

Table of Contents

Preface

Chapter 1: Fabrication and Processing of Porous Metals and Metallic Foams

Sandwich Manufacturing with Foam Core and Aluminum Face Sheets – A New Process without Rolling	
J. Hohlfeld, T. Hipke and F. Schuller	3
The Effect of Sintering Condition on Microstructural and Mechanical Properties of Porous Nickel	
A. Salehi, A. Moloodi, F. Barzegar and J. Mirabbasi	11
On the Role of both Vacuum System and Initial Size on Fabrication of Aluminum-LECA Composite Foam	
A. Moloodi and M.R. Moradi	17
Structural Transformation of Bilayer Ferro-Foams Caused by Magnetic Field	
H.Q. Dong, J. Liang, F.Y. Li, C.C. Zhang, S.B. Wang and Z.S. Lei	22
Investigation on Relationship between Spacer Content and Porosity of Steel Foams	
H.M. Wang, M.Z. Su and C. Chen	32
Fabrication, Structure and Property of Copper Foam	
C.Q. Guo, Y.D. Sun, Y. Zhou, B. Xie, T.Y. Wang and X.Q. Zuo	41
Fabrication, Properties and Applications of Porous Metals with Directional Pores	
H. Nakajima and T. Ide	49
Preparation and Sound Absorption Coefficient Test of Aluminum Foam with CaO Granules Infiltrating Agent	
y. zhang, Z.M. Chen, Z.J. Wang and J.H. Liu	55
Fabrication of Lead-Foam by Infiltration Casting	
X.L. Liang, H.J. Luo, X.T. Ma, Z.G. Zhang and J.R. Xu	61
Effects of Modification and Heat Treatment on Microstructure and Mechanical Property of Two-Step Foamed ZL111 Alloy Foam	
Y.Y. Jiang, X.X. Luo, Q. Chen, M.W. Zhao, J.S. Lu, Y. Zhou and X.Q. Zuo	68
Porous Titanium Fabricated by a Combination of Vacuum Distillation and Sintering Process	
X.T. Lu, H.J. Luo, W. Yin, L.L. Wu and Q.L. He	78
A Novel Method for Preparation of Aluminum Foam Sandwich Panels	
H. Lin, H.J. Luo, J.K. Zhang, Z.K. Cao and J. Xu	86
Influence of Material and Arrangement Mold on the Foaming Behavior of Extruded Precursor	
F. Wang and L.C. Wang	92
Fabrication and Compression Investigation of the Ordered Porous Aluminum with Cubic Pores	
H. Wang, Y. Fu, M.M. Su and H. Hao	97
Influence of Ambient Pressure on Cell Structure Evolution in Liquid Aluminum Foam	
Z.K. Cao, Y. Yu and M. Li	106
The Introduction of Thin Open-Cell Metal Foams and their Wider Engineering Applications	
Z. shi and J.A. Szpunar	112
Physical Simulation of Solid Liquid Mixture Stability in Molten Aluminum	
H.J. Luo, Y.L. Liu, L. Zhang, Y.H. Liu and C. Liu	123
The Processing and Structure of Steel Matrix Syntactic Foams Prepared by Infiltration Casting	
Q.Z. Yang, Y.P. Wei, Z.Q. Miao, P. Gao and B. Yu	129
Theoretical Analysis of Porosity in an Ordered Porous Copper Fabricated by Continuous Unidirectional Solidification	
R. Cao and Q.L. Jin	136

Effects of Heat Treatment on Compressive Behavior of Porous Aluminum Manufactured by SLM	
Y. Sugiyama, T. Miura and K. Kitazono	142
The Ordered Porous Aluminum: Modeling, Preparation, and Properties with Designed Structures	
H. Hao, H. Wang and K.Y. Li	148

