

Table of Contents

Preface and Committees

The Beauty of the Different Views on Diffusion

J. Kärger 1

Fabrication and Properties of Sn-3.5Ag-XCu Solder by Ball Milling and Paste Mixing

A. Nadia and A.S.M.A. Haseeb 12

Mass Transport Mechanism in the Retina of the Human Eye

H. Dória Silva, L.C. Pereira Dória, C. Pereira Dória, C. Pereira Dória, M.d.C.T. Dória Silva, H. Dória Silva Júnior and M.T. Dória Silva 18

Evaluation of Commercial Adsorbents for Removal of Biuret in Urea Solution for Automotive Applications

G.V. Estrela, W.C. Souza, G.V. Azevedo, H.L. Corrêa and M.A.G. Figueiredo 24

Evaluation of the Use of Solids Waste Generated in the Activities of Exploration as Adsorbents for Treatment of Oil Derivatives

W.C. Souza, J.P.M. Miguens, H.L. Corrêa and M.A.G. Figueiredo 29

Electrochemical Behavior and Thickness of Aluminium Oxide Films Studied by EIS: Laboratory and Field Studies

K. Habib, K. Al-Muhanna, F. Al-Sabti and A. Al-Arbeed 35

Back Diffusion during Zone Melting of Metallurgical Silicon

P.R. Mei, S.P. Moreira, A.D.S. Côrtes, D.S. Silva and F.C. Marques 43

Numerical Simulation of Rising Damp Phenomenon

A.S. Guimarães, J.M.P.Q. Delgado and V.P. de Freitas 48

Characterization of a Hygro-Regulated Wall Base Ventilation System for Treatment of Rising Damp

A.S. Guimarães, J.M.P.Q. Delgado and V.P. de Freitas 54

Influence of Thermal Treatment on the Heat Transfer of 10GN2MFA Steel

D. Seidl, P. Košťál, P. Jonšta, Z. Jančíková and I. Ružiak 60

Exploitation of Artificial Intelligence Methods for Prediction of Atmospheric Corrosion

D. Seidl, Z. Jančíková, P. Košťál, I. Ružiak, I. Kopal and K. Kreislova 65

The Influence of Carbon Fillers on Thermal Transport in Polyurethane

P. Košťál, Z. Jančíková, V. Stýskala, M. Kubliha, R. Madaj, I. Ružiak, J. Dedičová, R. Hrehuš and P. Jonšta 69

Slow Crystallization of Al-Sc Alloys: Growth of Spherical Intermetallic Particles

A.B. Shubin, E.A. Popova, K.Y. Shunyaev and E.A. Pastukhov 75

Novel Arrangement of Rough Tubes for Heat Flux Improvement

F. Farahbod, S. Farahmand and F. Farahbod 81

Estimation of Li-Ion Diffusion Coefficients in C₆₀ Coated Si Thin Film Anodes Using Electrochemical Techniques

A. Andreas Arie and J.K. Lee 87

Synthesis and Characterization of the Gold-SiO₂ Core-Shell Nanoparticle on the X-Nanozeolite Used for Immobilization of the Alkaline Protease Enzyme

N. Farhadyar and M.S. Sadjadi 93

The Kinetic Monte Carlo Simulations of the Self-Diffusivity in Zeolites

A. Tarasenko and L. Jastrabik 99

Comparison of Elastic Constant for *Borassus flabellifer* in the Longitudinal and Perpendicular Direction of Fibres with Frequency

S. Phadke, B. Shrivastava, A. Mishra and N. Dagaonkar 105

The Principles of Processing Siderite Ores with a High Magnesium Oxide Content

S. Klochkovskii and A. Smirnov 111

Closed Form Solutions to Nonlinear Heat Conduction Problems

J. Zabadał, R. Garcia, V. Ribeiro and F. Van Der Laan 115

Three-Dimensional Diffusion in Arbitrary Domain Using Generalized Coordinates for the Boundary Condition of the First Kind: Application in Drying

