

# Table of Contents

## Preface and Committees

## Chapter 1: Advanced Materials

|                                                                                                                                                                                                                                                                             |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Thermal Stability and Crystallization Kinetics of Ti<sub>40</sub>Zr<sub>10</sub>Cu<sub>34</sub>Pd<sub>14</sub>Sn<sub>2</sub> Bulk Metallic Glass</b><br>M. Calin, M. Stoica, N. Zheng, X.R. Wang, S. Scudino, A. Gebert and J. Eckert                                    | 3   |
| <b>Establishing the Glass Forming Ability of Ferromagnetic Bulk Amorphous Alloys Using a Mathematical Model Based on the Chemical Composition</b><br>D. Buzdugan, C. Codrean, M. Vodă and V.A. Șerban                                                                       | 11  |
| <b>Simulation of Thermal Field in Fe<sub>73</sub>Cr<sub>2</sub>Ga<sub>4</sub>P<sub>13</sub>Si<sub>5</sub>C<sub>3</sub> Bulk Metallic Glasses</b><br>B. Radu, D. Buzdugan, C. Codrean and V.A. Șerban                                                                        | 15  |
| <b>About Thermostability of Fe-Ni-P Amorphous Alloys</b><br>A. Raduta, M. Nicoară and C. Locovei                                                                                                                                                                            | 21  |
| <b>Synthesis of the Nanocrystalline/Nanosized NiFe<sub>2</sub>O<sub>4</sub> Powder by Ceramic Method and Mechanical Milling</b><br>V.F. Tara, I. Chicinaș, T.F. Marinca, B.V. Neamțu, F. Popa and C.V. Prica                                                                | 27  |
| <b>Effect of Sintering Parameters on the Stability of Phases of the ZnFe<sub>2</sub>O<sub>4</sub>/α-Fe Nanocomposite</b><br>V.F. Tara, I. Chicinaș, T.F. Marinca, B.V. Neamțu and F. Popa                                                                                   | 31  |
| <b>A Study on Trace Elements Concentration in Bone Particles by XRF Analysis</b><br>F. Miculescu, L.T. Ciocan, M. Miculescu, A. Ernuteanu, I. Antoniac, E. Matei and I. Pencea                                                                                              | 37  |
| <b>Thermal Stability of Ni<sub>40</sub>Ti<sub>40</sub>Nb<sub>20</sub> and Ni<sub>32</sub>Ti<sub>48</sub>Nb<sub>20</sub> Tapes Obtained by Rapid Solidification Technique</b><br>G. Thalmaier, I. Vida-Simiti, N. Jumate, V.A. Șerban, C. Codrean, M. Nicoară and L. Bukkosi | 41  |
| <b>Structural Observation of Twinning Deformation Mechanism in a Ti-Ta-Nb Alloy</b><br>V.D. Cojocaru, D. Raducanu, T. Gloriant, E. Bertrand and I. Cîncă                                                                                                                    | 46  |
| <b>Structural Analysis of PM Biocomposites Based on Hydroxyapatite Nanopowders Elaborated by Spark Plasma Sintering Route</b><br>B.A. Olei, O. Gîngu, N. Lupu and G. Sima                                                                                                   | 52  |
| <b>Thermomechanical Processing of a Biocompatible Ti-Ta-Nb Alloy</b><br>D. Raducanu, V.D. Cojocaru, I. Cîncă and I. Dan                                                                                                                                                     | 59  |
| <b>Experimental Tests on Fine Nitinol Wires Used in Medical Applications</b><br>M. Amarandei, L. Bogdan, A. Cernescu, L. Marșavina, J.M. Pătrașcu and D. Vermeșan                                                                                                           | 65  |
| <b>The Characterization of Ketoprofen-Hydroxypropyl-β-Cyclodextrin Complex with Modified Drugs Release Properties</b><br>M.C. Stamate, C. Gafitanu, C. Stamate and E. Gafitanu                                                                                              | 70  |
| <b>Comparative Study of the Biomechanics of Materials Used in Stenting</b><br>A. Enkelhardt, C.S. Nes and N. Faur                                                                                                                                                           | 76  |
| <b>3D Finite Element Analysis of Restorative Materials Used in Dental Abfractions</b><br>C. Mărcăuțeanu, F. Topală, M.L. Negrutiu, E.T. Stoica and C. Sinescu                                                                                                               | 82  |
| <b>Investigation of an Advanced Material for the Infiltration of White Spot Lesions in Orthodontics</b><br>A. Ogodescu, C. Sinescu, M.L. Negrutiu, R. Naghib, F. Topală, D. Dodenciu and E. Ogodescu                                                                        | 87  |
| <b>Heat Treatments Influence on Corrosion Resistance of some New Dental Cobalt Alloys</b><br>A. Ghiban, B. Ghiban, C.M. Borțun, N. Ghiban and I. Antoniac                                                                                                                   | 93  |
| <b>Corrosion Behavior in Ringer Solution of Ti-Mo Alloys Used for Orthopedic Biomedical Applications</b><br>A.M. Magheru, B. Ghiban, N. Ghiban and I. Antoniac                                                                                                              | 98  |
| <b>Characterization of Electron Beam Irradiated Polyvinylpyrrolidone-Dextran (PVP/DEX) Blends</b><br>M. Dumitrașcu, M.G. Albu, M. Virgolici, C. Vancea and V. Meltzer                                                                                                       | 102 |
| <b>Metallurgical Characterization of some Magnesium Alloys for Medical Applications</b><br>I. Antoniac, M. Miculescu and M. Dinu                                                                                                                                            | 109 |

