

# Table of Contents

## Preface, Organizers and Supporters

## Magnesium Alloys

<b>Influence of Homogenization Treatment on Electrochemical Behavior of the Mg-0.8wt%Ga-0.8wt%In Anode Materials</b>	
F. Yan, R.C. Wang and C.Q. Peng	1
<b>Study of Ca and Ce Additions on Different Ignition Resistance Behavior of Magnesium Alloy</b>	
J. Ding, W.M. Zhao, L. Qin and Y.Y. Li	7
<b>Process and Property of Superplastic Mould Forged AZ80 Wheel Hub</b>	
G.F. Quan and L.B. Ren	12
<b>Influence of Various Precipitate Phases on Tensile Properties of an Extruded Mg-Y-Nd Alloy</b>	
B. Song, R.L. Xin, G. Chen, K. Zeng, G.J. Huang and Q. Liu	17
<b>Microstructure, Texture and Mechanical Properties of Mg-2.0Zn-0.3Gd Alloy Sheets Fabricated by Large Strain Hot Rolling</b>	
J. Luo, H. Yan, R. Chen and E.H. Han	23
<b>Production of Primary Magnesium by the Aluminothermic Reduction of Magnesia Extracted from Dolomite Ore</b>	
P. Deng, Y.Q. Liu, W.G. Yao and H.W. Ma	28
<b>Effect of Nd and Dy Addition on AZ91D Ignition Temperature and Microhardness</b>	
J. Ding, L. Qin, Y.Y. Li and W.M. Zhao	34
<b>Influence of Various Heat Treatment on Corrosion Resistance of As-Extruded Mg-9Li-3Al-2.5Sr Alloys</b>	
Y.Q. Yu, X.D. Peng, H.Y. Yi and J.W. Liu	41
<b>Hot Deformation Behavior of As-Cast Mg-9Gd-2.5Y-Nd-0.5Zr Mg Alloy</b>	
Y.B. Yang, Z.M. Zhang, F.L. Ren and Q. Wang	45
<b>Purification of Magnesium by Vacuum Distillation and its Analysis</b>	
Y.C. Wang, Y. Tian, T. Qu, B. Yang, Y.N. Dai and Y.P. Sun	52
<b>Effect of Ce Addition on Microstructure and Mechanical Properties of ZM21 Magnesium Alloys</b>	
S.B. Fan, J. Peng, M. Zhou, K. Cui and Q. Li	58
<b>Impact of Peak Shock Stress on the Microstructure and Reloaded Mechanical Behavior of AZ31 Magnesium Alloy</b>	
M. Hao, C.W. Tan, X.D. Wang, W.W. He and B. Yang	64
<b>Microstructure and Mechanical Properties of As-Rolled Mg-Zn-Gd-Ca-Mn Sheets</b>	
S.S. Dongye, H. Yan, X.H. Du and R.S. Chen	68
<b>Microstructural Evolution of Friction Stir Treated WE43 Alloy</b>	
X.D. Wang, J.L. Li, Z. Lu, X.F. Zhang, Z.F. Ma and G. Sun	74
<b>Microstructure and Tensile Properties of As-Cast Mg-5Sn-4Cu Alloy</b>	
X.D. Wang, Z. Lu, Z.H. Feng, X.F. Zhang, Z.F. Ma and G. Sun	78
<b>Effect of Ce Addition on the Ignition-Proof Properties and Surface Tension of AZ91D-2.5Ca(Wt.%) Magnesium Alloy</b>	
L. Qin, J. Ding, Z. Fang and W.M. Zhao	82
<b>Effect of Re Addition on the Ignition Resistance of Pure Magnesium</b>	
J. Ding, Z. Fang, L. Qin and W.M. Zhao	88
<b>Deformation Behavior of ZK60 Magnesium Alloy at Elevated Temperature</b>	
C.Y. Wang, H.Q. Qi, K. Wu and M.Y. Zheng	93
<b>Grain Refinement and Mechanism of Carbon Inoculation in Mg-Al Magnesium Alloys</b>	
Z.H. Wang, X.L. Zhang, S.B. Li, K. Liu and W.B. Du	98
<b>Forming of Seat Bidet by AZ31 Magnesium Alloy through Stamping Process</b>	
L.F. Wang, H.C. Li, G.S. Huang, H. Zhang, S. Jiang, B. Liu and F.S. Pan	103