V.S.O. Farias, W. Pereira Silva, C.M.D.P. Silva e Silva and A.G.B. de Lima 120

Thermodynamics of Defect Formation and Hydration of Y₂O₃

L.P. Putilov, V.I. Tsidilkovski, A.N. Varaksin and A.Y. Fishman 126

Prediction of Effective Heat Storage Coefficient of Multi-Phase Materials R.S. Beniwal, M. Dabas and R. Singh	132
Effect of TiC Particles Volume Fraction on the Mutual Diffusion of Al and Mg during Fabrication of Al-4.5wt%Mg/TiC via Mechanical Alloying Process O. Ozhdelnia and A. Shokuhfar	141
Phase Transformation and Thermoelectric Properties of $\text{In}_{0.25}\text{Co}_{4-x}\text{Ni}_x\text{Sb}_{12}$ Skutterudites I.H. Kim	147
Improvement of Surface Quality and Parts Functional Ability by Vibro-Mechanical Consolidation Treatment and Finishing M.A. Djema, K. Hamouda, A.P. Babichev, D. Saidi, T. Sayah and M.N. Benallal	153
Applying Computational Analysis in Studies of Resin Transfer Moulding F. Ferreira Luz, S.C. Amico, A. de Lima Cunha, E.S. Barbosa and A.G.B. de Lima	158
Mass Transfer of God Particle or Higgs Boson R.L. Corral Bustamante, A.R. Rodríguez-Corral, G. Irigoyen-Chávez and A. Heiras-Torres	164
Study of Diffusion and Water Vapor Permeability in Chitosan Films and Chitosan Emulsified Films A.B. dos Reis, C.M. Pedroso Yoshida, V.S. de Oliveira Farias and W. Pereira Silva	170
The Meshfree Finite Element Method for Fluids with Large Deformations M. Darbani	176
Two-Phase Flow (Oil-Water) in Petroleum Reservoir with Irregular Geometry Including Water Injection: Effect of Porosity on the Oil Recovery Factor F.A. Batista, B. Gonçalves Coutinho, S.R. de Farias Neto and A.G.B. de Lima	181
Failure Analysis of an Automotive Component (Cardan Yoke) by Scanning Electron Microscopy A.A. Couto, A.H.P. Andrade, D.A.P. Reis and J. Vatauvuk	187
Effect of Artificial Aging on the Mechanical Properties of an Aerospace Aluminum Alloy 2024 D.A.P. Reis, A.A. Couto, N.I. Domingues Jr., A.C. Hirschmann, S. Zepka and C. de Moura Neto	193
Mass Transfer in Irregularly-Shaped Solid: An Exact Solution Using the Galerkin-Based Integral Method I.B. dos Santos, L.P. de Lucena Silva and A.G.B. de Lima	199
Study and Interpretation of the Mass Transfer Phenomena through Textile Structures in the Wet State M.J. Gerales, C. Monteiro and L. Hes	205
Relations between Diffusion Paths and Interdiffusion Coefficients in the Ternary System Fe-Co-Ni J. Priimets and Ü. Ugaste	209
Phases in Austenitic Cast Steel M. Garbiak and B. Piekarski	215
Numerical Modeling of Two Phase Flow under Centrifugation J. Kačur, B. Malengier and P. Kišon	221
Thermal Properties of CuGa_2 Phase in Inert Atmosphere T.V. Kulikova, V.A. Bykov, K.Y. Shunyaev and A.B. Shubin	227
Temperature Dependence of Elastic Properties of Aluminum Foam Structures S.M. Hossein Hosseini, A. Kharaghani, C. Kirsch and A. Öchsner	233
Synthesis of ZnS/SiO_2 Core-Shell by Sol-Gel Process and Covering then with Gold Nanoparticle and Study of its Photoluminescence Properties M.S. Sadjadi, N. Farhadyar and K. Zare	238
Silicon Carbide Solid-Phase Epitaxy on a Microporous Substratum G.I. Zmievskaia, A.L. Bondareva, V.V. Savchenko and T.V. Levchenko	243
The Thermal Diffusivity of Mg-Al-Sr and Mg-Al-Ca-Sr Sand Casting Magnesium Alloys A. Kielbus, T. Rzychoń and G. Moskal	249
The Corrosion Resistance of the Mg-Al-Ca-Sr Sand Casting Magnesium Alloys A. Kielbus, T. Rzychoń, J. Michalska and M. Stopyra	255
Determination of Pressure-Saturation-Permeability Relations by Centrifugation J. Kačur and H. Budáčová	261

