. Halodová, O. Libera, I.A. Prokúpková, V. Vrtílková and J. Krejčí	351
<b>Consequences of Inappropriate Temperatures of the Solution Heat Treatment in Al-Si-Cu Cast Alloys</b> L. Kuchariková, E. Tillová and I. Švecová	357

<b>Characterization of High-Speed Alumina Abrasive Grinding Wheel</b> Z. Pavloušková, D. Jech, P. Komarov, I. Ročňáková, L. Dyčková, M. Remešová, L. Čelko and D. Holemý	365
---	-----

## **Chapter 8: Powder Metallurgy**

<b>Step-Sintering of Fe-(1-3)%Mn-0.8%C Steels</b> M. Tenerowicz-Żaba and M. Sulowski	373
<b>Microstructure and Mechanical Properties of Fe-Cu-Ni Sinters Prepared by Ball Milling and Hot Pressing</b> J. Borowiecka-Jamrozek and J. Lachowski	379
<b>Characterization of Mg-Zn Layered Bulk Materials Prepared by Powder Metallurgy Method</b> P. Doležal, M. Krystýnová, T. Marada and H. Doležalová Weissmannová	385
<b>Influence of Oxide Dispersoids on the Structure Development of Copper Nanocomposite Prepared by Spark Plasma Sintering Technology</b> J. Szabo, K. Ďurišinová, O. Milkovič and J. Ďurišin	391
<b>Preparation of Cerium Stabilized Zirconia Bulk Ceramics by Spark Plasma Sintering</b> M. Vojtko, A. Kovalcikova, V. Puchý and O. Milkovič	396
<b>Sintering of High Mn Cemented Carbides in Mn-Rich Environment</b> M. Tarraste, J. Kübarsepp, K. Juhani, M. Kolnes, M. Viljus and A. Mere	402

## **Chapter 9: Surface Engineering and Coatings**

<b>Microstructure, Stiffness and Corrosion of Bare and Phosphated Specimens Made by Sintering of Structured Iron-Iron Oxide Spheres</b> M. Kupková, M. Kupka, R. Oriňáková and R. Gorejová	411
<b>Thermal Cyclic Behaviour of Conventional YSZ and Mullite-YSZ Thermal Barrier Coatings</b> D. Jech, P. Komarov, M. Remešová, L. Dyčková, K. Slámečka, S. Ravaszová, K. Dvořák and L. Čelko	417
<b>Influence of RF Plasma Jet Surface Treatment on Wetting Behavior of Ytria Stabilized Zirconia SPS Coatings</b> P. Komarov, D. Jech, L. Čelko, B. Pijáková, D. Zhou and R. Vaßen	423
<b>Microstructure Characteristics, Tribology and Nano-Hardness of Plasma Sprayed NiCrRe Coating</b> D. Medved, M. Ivor, T. Chmielewski, D. Golański, K. Pietrzak, D. Kottfer and J. Dusza	430
<b>Microstructure Characteristics, Tribology and Nano-Hardness of HVOF Sprayed NiCrRe Coating</b> M. Ivor, D. Medved, T. Chmielewski, K. Tobota, K. Pietrzak, M. Chmielewski, M. Halama, D. Kottfer and J. Dusza	435
<b>Anodizing of Pure Magnesium in Sodium Hydroxide Electrolyte Solution</b> M. Páleníček, M. Papula, M. Remešová, D. Jech, I. Ročňáková and L. Čelko	440