|                                                                                                                                                           |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Failure Analysis of some Retrieved Orthopedic Implants Based on Materials Characterization</b>                                                         |     |
| M. Bane, F. Miculescu, A.I. Blajan, M. Dinu and I. Antoniac                                                                                               | 114 |
| <b>Analysis of Deformation Characteristics of Cortical Bone Tissue</b>                                                                                    |     |
| S.M. Li, E. Demirci and V.V. Silberschmidt                                                                                                                | 118 |
| <b>Computerized Image Processing for Evaluation of Microstructure in Metallic Matrix Composites</b>                                                       |     |
| M. Nicoară, A. Răduță and C. Locovei                                                                                                                      | 124 |
| <b>Theoretical and Practical Aspects Regarding Al-SiC Particles Composites Obtaining by Casting</b>                                                       |     |
| G. Neagu, F. Ștefănescu, A. Mihai, I. Stan and I. Odagiu                                                                                                  | 134 |
| <b>Quality Control of Composite Material Pipes by Infrared Thermography</b>                                                                               |     |
| A. Mihai, F. Ștefănescu, G. Neagu and C.P. Mihai                                                                                                          | 140 |
| <b>Thermo-Mechanical Modelling of Jointing Process by Friction Stir Welding of Aluminium-Based Composite Materials</b>                                    |     |
| M. Pop-Calimanu and T. Fleer                                                                                                                              | 144 |
| <b>Drilling-Induced Damage in CFRP Laminates: Experimental and Numerical Analysis</b>                                                                     |     |
| V.A. Phadnis, F. Makhdum, A. Roy and V.V. Silberschmidt                                                                                                   | 150 |
| <b>Experimental Investigation and Numerical Modeling Fracture Processes under Mode II in Concrete Composites Containing Fly-Ash Additive at early Age</b> |     |
| G.L. Golewski and T. Sadowski                                                                                                                             | 158 |
| <b>Numerical Modelling of Thermally Bonded Nonwovens: Continuous and Discontinuous Approaches</b>                                                         |     |
| E. Demirci, X.N. Hou, M. Acar, B. Pourdeyhimi and V.V. Silberschmidt                                                                                      | 164 |
| <b>Ultrasonically Assisted Drilling of Carbon Fibre Reinforced Plastics</b>                                                                               |     |
| F. Makhdum, D.N.P. Norddin, A. Roy and V.V. Silberschmidt                                                                                                 | 170 |
| <b>Thermoactivated Pinning - A Novel Joining Technique for Thermoplastic Composites</b>                                                                   |     |
| W. Hufenbach, R. Kupfer and A. Hornig                                                                                                                     | 176 |