Heat and Mass Transfer and Volume Variations during Drying of Industrial Ceramic Bricks: An Experimental Investigation J. Barbosa da Silva, G.S. Almeida, G.A. Neves, W.C.P. Barbosa de Lima, S.R. de Farias Neto and A.G.B. de Lima	267
Hot Corrosion Resistance Properties of Al-Si Coatings Obtained by Slurry Method A. Kochmańska	273
Spatial Variation of Longitudinal Dispersion in LECA-Based Vegetated Beds A. Albuquerque	279
Characterisation of C-B-N Diffusion Layers Developed on High-Speed Steel Substrate A.S. Chaus, L. Čaplovič, Y.A. Chaus and J. Sojka	285
Structure and Properties of Gas Nitrided Layers on Nanoflex Stainless Steel P. Kochmański and J. Baranowska	291
The Influence of Chemical Composition of Stainless Steel on the Formation of Low Temperature Nitrided Layer J. Baranowska, P. Kochmański and J. Bielawski	297
Recrystallization Microstructure after Annealing inside Magnetic Field C.M.B. Bacaltchuk, G.A. Castello-Branco, J.N. Müller, L.P.M. Brandão and H. Garmestani	303
A Comparison of Thermal Dispersion Behaviour in High-Conductivity Porous Media of Various Pore Geometries C.T. DeGroot and A.G. Straatman	307
Contaminant Transport in Partially Saturated Porous Media E. Trojáková and J. Babušíková	313
Experimental Analysis of the Infrared Thermography for the Thermal Characterization of a Building Envelope G. Ferreira, A. Aranda, M.D. Mainar-Toledo and D. Zambrana	318
Surface Quality Control of Materials Being Cut by Laser with Respect to Corrosion Resistance J. Valíček, M. Harničárová, R. Čep, K. Rokosz, C. Łukianowicz, D. Kozak, M. Zelenák and P. Košťál	324
Emission Distribution and Regulation of Local Heat Source J. Valíček, J. Müllerová, V. Kuběna, P. Košťál, M. Harničárová and M. Mikulík	330
Microstructure and Mechanical Properties Evaluations of Heat Treated Dissimilar Metal Joint Weldment between API 5CT C90 and ASTM A182 F22 M. Awang, M.H. Othman, K.Z. Ku Shaari and M.N. Wichi	335
Enhancement of Heat Transfer over Spatial Stationary and Moving Sinusoidal Wavy Wall: A Numerical Analysis P. Kumar, F. Topin and L. Tadrist	341
Effect of Austenitising Temperature on Structural Changes in Modified High-Speed Steel of AISI M2 Type A.S. Chaus, M. Beznák, M. Boháčik, J. Porubský and P. Úradník	348
Investigations on Tensile Properties of Waste Fillers Reinforced Composites M.S. Bodur, T. Gülmez and A. Durademir	354
Mass Transfer of Organic Substances in Supercritical Carbon Dioxide M. Hu, R. Benning, Ö. Ertunc, A. Delgado, V. Nercissian and A. Berger	360
Energy-Flow Methodology for Thermodynamic Analysis of Manufacturing Processes: A Case Study of Welding Processes D. Zambrana, A. Aranda, G. Ferreira and F. Barrio	366
CuO Nanoparticles: A Mild and Efficient Reusable Catalyst for the One-Pot Synthesis of 4-amino-5-pyrimidinecarbonitriles under Aqueous Conditions S.J. Ahmadi, S. Sadjadi and M. Hosseinpour	372
Effect of Salt Bath Composition on the Chromium Diffusion on Plain Carbon Steels by TRD Process A. Ghadi, M. Soltanieh and H.R. Karimi Zarchi	377
Effect of Structure on the Electrochemical Oxidation Rate of Copper and Nickel Sulfides O.V. Nechvoglod, E.N. Selivanov and S.V. Mamyachenkov	383
The Increased Flow of a Railway Line by Repositioning of a Minimum Number of Axes Halts H. Siguerdjidjene, I.V. Turbine and D. Saidi	388