Chapter 2: Properties of Porous Metals and Metallic Foams

Thermal Conductivity Measurements of Novel Porous Copper Fiber Sintered Sheet	
R.L. Liu, W. Zhou, W.S. Ling, S.L. Li and P. He	159
Evaluation of Local Strain Distribution during Compressive Deformation of Open-Cell Porous Metals	
K. Maruyama, X.Z. Yue and K. Kitazono	169
Microstructure and Compressive Properties of Al/Al₂O₃ Syntactic Foams	
M.M. Su, H. Wang, K.Y. Li and H. Hao	174
Observation of Gas Pores inside the Columnar Grains of a Lotus Type Porous Copper	
S.L. Li and Q.L. Jin	182
The Dynamic Response of Sandwich Structures with Cellular Metallic Core under Blast Loading	
Y.C. Guo and G.P. Zhao	188
The Compressive Properties of Open-Cell Zn-22Al Foams with Spheroidal Pore at Different Temperatures	
J.A. Liu, Q.X. Qu, Z.B. Zheng and T.Y. Zhang	196
Impact Toughness of Closed-Cell Aluminum Foam	
Y.L. Mu, D.D. Wang, Y.D. He and G.C. Yao	203
Quasi-Static Crushing of Aluminum Foam-Filled Thin-Walled Aluminum Tubes	
Y. Yu, Z.K. Cao, M. Li and H.J. Luo	209
Influence of Cell Morphology on the Compressive Deformation Behavior of Aluminum Foams	
M. Li, Z.K. Cao, Y. Yu, H.J. Luo, J.C. Shi, L.P. Zhou and G.C. Yao	215
Structural Loading of Cellular Metals: Damage Mechanisms and Standardization Concepts	
U. Krupp, T. Hipke and S. Nesic	220
Sulfidation Resistance of Porous FeCrAl Alloy	
P. Tan, A. Li, J.M. Chen, Z.F. Li and Y. Ge	226
Study on Mechanical Properties of Monel Porous Plate Used for Distributing Gas	
Y. Ge, P. Tan, Z.F. Li, J.Y. Wang, Q.B. Wang and B.J. Yang	234
Compressive Behavior and Deformation Characteristic of Al-Based Auxetic Lattice Structure Filled with Silicate Rubber	
Y.Y. Xue, X.F. Wang, X.F. Wang and F.S. Han	240
Quasi-Static and Impact Response of Graded Aluminium Matrix Syntactic Foams	
C. Liang and Y.Y. Zhao	246
Numerical Simulations and Experimental Studies on the Quasi-State Axial Compression Behavior of Steel-Based Porous Materials	
Y.P. Wei, Q.Z. Yang, P. Gao, Z.Q. Miao, J.C. Cheng, X. Sun and B. Yu	256
Formation Mechanism and Properties of Thickness-Controllable Tungsten Coating on Diamond Surface by Salt Bath Plating	
Y.H. Dong, R.Q. Zhang, L. Zhou, A.M. Chu, T.G. Luo, D.Z. Chen, Q.J. Chen, Z.G. Ye and B.L. Zhang	264

Chapter 3: Porous and Nanoporous Biomaterials

Mechanical Evaluation of Titanium Scaffolds for Orthopedic Implants	
A. Salehi, H. Amini Mashhadi, M.S. Abravi, F. Baezegar, S. Nokhasteh and M. Mahdavi	277
Magnesium-Based Foam Biomaterials and their Related Properties	
W.Z. Huang, H.J. Luo, L. Zhang, Y.L. Mu and X. Cui	282

Human Bone Inspired Design of an Mg Alloy-Based Foam V.M. Posada, C. Orozco, J.F. Ramirez Patino and P. Fernandez-Morales	291
Mechanical Response of Nano-Porous Copper under Different Temperature and Strain Rate through Molecular Dynamics Simulations S.Y. Wei, C.W. Yao, L. Wang and D.H. Yang	297
Biocompatibility of Titanium Implants with Porous Surface Fabricated by Micromachining H. Nakajima, Y. Higuchi, K. Takahashi and H. Komasa	304
Relationship between Elastic Module and Porous Structure of Cancellous Bone Y.H. Du, S.Y. He, M.K. Huo, P. Zhou, Q. Chen, N.R. Bao and L. Ba	309
Antimicrobial Effect of Lotus-Type Porous Copper H. Nakajima, K. Yasunaga, R. Yamagishi and S. Matsuda	314

Chapter 4: Energy Absorption and other Applications of Porous Metals and Metallic Foams

Energy Absorption Efficiency of Open-Cell Carbon Foams F. Asai, H. Fukazawa and K. Kitazono	323
Energy Absorbing Properties of the Cellular Structures with Different Wall Thickness, Produced by the Selective Laser Melting P.A. Kuznetsov, A. Deev, M. Staritcyn, A.Z. Zhukov and V.V. Bobyr	330
Impact Energy Absorbing System for Space Lander Using Hemispherical Open-Cell Porous Aluminum K. Kitazono, R. Tada, Y. Sugiyama and T. Miura	337
Metal-Foam Bipolar Plate for PEM Fuel Cells: Simulations and Preliminary Results Y. Awin and N. Dukhan	342
Numerical Simulation on the Compression Property in Different Face Sheet of Sandwich Panel Combined with Aluminum Foam Y.L. Wang, K.N. Tian, H. Xu and L.C. Wang	351
The Sound Absorption Properties Comparison of Metal Foams and Flexible Cellular Materials L.S. Liang, X.L. Wu, N.N. Ma, J.J. Du and M.B. Liu	357
Sound Absorption Properties of Stainless Steel Fiber Porous Materials before/after Corrosion Q.B. Ao, J.Z. Wang, J. Ma and Y. Ge	367
Experimental Study of Acoustic Performance of Porous Metals at High Temperatures J.Z. Zhang, X.P. Wang, B. Zhang and L.H. Zhang	373
Heat Transfer Performance of LCS Porous Copper with Different Structural Characteristics K.K. Diao, X.K. Lu, Z.N. Wu and Y.Y. Zhao	380