

Table of Contents

Committees

Laudatio

Preface

On some Conceptual Considerations for the Finite Element Simulation of the Oxygen Out-Diffusion in Ag-MgO Composites

A. Öchsner 1

Numerical Prediction of the Effective Thermal Conductivity of Perforated Hollow Sphere Structures

S.M. Hossein Hosseini, M. Merkel, C. Augustin and A. Öchsner 6

Lattice-Based Walks and the Monte Carlo Method for Addressing Mass, Thermal and Elasticity Problems

I.V. Belova, G.E. Murch, T. Fiedler and A. Öchsner 13

Carbon Diffusion in Cementite: A Molecular Dynamics Study

E.V. Levchenko, A.V. Evteev, I.V. Belova and G.E. Murch 24

Diffusion of Interstitial Elements in Ti Alloys Used as Biomaterials

C.R. Grandini, L.H. de Almeida, R.A. Nogueira and T.C. Niemeyer 30

Diffusion of Nitrogen in Ti-13V-11Cr-3Al Alloys

C.R. Grandini, E.H. Kamimura, J.R.S. Martins, H.R.Z. Sandim and O. Florêncio 38

Reduction Kinetics of Iron Ore Materials by Gases

A.N. Dmitriev and Y.A. Chesnokov 45

Specific Features of Jahn-Teller Structure Phase Transitions in Nanocrystalline Materials

A.Y. Fishman, M.A. Ivanov, S.A. Petrova, N. Tkachev, V.B. Vykhodets and R.G. Zakharov 53

Experimental Studies of Kiwi and Pear Fruit in Ice-Temperature Storage

B. Liu, S. Jiang, Y.L. Guo and R. Bennacer 59

The Influence of Deep Cryogenic Treatment on Precipitation Phenomena during Tempering and Ageing

I. Wierszyłowski and W. Niemczyk 65

Stability of Neutral Silicon Interstitials in 3C- and 4H-SiC: A First-Principles Study

T. Liao and G. Roma 74

Elastic Behavior of the Ti-13Nb-13Zr Alloy Obtained by Anelastic Spectroscopy

O. Florêncio, P.S. Silva, R. Ribeiro, J.A. Muñoz Chaves, F.H. Sá, F.X. Melo and S.G. Schneider 84

Nanostructured Materials Prepared by Mechanical Alloying and Mechanochemical Process

A. Shokuhfar and B. Nasiri-Tabrizi 90

Effect of Polymeric Milling Media on the Mechanochemical Synthesis and Structural Properties of Nanocrystalline Hydroxyapatite

A. Shokuhfar, B. Nasiri-Tabrizi, O. Gashti and R. Ebrahimi-Kahrizsangi 98

Stick-Slip Behaviour of Bonded Planes - Phase Transitions in Dislocation Fields

W. Eib 106

Investigation and Comparison between Wear Properties of Powder Metallurgy (P/M) and Powder Forge (P/F) Product

S. Abdi and H. Khorsand 111

Steam Oxidation Behaviour of Ni-Based Alloys

H. Fujikawa 117

Boundary Line of Microcrystallites in Amorphous and Crystalline Structures of Metallic Glasses

K. Habib and A. Al-Arbeed 123

Diffusion in Very Dilute Zr-Fe Alloys

R.A. Pérez 128

Evaluation of the Diffusion Coefficient of N in γ' Iron Nitride: Influence of the Nitriding Potential