## **Effects of Different Sr Additions on As Cast Microstructure and Tensile Properties of AS31 Alloy**

J.X. Zhou, D.Q. Zhao, J.W. Wang, S.Q. Tang and W.H. Li 110

## **Review on Hydrostatic Extrusion of Magnesium Alloys**

R. Wang, X.R. Zhu, Z.W. Shao, Y.D. Xu, J. Wang, J.J. Nie and H. Zhang 115

## **Microstructures and Mechanical Properties of Mg-10Gd-3Y-2Zn-0.5Zr Alloy**

Y.D. Xu, J. Wang, Z.W. Shao, R. Wang and X.R. Zhu 122

## **Numerical and Experimental Investigation on Hot Backward Extrusion Process of Mg-Gd-Y-Zn-Zr Magnesium Alloy**

Z.W. Shao, X.R. Zhu, J. Wang, R. Wang, Y.D. Xu, B.R. Zhao and G.P. Ling 127

## **Advanced Titanium Alloys**

### **Effect of Cold Machining Process on the Property and Microstructure of Ti-5Mo-5V-8Cr-3Al Strip**

P.T. Ni, L.P. Zhou, B.L. Bai, M.C. Han and M.S. Zhu 134

### **Influences of Copper Complexes on the Properties of MAO Ceramic Coating on Titanium Alloy Surface**

Q. Yao, S.R. Yu and H.C. Chu 138

### **Calculation of Aluminum Equivalent Based on Thermo-Calc Software in Ti-Al-Nb Ternary System**

H.M. Yang, L.S. Luo, M.H. Song, H.Q. Qi, C.Y. Wang and C. Yang 144

### **Forming Parameter Design and Thickness Uniformity Control of Short Radius Elbow Made by Expanding Diameter and Pushing Bend**

J. Chen, Y.L. Yang, H.Y. Yang and T.X. Wang 150

### **Microstructure and Hardness of High Temperature Alloy Ti-1100 Melted in CaO Crucible**

B.G. Fu, H.W. Wang, C.M. Zou, P. Ma and Z.J. Wei 158

### **Composition-Dependent Collapse of $\beta$ {111} Planes Leading to $\omega$ Precipitation in Ti-Nb Alloys: A First-Principles Study**

W.C. Ou, H.C. Kou, C.S. Meng, B. Tang and J.S. Li 164

## **Advanced Aluminium Alloys**

### **Erosion Behavior of Al-12Si-2Mg-15Cu Alloy against 304 Stainless Steel Surface**

X.H. Zhang, S.R. Yu and J. Xu 171

### **Preparation and Evaluation of a Novel Al-5.4Si-0.5Mg Welding Wire**

H. Wang, C.S. He, D. Wang, X. Zhao and L. Zuo 176

### **Mechanical Spectra of an Al-12.7Si-0.7Mg Alloy under Extrusion and T6 States**

N. Yu, C.S. He, D. Wang, J.W. Ji and L. Zhang 182

### **Microstructures and Mechanical Properties of a Squeeze-Casted Al-Zn-Mg-Cu Alloy after Heat Treatment**

L. Lu, D.T. Zhang and Y.Y. Li 187

### **Morphologies and Formation Mechanism of Interconnected Pores in a Spray Formed 7XXX Aluminum Alloy**

Y.B. Yin, Y.A. Zhang, B.Q. Xiong, F. Wang, H.W. Liu, Z.H. Li and X.W. Li 193

### **Hot Deformation Behavior and Microstructure of 6069 Aluminum Alloy**

H.Z. Li, J. Jiang, M. Deng, X.P. Liang and J. Ouyang 201

### **Microstructural Evolution of High Purity Al-Cu-Mg Alloy during Homogenization**

H.Z. Li, Y.J. Ou, H.J. Liao, X.P. Liang and J. Jiang 208

### **Microstructure and Mechanical Properties of a 6061 Aluminum Alloy Part Prepared by Casting-Forging Integrated Forming Technology**

