

Table of Contents

Preface

Chapter 1: Tools and Technologies of Materials Processing

A Practical Analysis of Wire Drawing Operation Effects on the Die and Product Behaviors W.I. Imad Adnan, M.A. Nasser and H.A. Hussein	3
The Role of Ceramic Materials in Surface Modification of Cutting Tools - A Review Paper W. Asaad, S.J. Kareem and H. Al-Ethari	17
Fabrication and Evaluation of Mechanical and Tribological Properties of Al-Foam Produced by Powder Metallurgy Route A.A. Mohammed and H.A. Hussein	33

Chapter 2: Metallic Materials for Biomedical Applications

Optimization of Antibacterial properties of 316 Austenitic Stainless Steel A.M.H. Wais, A.R. Abid Ali, A.H. Jasim and H.S. Majdi	53
Study the Structure and Properties of TiO₂/HAp Coating onto Ti-6Al-4V Alloy Using Electrophoretic Deposition A.M.H. Wais, A.R. Abid Ali and H.S. Majdi	62

Chapter 3: Materials for Energy Transition

Defect and Thickness Optimization of Perovskite for High Efficiency Solar Cells M.J. Edam, S.M.A. Almohsin, H.M. Khadier, B.H. Auad and D. Tarek	75
Preparation of Electrospun Styrofoam Membranes for Hydrogen Fuel Cells N.M. Jalal, D. Zainab Abdali and S.M. Roaa	86
The Structural, Magnetic, and Electrochemical Properties of Composite PAni/Co_{0.2}Mn_{0.8}Fe₂O₄ S. Raad, M.M. Ismail and I.M. Ibrahim	96

Chapter 4: Green Concrete

Behavior of Reactive Powder Concrete Covering Quartz Powder Strengthened by Electrical Waste Copper Wire Fiber S.I. Hendi and N.M.F. Aljalawi	111
Effect of Sustainable Fibres on Properties of Structural Perlite Concrete Containing Local, Sustainable Materials A.J. Qassem and N.M.F. Aljalawi	127
Performance of Beams Incorporating Geopolymer and FRP Bars: A Review A.J. Kadhim and O.H. Zinkaah	139
Effect of Carbon Fibers on some Properties of Pervious Concrete Containing Brick Waste D.J. Kazem and N.M.F. Aljalawi	155
Exploring Sustainable Building Practices: Utilizing Olive Stone Waste and Crushed Glass in Concrete Mixtures M.A. Abdulkarem, D.A. Rasool and B.J. Nabhan	170
Effect of Crushed Brick on some Properties of Modified Reactive Powder Concrete R.H. Saeed and N.M.F. Aljalawi	181

Chapter 5: Sustainable Technologies in Architecture and Construction

Assessing Indoor Air Quality Indices and Airborne Contaminant Exposure in Isolation Rooms with Protected Zone Ventilation Systems: A Comprehensive Review E.S. Barrak, H.M. Hussain and L.J. Habeeb	191
Design and Development of Natural Lighting System in Modern Malaysian Building F.B. Ismail, M.F. Izzuan, A. Abdulwahab, H.A. Kazem and M.A.A. Rahmat	203
Employing Clean Energies in the Design of Contemporary Buildings, Review M.M. Alobaidi and L.M. Yahya	217

Chapter 6: Engineering Research and Design of Machines and Equipment

An Investigation of the Design Mechanical Performance of Belleville Spring N.A. Hayder Ali, M.A. Nasser and K.J. Jadee	229
A New Main Matrix to Find the Principal Stresses, Strains and the Max - Shear Stress, Strain by MATLAB Simulation A. Dhayea Assi	246
A Numerical Assessment of the Belleville Spring Strength Behaviour N.A. Hayder Ali, M.A. Nasser and K.J. Jadee	258
Enhancing Efficiency of Rural Cooking Stove: Numerical and Experimental Validation of Design and Development F.B. Ismail, K. Balan, A. Abdulwahab, H.A. Kazem, M.T. Chaichan and M.A.A. Rahmat	275
Effect of Split and Timing Injection Techniques on Diesel-Biodiesel Blends Fueled RCCI Engines N.K.F. Al-Abboodi, A.R. Al-Badri and A.A. Abdulsaeed	290
Malaysian Rainwater Harvesting System for In-House Power Generation F.B. Ismail, M.I. Fahmy, A.M. Abed, H.A. Kazem, M.T. Chaichan and M.A.A. Rahmat	302
Experimental Study and Performance Analysis of Thermoelectric Cooler Using Solar Photovoltaic Energy N.A.H. Ali Taher and A.A.F. Al-Hamadani	314

Chapter 7: Heat and Mass Transfer in Engineering Systems

A Review Study on Modifying Vortex Generators to Improve Thermal Performance in Single- and Two-Phase Flow in Circular Tubes F.S. Alnasur and R.S. AL-Turaihi	327
Numerical Study of the Effect of Rotation on Backward-Facing Step G.K. Rahi and D. Hamza	349
Thermal Stratification in Solar Water Storage Tanks through Inlet Port Diffuser Optimization during Charge and Discharge Processes E.S. Barrak, K.A. Hammodi and A. Mouthanna	363
Numerical Analysis of Thermally Developing and Fully Developed Flow in Different Configurations of Microchannels G. Kahdem and A. AL-Saadi	378
Enhancement of Vapor Compression Refrigeration System by Adding Different Nano-Fluids: A Review D.S. Qaid	396
Enhancement Thermal Transmission for Cross Flow Heat Exchanger by Using Triangular Fins Experimentally S.A. Mardan, Z.K. Kadhim and A.A. Alwan	410