M. Keddad, B. Bouarour, R. Kouba and R. Chegroune 133

Defects and Diffusion in a Prototype of Shape Memory Alloys: β_2' Au-Cd Alloys

D. Gupta and D.S. Lieberman 139

Short Order and Hydrogen Transport in Amorphous Palladium Materials E.A. Pastukhov, N.I. Sidorov, V.A. Polukhin and V.P. Chentsov	149
Silver Self-Diffusion in Al₂O₃/QE22 Magnesium Alloy Matrix Composite I. Stloukal and J. Čermák	155
Potassium Self-Diffusion in Potassium Bismuth/Rare Earth Molybdate Crystals V. Trnovcová, M. Palcut, I. Furár and D. Schultze	161
Effects of Copper Powder Insert Layer on the Properties of Friction Welded Joints Between AlCu and AISI 4140 Structural Steel E. Bouarroudj, W. Bouzidi, O. Menchi and S. Abdi	166
An Analytical Study on the Spherical Spindle of an Ultra Precision Machine for Use in Nano Machining Technology M. Vahdati and A. Shokuhfar	171
The Influence of External Load and Air Pressure on Air Slide Table Performance of Ultra Precision Machines in Nano Machining M. Vahdati, A. Shokuhfar and M. Bagheri	177
Experimental and Numerical Analysis of the Nickel Deposition and Diffusion Using Plasma in a Confined Anode-Cathode Configuration R.P. Cardoso, A.M. Maliska and C.R. Maliska	183
Surface Composition and Diffusion in Catalysts Probed by PFG NMR Techniques D. Weber, M.D. Mantle, A.J. Sederman and L.F. Gladden	190
High Temperature Oxidation of Liquid Cu-Ti Alloy at 1473K Y. Sazaki, H. Tomita and M. Hino	194
Diffusion Process of ⁸Li for Radioactive Beam Production M. Re, L. Celona, F. Chines, G. Cuttone, D. Garufi, G. Messina, D. Rifuggiato and D. Rizzo	200
Air Oxidation Kinetics Study of Zr₅₈Nb₃Cu₁₆Ni₁₃Al₁₀ Bulk Metallic Glass D.Y. Huang, X.J. Zhao, T. Zhang and V. Ji	209
Evaluation of Concentration Dependent Diffusivities of Manganese in the Diffusion Joint Fe/FeMn-Steel by Means of Mathematical-Analytical Methods P. Kubiček, J. Drápala and P. Wostrý	214
Experimental Investigation of Conditions of Water Diffusion before Cooking within Production Line of Red Beans M. Sharifpur and S. Rostamirad	220
Hydrogen Diffusion Coefficient during Hydrogen Permeation through Nb-Based Hydrogen Permeable Membranes H. Yukawa, G.X. Zhang, N. Watanabe, M. Morinaga, T. Nambu and Y. Matsumoto	225
Dynamics of Hydrogen in the Hexagonal (C14) Laves Phase Compounds TiCr_{1.8-x}Mn_x G. Mazzolai	231
The Diffusion of Gallium into Copper-Tin Alloy Particles A.B. Shubin, K.Y. Shunyaev and L.F. Yamshchikov	238
Numerical Simulation of a Ceramic Furnace Burner - Capacity of Turbulent and Radiation Models A. Soudi, W. Kriaa, H. Mhiri, G. Le Palec and P. Bournot	243
Synthesis and Characterization of Ag Doped Hydroxylapatite as an Antibacterial Scaffolds Material A. Bahadir, C. Ergun and M. Baydogan	250
Three-Dimensional Study of Unsteady Flow in Fractured Horizontal Wells N. Mimouni and S. Chikh	256
Axial Fission Gas Transport in Nuclear Fuel Rods M.T. del Barrio and L.E. Herranz	262
Synthesis of B₄C/SiC Composite from Sugar Based Precursor S. Cihangir, C. Ergun, S. Yilmaz and F.Ç. Şahin	268
Diffusion and Transformation of Eutectic Carbides in High-Speed Steels during Heat Treatment A.S. Chaus and M. Beznák	273
Diffusion and Structural Changes in High-Speed Steels Alloyed with Boron A.S. Chaus	279
Analysis of Phase Transformation of Austenitic 316L Implant Steel during Compression M. Grądzka-Dahlke and J. Waliszewski	285