Y. Peng, S.C. Wang, H.T. Zhou, K. Zheng and H.X. Chen 215

### **Fracture Toughness and Fatigue Behavior of T7451 Al-Zn-Mg-Cu Alloy Thick Plate**

L.L. Wei, Q.L. Pan, Y.L. Wang and L. Feng 223

### **Investigation on an Al/WC Composite Coating of A356 Alloy Fabricated by Mechanical Alloying**

M. Zuo, D.G. Zhao, Z.Q. Wang, H.R. Geng, H.J. Zhang and L. Pu 231

### **Study on Anodic Oxidation of 2024 Aluminum Alloys in Sulfuric-Citric Acid**

X.F. Meng, G.Y. Wei, X.X. Zhao and H.L. Ge 236

<b>Microstructure and Cryogenic Mechanical Properties of AA5083 Joints Prepared by Friction Stir Welding</b>	243
B.K. Gu and D.T. Zhang	
<b>Microstructure and Mechanical Properties of Al-Li Alloy 2397-T87 Rolled Plate</b>	249
C.P. Fan, Z.Q. Zheng, M. Jia, J.F. Zhong and B. Cheng	
<b>Effect of Heat Treatment on Positron Annihilation Lifetime of an Extruded Al-12.7Si-0.7Mg Alloy</b>	258
Y.H. Zhang, D. Wang, C.S. He, X.Z. Cao and L. Zhang	
<b>Macro-Distribution of Alloy Elements along the Thickness of the Twin Roll Cast Billet</b>	262
Y.Z. Zhu, C.Q. Zhao, J.C. Li and B.L. Li	
 <b>Advanced Iron and Steel Materials</b>	
<b>TRIP Effect in a Hot-Rolled Low-Carbon High Strength Complex Phase Steel</b>	267
X.D. Tan, Z.Q. Liu, Y.B. Xu, X.L. Yang and D. Wu	
<b>Investigation on the Grain Growth of Fe-40Ni-Ti Austenitic Steel in Heating Process</b>	272
S.Q. Yuan, X.J. Zhang, Y.H. Yang and G.L. Liang	
<b>Effect of Quenching Microstructure on the Formation of Reversed Austenite in 9Ni Steel</b>	277
Y.H. Yang, X.J. Zhang, S.Q. Yuan and J. Li	
<b>Influence of Deoxidation Methods on Inclusions in Sub-Rapid Solidified Low Carbon Steel</b>	282
H.G. Li, F.F. Sun, D. Zhao, S.B. Zheng and Q.J. Zhai	
<b>Thermodynamics of CaO in Slag Reduced by Carbon during VD Process of Hollow Steel 95CrMo and its Effect on Inclusions</b>	289
C.J. Cai, S.B. Zheng, J. Chen, Z.Y. Ye, H.G. Li and J.M. Yang	
<b>Isothermal Bainite Transformation in Low Silicon TRIP Steel with Phosphorus Addition</b>	298
P. Chen, J.J. Yan, C.Y. Shen, Y.B. Xu and G.D. Wang	
<b>Effect of V Contents on Microstructure and Mechanical Properties in a Fe-Cr-Ni-Mo High-Strength Steel</b>	304
T. Wen, X.F. Hu, D.S. Yan and L.J. Rong	
<b>Effect of Solid Solution Treatment on the Microstructure and Properties of Fe-Mn-Al Light-Weight Steel</b>	311
F.Q. Yang, R.B. Song, L.F. Zhang and C. Zhao	
<b>Microstructures of Infiltrated Layer and Friction Properties of Low-Carbon Cr-Ni-Mo Bearing Steel during Duplex Surface Finishing Process</b>	317
C. Xu, M.S. Yang, A.Q. Ma and S.J. Zheng	
<b>Effect of Different Deformation on Microstructures and Properties in 304HC Austenitic Stainless Steel Wire</b>	323
R.B. Song, Y. Pei, Y.S. Jia, Z. Gao, Y. Xu and P. Deng	
<b>Effect of Spark Plasma Sintering on the Microstructure Evolution and Properties of M3:2 High-Speed Steel</b>	329
R. Zhou, X.G. Diao, J. Chen, X.N. Du, G.D. Yuan and G.F. Sun	
<b>Effects of Strain Rate on Dynamic Strain Aging of SA508-III Steel</b>	334
D. Yuan, L. Wang, Y. Liu, X. Song and J.H. Liu	
<b>Effects of Quenching and Partitioning Process on Mechanical Properties of a Hot-Stamping Steel</b>	340
M. Cheng, H.W. Song, X. Li, S.H. Zhang, M. Cheng and T. Lin	
<b>Research on Ultra-Fast Cooling Heat Transfer Coefficient Affecting Law for Hot Strip Mill</b>	346
L.Y. Jiang, G. Yuan, Z.L. Li, D. Wu and G.D. Wang	
<b>Continuous Annealing Process and Microstructure Property of 1200mpa High Strength Steel by Ultrafast Cooling</b>	351
S.C. Yu, R.B. Song, Q.F. Dai and Z. Gao	
<b>Effect of Strain Induced Martensite for 304M2 Austenitic Stainless Steel Wire</b>	357
Y.S. Jia, R.B. Song, Y. Pei, Y. Xu and J.X. Hu	
<b>Working Hardening Mechanism and Aging Treatment Behaviors of D631 Precipitation Hardening Stainless Steel Wire</b>	362
L. Chen, R.B. Song, F.Q. Yang and Y. Pei	
<b>Research on Deformation Permeability Changing Law during Snake Rolling Process</b>	367
X.J. Liu, L.Y. Jiang, G. Yuan and G.D. Wang	

