

Table of Contents

Preface

Chapter 1: Materials Properties in Solids

Impact of Hot Isostatic Pressing of Raw CMSX-4 on Interdiffusion and Kirkendall Porosity in Ni/CMSX-4 Diffusion Couple

A. Riyahi Khorasgani, B. Camin and J. Kundin

3

Competition between Formation and Decomposition of Solid Solution during High Pressure Torsion: A Review

B. Straumal, A. Kilmametov, A. Straumal and B. Baretzky

15

Chapter 2: Materials Properties in Liquids

Simplifying the Methodology to Estimate the Separation Time of a Particle at 1-g under Unsteady Conditions

F.E. Carvajal-Larenas

29

Jump Behavior of Individual Atoms in Liquid Pb Using Molecular Dynamics Simulation

K. Kawashima, M. Shiinoki, Y. Kobayashi and S. Suzuki

39

Linking Rheology to Morphology in Lava Flows: A Theoretical Framework for Power-Law and Prefractal Scaling

A.F. Miguel, V.d.R. Pepe and L.A.O. Rocha

53

Design Automation and Optimization of Micro Cross-Junctions for Droplet Generation Using CFD and Machine Learning Approaches

F. Azzini, B. Pulvirenti, C. Naldi, G. Martino and G.L. Morini

67

Technology Roadmap: Trends in the Use of Bio-Oil in Catalytic Refining Processes

I. Oliveira Tavares, C. Assumpção Henriques, M.A. Gaya de Figueiredo, H. Lourenço Corrêa and J.M. Moreira Ferreira

77

Thermohydraulic Analysis of a Flat-Plane Solar Collector with Fractal Patterns and Allometric Scaling Using CFD

R. Rodríguez-Rivera, I. Carvajal-Mariscal, H. Terres-Peña, S. Chávez-Sánchez, A. Lizardi-Ramos and J.R. Morales-Gómez

97

Chapter 3: Materials Properties at the Nanoscale

Investigation of the Dielectric Properties of Cu Based Microwave Absorbers

K. Farid, F. Otmane and M. Azzaz

113

Generation of Nano Phase in Al-Sr Eutectic Alloy

J.R. Li, Y.M. Zheng, T.Y. Zhang, P.L. Ying, W.T. Shen and H. Hu

123

Characterization of Ti-40Ta Alloy Synthesized by Laser Deposition with Potential Use as Biomaterial

R. Emilio, C.J.R. Lustosa, A. Almeida and O. Florêncio

133

Evaluation of the Photoprotective Effect of Titanium Oxide Nanotubes on Spheroids of hFOB 1.19 Cells

M. Vargas Lopez, J.L. Castrejón Flores, A.J. Nevarez Ramirez, N. Perez Hernandez, M.F. Ballesteros Escamilla and I.P. Torres Avila

143

Enhancing Oil Recovery Efficiency with Manganese Dioxide Nanofluids: Exploring the Role of Electrochemical Potentials and Electromagnetic Fields

H. Soleimani, S. Sikiru, H. Soleimani, L. Khodapanah, A. Rostami, M. Yeganeh Ghotbi and M. Sabet

153

Advanced Nanotechnology for Enhanced Oil Recovery: Optimizing Nanomaterial Performance for Sustainable and Efficient Extraction

M. Sabet and H. Soleimani

165

Chapter 4: Experimental Methods for the Heat Transfer Analysis

Effect of the Fin Density on the Thermal Performance of a Finned-Tube Heat Exchanger Loaded with a Paraffinic PCM	
G.A. D'Errico, G. Martino, C. Naldi, M. Dongellini, F. Azzini, C. Biserni and G.L. Morini	179
Performance Analysis of R1233zd and DMAC Binary Solution in a Diffusion Absorption Refrigeration System	
B. Gurevich and A. Zohar	189
Heat Loss Analysis in Rotary Kiln Torrefaction of Biomass Fuel Using Briquetted Fuel as Thermal Energy Source	
W. Intagun, N. Thuchayapong and N. Tharawadee	199
Influence of Distinctive Firing Temperatures on Composite Mechanics of Rice Husk Ash and Stream Sediments	
K. Trakoolngam and S. Promkottra	211

Chapter 5: Numerical Modelling of the Heat Transfer

Use of Inverse Methods for Simultaneous Identification of Thermal Conductivity and Transfer Coefficients	
A. Maamar, M. Bouanini, E. Rossi di Schio, P. Valdiserri and C. Biserni	225
Development of a Three-Dimensional Mathematical Model for the Analysis of the Non-Uniform Distribution of Hydrogen-Containing Gases in a Blast Furnace	
A.N. Dmitriev, Y.E. Burova, M.M. Tsymbalist and G.Y. Vitkina	235
Numerical Simulation Applied to Monitoring Temperature Distribution during the Dual Laser Beam Welding of Duplex Stainless Steel	
E. Babalová, M. Behúlová, B. Šimeková and L. Kopčanová	245
Numerical and Experimental Investigation of Heat Transfer in Perforated Rectangular Fins	
I. Bennia, K. Hamidi and S. Haddou	255
Numerical Analysis of Innovative Systems for Thermal Management of Li-Ion Batteries Using Phase Change Materials	
F. Azzini, G. Martino, C. Naldi and B. Pulvirenti	267
Application of Analytical and Numerical Tools to Describe the Drying of Umbu Seeds (<i>Spondias tuberosa</i>)	
J.D. Lima Silva, A. Freire da Silva Júnior, V. Bordin Viera, M.T. Lucena Pereira, A.R. Nascimento Lima, B. da Silva Dantas, L. Matos de Souto, C.M. Rufino Franco and J. Stefanini Pereira de Ataíde	279