Modification of Sintered 316L Stainless Steel by Addition of Calcium Pyrophosphate M. Grądzka-Dahlke	291
Numerical Three-Dimensional Double Diffusion Poiseuille-Rayleigh-Benard Flows in Rectangular Channels O. Rahli, K. Bouhadeh, R. Bennacer and D.E. Ameziani	297
Simulation of a Liquid Droplet Impinging on a Horizontal Solid Substrate Using Lattice Boltzmann Moment Model Y.L. Guo, R. Bennacer, S.Q. Shen and W.Z. Li	303
Exhaust Thermal Energy Use and Optimization in Remote Areas A. Benzaoui and N. El Gharbi	309
Evaluation of Environmentally Friendly Zr Based Nano Structured Conversion Coating for HRS (Hot Rolled Steel) in Powder Coating B. Tepe and B. Gunay	316
Early Stage of Solid State Interfacial Reaction between Copper and Tin M. Maeda, N. Inoue, T. Sato and Y. Takahashi	323
A Numerical Study of Decoupled Bubble Dynamics in Nucleate Boiling M. Sajid and R. Bennacer	329
Applied Conditions for a Diffusion Electrochemical Method for Surface Streamlines Visualisation A. Nouredine	335
Study of Macrosegregation Defects Formation Caused by Double Diffusive Convective Flow during Solidification of a Binary Alloy F. Mechighel, M. Kadja, M. El Ganaoui and B. Pateyron	340
Experimental and Numeric Study of Flow Around a Parallelepiped Obstacle Issued from a Bent Chimney I. Bhouri Baouab, N. Mahjoub Said, H. Mhiri, G. Le Palec and P. Bournot	346
Numerical Model for Multilayer Thin Films Irradiated by a Moving Laser Source N. Bianco, O. Manca and D. Ricci	352
Transient Heat Conduction in Solids Irradiated by a Moving Heat Source N. Bianco, O. Manca, S. Nardini and S. Tamburino	358
Lattice Boltzmann Simulations for Thermal Conductivity Estimation in Heterogeneous Materials M.R. Arab, B. Pateyron, M. El Ganaoui and N. Calvé	364
Hydrogen Trap on the Microstructure of Cr-Mo Type Steels L.F. Lemus, J.H. Rodrigues, D.S. Santos and L.H. Almeida	370
Problem of the Variability of Substitute Thermo-Physical Properties for Heat Transfer Modelling in Iso- and Iso-Exo Porous Materials Z. Ignaszak and P. Popielarski	376
Heat Transfer during Hot Distortion Test of Ceramic Porous Material Bonded by Various Resins Z. Ignaszak and P. Popielarski	382
Macroscopic and Microscopic Effects in Diffusion and Reaction in Catalyst Porous Particles A. Martins, C.H. Braga and T.M. Mata	388
Numerical Analysis for the Behavior of Multiple Markers in Multiple Phase Diffusion Couples T. Shimozaki, T. Okino and C.G. Lee	394
Treatment of Surface Properties of Titanium with Plasma (Ion) Nitriding H. Yilmazer, S. Yilmaz and M.E. Acma	401
Synthesis and Characterization of Single Crystals $Y_3Fe_5O_{12}$ and $Bi_3Fe_5O_{12}$ Prepared via Sol Gel Technique N. Yahya, K. Koziol and M.K. Bin Mansor	406
Characterisation by EBSD of Cold Rolled High-Silicon Steel P. Rodriguez-Calvillo, J. Schneider and Y. Houbaert	413
Microstructure and Phase Identification of Tertiary Oxide Scale on Steel by EBSD L. Suarez, P. Rodriguez-Calvillo, R. Colás and Y. Houbaert	419
Fundamental Studies on the Transient Stages of Scale Growth in Fe-22 wt.% Cr Alloys L.M. Fernandez Diaz, J. Zhu, G.R. Holcomb, P.D. Jablonski, D.E. Alman and S. Sridhar	425
Influence of Fast Path Diffusion on the Oxidation of Mn Strengthened IF Steels Z.T. Zhang, S. Balaji, I.R. Sohn, B.E. Ydstie and S. Sridhar	432