Characterization of Pt-Doped WO₃ Nanoparticles Synthesized by Flame Spray Pyrolysis T. Samerjai, N. Tamaekong and S. Phanichphant	394
Assessment of Heat Affected Zone of Submerged Arc Welding Process through Digital Image Processing A. Ghosh, S. Chattopadhyaya and N.K. Singh	400
Prediction of Weld Bead Parameters, Transient Temperature Distribution & HAZ Width of Submerged Arc Welded Structural Steel Plates A. Ghosh, S. Chattopadhyaya and N.K. Singh	405
Dispersion in Metal Foam: A Pore Scale Numerical Study J.M. Hugo and F. Topin	410
CFD Simulation of Coaxial Jet Mixer Using RANS Turbulent Models K.Z. Ku Shaari, A.M. Laziz, K. Heinen, M. Awang, S. Sufian and M. Shuhaimi	416
Rheology Assessment of PSf/ NMP Solution and its Influence on Membrane Structure P. Anadão, R.R. Montes, H.S. de Santis and H. Wiebeck	422
Experimental Evaluation and Simulation of Al/Si Diffusion in Hot Dipped Fe-Si Steels I.I. Danzo, B. Malengier, S. Miyar, E. Gomez, K. Verbeken, Y. Houbaert, R. Van Keer and I. de Graeve	428
Solid Skin Characterization of PMMA/MAM Foams Fabricated by Gas Dissolution Foaming over a Range of Pressures J. Pinto, S. Pardo, E. Solórzano, M.A. Rodríguez-Pérez, M. Dumon and J.A. de Saja	434
Heat Transfer Enhancement Using Cu-Water Nanofluid in an Enclosure with Moving Cold Sidewalls G.A. Sheikhzadeh, M. Tavakoli and H. Alizadeh	440
Phase Field Simulation of the Collapse of the Rafted Structure in Ni-Based Superalloys T. Tanimoto, Y. Tsukada, Y. Murata and T. Koyama	446
Measurement of the Molecular Mass Dependence of the Mass Diffusion Coefficient in Protein Aqueous Solutions J.F. Torres, A. Komiya, J. Okajima and S. Maruyama	452
Diffusivity of Hydrogen in ZnO Single Crystal J. Čížek, F. Lukáč, M. Vlček, I. Procházka, F. Traeger, D. Rogalla and H.W. Becker	459
Metal-Ceramic Composite Foams and their Fire Resistance J. Grabian	465
Crystallisation of Silicon on Reinforcement Fibres as a Consequence of Overheating of Matrix Metal during Saturation in MMC K. Gawdzińska, D. Nagolska and J. Grabian	471
Microstructure and Thermal Analysis of Mg-Al-Ca-Sr Alloys T. Rzychoń	477
Effect of Thermal Contact Resistance on Alumina Molten Particle Impacting onto a Metal Substrate S. Oukach, B. Pateyron, H. Hamdi and M. El Ganaoui	482
An Attempt to Apply Darcy's Flow Law in MMC Recycling Process Analysis D. Nagolska and K. Gawdzińska	488
Characteristics and Wear Performance of Nitrided Ti6Al4V F. Seahjani and H. Çimenoglu	494
Fluoride Influence on the Properties of Oxide Layer Produced by Plasma Electrolytic Oxidation B. Kazanski, A. Kossenko, A. Lugovskoy and M. Zinigrad	498
Modifying the Sorption Capacity of Biopolymers by the Mechanochemical Activation S. Lugovskoy, M. Zinigrad and M. Eliazade	504
Creep Behavior of the Inconel 718 Superalloy T. Sugahara, K. Martinolli, D.A.P. Reis, C. de Moura Neto, A.A. Couto, F.P. Neto and M.J.R. Barboza	509
Modeling Analyze from Titanium Alloy N.M. Guimarães, D.A.P. Reis, C. de Moura Neto, G.C. Coelho and A.A. Couto	515
Determination of Creep Parameters of Ti-6Al-4V with Bimodal and Equiaxed Microstructure L.A.N.S. Briguente, A.A. Couto, N.M. Guimarães, D.A.P. Reis, C. de Moura Neto and M.J.R. Barboza	520