## Chapter 2: Materials Characterization

|                                                                                                                                                 |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Considerations on Outliers in Medical Sciences and Materials Characterization</b>                                                            |     |
| L.R. Cucuruz, M. Nicoară, A. Răduță, C. Locovei, M. Cucuruz and F. Tatu                                                                         | 185 |
| <b>Estimation of the Constitutive Law by Dual Small Punch Test and Instrumented Indentation</b>                                                 |     |
| G. Guillemot, A. van Gorp, T. Coorevits and A. Iost                                                                                             | 193 |
| <b>Topography Imaging of Material Surfaces Using Atomic Force Microscope</b>                                                                    |     |
| C. Florea, K. Berdich and M. Dreucean                                                                                                           | 199 |
| <b>Size Effect on Fracture Toughness of Rigid Polyurethane Foams</b>                                                                            |     |
| E. Linul, L. Marșavina, T. Sadowski and M. Kneć                                                                                                 | 205 |
| <b>Viscoelastic Properties of Semi-Crystalline Thermoplastic Polymers: Dynamic Analysis and Creep</b>                                           |     |
| D.A. Serban, H. Hanson, L. Marșavina and V.V. Silberschmidt                                                                                     | 211 |
| <b>Indentation in F.C.C. Single Crystals</b>                                                                                                    |     |
| A. Zahedi, M. Demiral, A. Roy, V.I. Babitsky and V.V. Silberschmidt                                                                             | 219 |
| <b>Experimental Study of Bimaterial Shear Strength and Strain Concentrations by Iosipescu Based Test Using Digital Image Correlation System</b> |     |
| T. Sadowski and M. Kneć                                                                                                                         | 226 |
| <b>Modeling and Prediction of Mechanical Behavior of Plastic Gears in Simulated Wear Situation</b>                                              |     |
| D. Koffi, K.A. Kassegne, K.F. Wotodzo and K. Bedja                                                                                              | 232 |
| <b>Test Vehicle for Studying Thermal Conductivity of Die Attach Adhesives for High Temperature Electronics</b>                                  |     |
| C. Slater, F. Vecchio, T. Maeder and P. Ryser                                                                                                   | 238 |
| <b>Effects of Thermal Losses on the Heating of a Multifunctional LTCC Module for Atomic Clock Packaging</b>                                     |     |
| F. Vecchio, T. Maeder, C. Slater and P. Ryser                                                                                                   | 244 |

|                                                                                                                                                                        |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Finite-Element Analysis of Forces in Drilling of Ti-Alloys at Elevated Temperature</b><br>R. Muhammad, N. Ahmed, Y.M. Shariff and V.V. Silberschmidt                | 250 |
| <b>Durability Study of a Machine Shaft Based on the Material Behavior of 41Cr4 Steel Subjected to Rotating Bending</b><br>L. Kun, C.S. Nes, I. Dumitru and N. Faur     | 256 |
| <b>Stress Evaluation by Neutron and Synchrotron Radiation</b><br>A. Lodini and A. Benmarouane                                                                          | 262 |
| <b>Morphology and Dielectric Properties of some LDPE/PA Blends in Presence of Compatibilizers</b><br>S.T. Aradoaei, R.N. Darie, C. Vasile, M. Mosneagu and M.A. Olariu | 268 |