Microstructural Evolution and Resulting Mechanical Properties of Weld Joints upon Flux Cored Arc Welding and Post-Weld Heat Treatment H. Yu, K.S. Shin, J.L. Dong, D.H. Yoo, W. Lee, H.D. Im, W. Kil and W.J. Jung	439
Electron Microscopic Characterization of the Microstructural Evolution of 9-12% Cr Steels upon Aging J.L. Dong, Q.B. Huynh, D.H. Yoo, H. Yu, M.S. Kim, S.T. Kang and K.S. Shin	447
Defect Analyses of Deformed Zr-Cu-Ni-Al Bulk Metallic Glasses J.H. Yoo, D.H. Yoo, J.H. Seo, J.L. Dong, Y.S. Na, K.S. Cho, J.H. Lee, U. Shaislamov, J.M. Yang, C.G. Lee and K.S. Shin	453
Influence of Strain Rate and Strain on the Surface Properties in Superplastically Boronized Duplex Stainless Steel (DSS) N.H. Abd Aziz, I. Jauhari, H.A.M. Yusof and N.W. Ahamad	458
Selective Oxidation of Low Alloyed Ferritic Steels M.L. Giorgi, A. Ollivier, J.B. Guillot and F. Goodwin	464
Influence of Diffusion in the Underlying Metal during Oxidation of Iron Containing Small Amounts of Copper and Nickel B.A. Webler and S. Sridhar	471
Numerical Study of Melting/Solidification by a Hybrid Method Coupling a Lattice Boltzmann and a Finite Volumes Approaches S. Addakiri, E. Semma, M. El Ganaoui and B. Pateyron	477
The influence of the Synthesis Conditions of NiCuZn Ferrites on their Microscopic Homogeneity D. Sakellari, V. Tsakaloudi, V.T. Zaspalis and E.K. Polychroniadis	483
Diffusion Transport in Electrochemical Systems: A New Approach to Determining of the Membrane Potential at Steady State R. Filipek, K. Szyszkiewicz, B. Bożek, M. Danielewski and A. Lewenstam	487
The Influence of Milling Time and Impact Force on the Mutual Diffusion of Al and Cu during Synthesis of Al-4.5wt%Cu Alloy via Mechanical Alloying A. Mostaed, E. Mostaed, A. Shokuhfar, H. Saghafian and H.R. Rezaie	494
Effect of SiC Particles Volume Fraction on the Mutual Diffusion of Al and Cu during Fabrication of Al-4.5wt%Cu/SiC via Mechanical Alloying E. Mostaed, A. Mostaed, H. Saghafian, A. Shokuhfar and H.R. Rezaie	499
An Indirect Approach for Correlation of Permeability and Diffusion Coefficients K.K. Al-Tarawneh, O. Buzzi, K. Krabbenhoft, A.V. Lyamin and S.W. Sloan	504
Thermo-Mechanical Coupled Problems at Finite Strains M. Vaz, P.A. Muñoz-Rojas, M.R. Lange and J. Stahlschmidt	515
Transmission Conditions for Thin Reactive Heat-Conducting Interphases: General Case G. Mishuris, W. Miszuris and A. Öchsner	521
Numerical Modelling of Mass Transfer Problems in Combined Domains with Non-Linear Imperfect Transmission Conditions M. Wrobel and G. Mishuris	527
Structural Relaxation Process in CuHfTi Amorphous Alloys K. Yamada, N. Shinagawa, M. Sogame, I.A. Figueroa, H.A. Davies and I. Todd	533
Kinetics of the Calcium Oxysulfides Reduction by Carbon Monoxide R.I. Gulyaeva, E.N. Selivanov and A.N. Mansurova	539
Some Basic Results and Techniques of Studying Anomalous Diffusion and Segregation in Metals: Relevance to New Nanofabrication Applications Y.S. Nechaev and A. Öchsner	545

Special Session: Heat and Mass Transfer in Porous Media Organised by: Prof. Dr. J.M.P.Q. Delgado

Concentration Distribution in the Wake of a Plane Surface Buried in a Porous Media in Alignment with the Flow Direction J.M.P.Q. Delgado and M. Vázquez da Silva	553
Cold-Set Whey Protein Isolate Gels Prepared with Mg²⁺: Denaturing Conditions and Phase Diagram M. Vázquez da Silva and J.M.P.Q. Delgado	559