Evaluation of Inconel 718 Creep Behavior K. Martinolli, T. Sugahara, D.A.P. Reis, C. de Moura Neto, A.C. Hirschmann and A.A. Couto	525
The Analysis of Heat Transfer and Thermal Stresses in Thermal Barrier Coatings under Exploitation T. Sadowski and P. Golewski	530
Lattice Boltzmann Analysis of the Heat Transfer in Cubical Enclosures D.E. Ameziani, R. Benacer, M. Belmedani and A. Boutraa	536
Numerical Simulation of Diffusive Processes in Heated Cylinder Using the Finite Volume and Finite Difference Methods M.D. de Campos, E.C. Romão and L.F. Mendes de Moura	542
Influence of Casting Conditions and Alloy Additions on the Zn₂₂Al₂Cu Structure R. Michalik, A. Tomaszewska and H. Woźnica	547
Structure and Corrosion Resistance of Cast ZnAl₄₀Cu₂ Alloy R. Michalik and H. Woźnica	555
Heat-Mass Transfer and Related Microstructures in TiAl-Based Alloys Directionally Solidifying in the Earth Gravity and Microgravity A.V. Kartavykh, V.P. Ginkin, S. Ganina, S. Rex, U. Hecht and D. Voss	561
Measurement of the Transverse Diffusion Coefficient of Charge in Liquid Xenon W.T. Chen, H. Carduner, J.P. Cussonneau, J. Donnard, S. Duval, A.F. Mohamad-Hadi, J. Lamblin, O. Lemaire, P. Le Ray, E. Morteau, T. Oger, L. Scotto-Lavina, J.S. Stutzmann and D. Thers	567
Study of Phase Transformation in Alloys of the Al-Fe System M. Jabłońska, M. Mikuśkiewicz, A. Śmigiewicz and E. Bernstock-Kopaczyńska	573
Evaluation of the System Free Energy in FG-HAZ of Mod.9Cr-1Mo Steel for Nuclear Power Plants M. Iwata, Y. Sugiyama, Y. Murata and S. Takaya	578
Effect of Manganese on Titanium Thin Films Adhesion Deposited on Steel Substrates R. Gheriani and R. Mechiakh	583
Thermal Expansion of Alloys from the Al-Fe System A. Śmigiewicz and M. Jabłońska	587
Development of Nonlinear Analytical Models for the Study of Heat/Mass Transfer Properties in the Drying of Porous Type Fabric R.W.L. Ip and E.I.C. Wan	593
Comparison of Two Models for Simulation of Binary Alloy Solidification S. Ganina, V.P. Ginkin, O. Budenkova, B. Saadi, L. Hachani and Y. Fautrelle	599
Application of Simplified Inverse Solution to Estimate the Thermo-Physical Parameters of Granular Porous Materials Bonded by Different Resins Z. Ignaszak and P. Popielarski	605
Problem of Acceptability of Internal Porosity in Semi-Finished Cast Product as New Trend "Tolerance of Damage" Present in Modern Design Office Z. Ignaszak, P. Popielarski, J. Hajkowski and J.B. Prunier	612
The Effect of Hydrogen on Pitting Corrosion of Superaustenitic and Austenitic-Ferritic Stainless Steels J. Michalska	620
Flow Controllability of Hydrogen Diffusion Driven by Local Stress Field for Steel under Cyclic Loading Condition T. Ohmi, A.T. Yokobori Jr. and K. Takei	626
Analysis of Stress Induced Voiding Using by Finite Element Analysis Coupled with Finite Difference Analysis H. Shigeyama, A.T. Yokobori Jr., T. Ohmi and T. Nemoto	632
Exergetic Analyses of a Particular Absorption Cooling System N. Bouaziz, D. Lounissi, L. Kairouani and M. El Ganaoui	641
Effect of Synthesis Duration on the Physicochemical Properties of Siliceous Mesoporous Molecular Sieve (Si-MMS) A. Ramli, S. Ahmed and S. Yusup	647
Effect of Frequency on Hydrocarbon (HC) Detection Using 3D Finite Integral Modeling H. Daud, M. Niaz Akhtar, N. Yahya, N. Nasir and H. Soleimani	654
Drying Kinetics of External Thermal Insulation Composite Systems (ETICS) E. Barreira, J.M.P.Q. Delgado, N.M.M. Ramos and V.P. de Freitas	662

The Effect of Shading Devices in Rising Damp Phenomenon of Historical Buildings J.M.P.Q. Delgado, A.S. Guimarães and V.P. de Freitas	668
Structure, Thermal Stability and Properties of Grain Boundaries of Submicrocrystalline Mo Obtained by Severe Plastic Deformation V.V. Popov, G.P. Grabovetskaya, A.V. Sergeev and I.P. Mishin	674
Quantum Dots Based Optical Sensors A. Lobnik, Š. Korent Urek and M. Turel	682
Characterising the Differences between the Adsorption and Desorption Processes in a Desiccant Layer by Detailed Numerical Modelling C.R. Ruivo, J.J. Costa and A.R. Figueiredo	690
Diffusion of Oxygen and Nitrogen in the Ti-15Mo Alloy Used for Biomedical Applications J.R.S. Martins, R.A. Nogueira, R.O. de Araújo and C.R. Grandini	696
Oxygen Diffusion in Ti-20Mo Alloys, Used as Biomaterial, Measured by Mechanical Spectroscopy R.A. Nogueira and C.R. Grandini	702
Diffusion of Interstitial Solutes in Nb-46wt% Ti Alloys Measured by Mechanical Spectroscopy C.R. Grandini, O. Florêncio and W.J.B. Filho	708
Isotopic Exchange of Gaseous Oxygen with Mechanoactivated Manganese Oxides A.Y. Fishman, T.E. Kurennykh, V.B. Vykhodets and V.B. Vykhodets	713
Study of the Anelastic Behavior of PZT and PLZT Ferroelectric Ceramics O. Florêncio, P.S. Silva, J.A. Eiras, D. Garcia and E.R. Botero	719
Numerical Simulation of 2D Flow through a Packed Bed of Square Cylinders P.J.S.A. Ferreira de Sousa, I. Malico and G. Fernandes	725
Hydrogen Mobility in the Non-Martensitically Transforming Shape Memory Alloy Ni₅₂Ti₄₈ G. Mazzolai	731