### **Chapter 3: Engineering Materials**

|                                                                                                                                                                                                                      |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Turning of Advanced Alloys with Vibrating Cutting Tool</b><br>R. Muhammad, N. Ahmed, A. Roy and V.V. Silberschmidt                                                                                                | 277 |
| <b>Study on Continuous Casting of Steel by Sizes</b><br>E. Ardelean, M. Ardelean, F. Drăgoi and E. Popa                                                                                                              | 285 |
| <b>Research on the Use of Synthetic Slags to Steel Elaborated in Duplex System EBT-LF</b><br>A. Putan, T. Hepuț, V. Putan and L. Vilceanu                                                                            | 293 |
| <b>Research on Welded Thin NiTi Wires and Orthodontic Bands</b><br>C. Szuhaneck and T. Fleer                                                                                                                         | 300 |
| <b>The Influence of the Mechanical Vibrations upon 1.7035 – 41Cr4 Steel during Hardening Process</b><br>M.A. Luca, T. Machedon Pisu and F.C. Gadea                                                                   | 306 |
| <b>Controlled Temperature Distribution and Heat Transfer Process in the Unidirectional Solidification of Aluminium Alloys</b><br>F. Ștefănescu, G. Neagu, A. Mihai and I. Stan                                       | 314 |
| <b>Structure Characteristics of Ce-Inoculated, Low Sulphur Grey Cast Irons</b><br>I. Anton and I. Riposan                                                                                                            | 318 |
| <b>Chill (Carbide) Control in Low Sulphur Electric Melt Grey Cast Irons</b><br>C.B. Albu and I. Riposan                                                                                                              | 324 |
| <b>Analysis of Machinability of Ti- and Ni-Based Alloys</b><br>A. Maurotto, A. Roy, V.I. Babitsky and V.V. Silberschmidt                                                                                             | 330 |
| <b>Increase the Ingots Quality Cast in Vacuum</b><br>V. Mincu, M. Negru and N. Constantin                                                                                                                            | 339 |
| <b>Complex Characterization of a New Low Ni Maraging Steel with Enhance Service Stability</b><br>M. Branzei, I. Nedelcu and M. Miculescu                                                                             | 346 |
| <b>Researches on the Influence of Chemical Composition Regarding the Physical-Mechanical Characteristics of Steel for the Manufacture of Monobloc Wheels</b><br>C. Andronache, A. Socalici, L. Vilceanu and T. Hepuț | 352 |

### **Chapter 4: Modern Processing Techniques**

|                                                                                                                                                                                                                   |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Physical Properties of Magnetorheological Fluid Dampers</b><br>M. Liță and D. Buzdugan                                                                                                                         | 361 |
| <b>Researches Regarding Elaboration of Barium Hexaferrite from Microwave Heating</b><br>I. Ștefan, S.V. Savu, O. Ghermec, C. Nicolicescu and M. Trotea                                                            | 369 |
| <b>Empirical Determination of the Diffusion Coefficient of Carbon in Austenite in Carburizing Phase of the Gas-Carburizing-Sintering Process</b><br>M. Trotea, M. Mangra, J. Ghercioiu and I. Ștefan              | 376 |
| <b>Research of the Milling Time Influence on Ag-Cu Powder Particles Size Processed by Mechanical Alloying Route</b><br>O. Gîngu, C. Nicolicescu and G. Sima                                                       | 382 |
| <b>Studies and Researches on the Obtaining of Sintered Gradual Porous Structures by Irregular Nickel Powders Sedimentation</b><br>V. Moldovan, I. Vida-Simiti, N. Jumate, G. Thalmaier, N. Sechel and V. Petrescu | 388 |

|                                                                                                                                      |     |
|--------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Researches Regarding the Properties of Sintered Electrical Contacts Obtained From Mechanically Alloyed W-Cu Powders</b>           |     |
| C. Predescu, C. Nicolicescu and M. Gavrilă                                                                                           | 395 |
| <b>Influence of the Energy Density on the Porosity of Polyamide Parts in SLS Process</b>                                             |     |
| M. Toth-Tașcău, A. Raduta, D.I. Stoia and C. Locovei                                                                                 | 400 |
| <b>Scanning Strategies for Aluminium and Plastic Parts</b>                                                                           |     |
| C. Cioană, A. Tulcan, I. Grozav and C. Cosma                                                                                         | 406 |
| <b>Co-Cr Material Selection in Prosthetic Restoration: Laser Sintering Technology</b>                                                |     |
| L. Reclaru, L. Ardelean, L.C. Rusu and C. Sinescu                                                                                    | 412 |
| <b>Wear Resistance of Internal WC-CoCr Coatings Produced by High Velocity Oxy-Fuel Spraying</b>                                      |     |
| I.F. Secosan, I.D. Uțu, V.A. Șerban and W. Brandl                                                                                    | 416 |
| <b>Comparison of Structure and Wear Properties of Fine-Structured WC-CoCr Coatings Deposited by HVOF and HVOF Spraying Processes</b> |     |
| I. Hulka, V.A. Șerban, K. Niemi, P. Vuoristo and J. Wolf                                                                             | 422 |
| <b>Research about Wearing Resistance of Metal Coating Layers</b>                                                                     |     |
| A. Olăh and M.H. Tîrcean                                                                                                             | 428 |