Water Sorption Isotherms and Textural Properties of Biodegradable Starch-Based Superabsorbent Polymers	
J.M.P.Q. Delgado, M. Vázquez da Silva, R.O. Nasser, M.P. Gonçalves and C.T. Andrade	565
The Effect of Mg^{2+} and Tara Gum Concentrations on the Rheological Properties of WPI Solutions	
M. Vázquez da Silva and J.M.P.Q. Delgado	571
Current-Voltage Measurements on Indium Phosphide Schottky Diodes	
C.A.C. Sequeira and D.M.F. Santos	577
Gas Diffusion and Re-Diffusion in Polyethylene Foams	
J. Escudero, J. Lázaro, E. Solórzano, M.A. Rodríguez-Pérez and J.A. de Saja	583
Heat and Mass Transport in the Unsaturated Porous Media: Application to the Soil Dry Drainage Method	
M. Adala, R. Bennacer, H. Sammouda and A. Guizani	589
A Porous Medium Materiel Used In Solar Energy Conversion	
A. Benzaoui and N. El Gharbi	594
Experimental Investigation of Pressure Drop in One Phase Flow, Particle-Liquid Two-Phase Flow, and Porous Media Consisting of the Same Particle Size	
H.Ş. Aybar, M. Sharifpur and R. Vaziri	599
Extraction of Antioxidant Compounds from Grape Stalk Dried at Different Conditions	
J.V. García-Pérez, J.A. Cárcel, J. Benedito, M. Blasco and A. Mulet	604
Grape Seeds Dehydration under Forced Convection Conditions	
G. Clemente, N. Sanjuán, J. Bon, R. Peña and J.V. García-Pérez	610
Analysis of the Flow at the Interface of a Porous Media	
T.C. Hayashi, I. Malico and J.F.C. Pereira	616
Anodic Polarisation Characterisation of Absorbed Hydrogen in Modified $Mm(B_5)_x$ Alloys	
D.M.F. Santos, Y. Chen and C.A.C. Sequeira	622

Special Session: Thermodynamics, Kinetics and Structure of Interfaces and Associated Phenomena Organised by: Prof. Dr. B. Bokstein and Prof. Dr. V.V. Popov

Structure and Properties of Grain Boundaries in Submicrocrystalline W Obtained by Severe Plastic Deformation	
V.V. Popov, R. Valiev, E.N. Popova, A.V. Sergeev, A.V. Stolbovsky and V.U. Kazihanov	629
Desorption Kinetics of Hydrogen in Mg_2NiH_4 Hydride and in Hydrogeneated Eutectic $(Mg/Mg_2Ni)H_x$	
J. Cermak and L. Král	639
Ti Redistribution in Multifilamentary Nb/Cu-Sn Composites	
E.N. Popova, V.V. Popov, E.P. Romanov, S.V. Sudareva, E.A. Dergunova, A.E. Vorobyova, A.K. Shikov and S.M. Balaev	649
The Effect of Mo Crystallinity on Diffusion through the Si-on-Mo Interface in EUV Multilayer Systems	
S. Bruijn, R.W.E. van de Kruijs, A.E. Yakshin and F. Bijkerk	657
Hydrogen Absorption in Ion Beam Sputtered Titanium Thin Films	
E. Tal-Gutelmacher, R. Gemma, A. Pundt and R. Kirchheim	662
Grain Boundary Diffusion and Segregation of Co and Cr in Zr-Based Alloys	
C. Corvalán Moya, M.J. Iribarren, N. Di Lalla and F. Dymont	669
Measurement of Fracture Toughness in AISI 1018 Borided Steels by Vickers Indentation	
I. Campos-Silva, N. López-Perrusquia, M. Ortiz-Domínguez, U. Figueroa-López and E. Hernández-Sánchez	675
Determination of Boron Diffusion Coefficients in Borided Tool Steels	
I. Campos-Silva, M. Ortiz-Domínguez, N. López-Perrusquia, R. Escobar Galindo, O.A. Gómez-Vargas and E. Hernández-Sánchez	681
Diffusion Parameters of Carbide-Forming Elements in Fe-M-C Systems	
V.V. Popov	687
Investigation of Harrison Type-A, B and Intermediate AB Kinetics Regimes in Grain Boundary Diffusion	
I.V. Belova and G.E. Murch	697