<b>Effect of Austenizing Temperature and Time on Microstructure and Mechanical Properties of Cr12MoVNbRE Steel</b>	372
C.H. Jiang, D. Tang, A.M. Zhao, Y. Zhang and C. Zhang	
<b>Effects of Cooling Processes on Microstructure Evolution of X80 Pipeline Steel</b>	378
F.Q. Ji and G.D. Wang	
<b>Effects of Processing Parameters on the Evolution of Microstructure and Hole Expansion Property of F/B Dual Phase Steels</b>	384
X.J. Shen, X.J. Zhang, F.Q. Ji, J. Chen, S. Tang and G.D. Wang	
<b>Analysis of Abnormal Fracture Occurring during Full Scale Tension Increasing to Failure Test of High Strength Low Alloy Steel Casing</b>	390
Q. Lou, S.R. Yu, W. Du and H.C. Chu	
<b>Dynamic Recrystallization Behavior of N08028 Corrosion Resistant Alloy</b>	396
L. Wang and F. Liu	
<b>Microstructure and Mechanical Properties of Microalloyed Multiphase Steel</b>	406
Y. Zhou, X.M. Wang and X.L. He	

## Superalloy

<b>High Cycle Fatigue Behavior of a Wrought Nickel-Base Superalloy GH4698</b>	414
H. Wang, C. Yuan, J.T. Guo, L.Z. Zhou and H.Y. Qin	
<b>Influence of Master Alloy on the Cleanliness of Spray Formed Superalloy</b>	421
W.Y. Xu, Z. Li, H. Yuan, Y. Wang, N. Liu and G.Q. Zhang	
<b>Effect of Ta on the Solidification Behavior of Ni<sub>3</sub>Al-Base Single-Crystal Superalloys</b>	426
T.T. Zheng, S.S. Li, Y.L. Pei, C. Ai and S.K. Gong	
<b>Nitrogen-Bearing Carbides in K417G Alloy Doped with Different Nitrogen Contents</b>	433
G.L. Yang, L.X. Yu, D. Jia, W.R. Sun, H.C. Yang and Z.Q. Hu	
<b>Uniaxial Compression Test and FEM Simulation for GH4145 Superalloy at Room Temperature</b>	438
P.T. Hua, W.H. Zhang, W.R. Sun, L.J. Huang and S.C. Li	
<b>Effect of Element V on the Microstructure and Mechanical Properties of DZ417G Superalloy</b>	446
Z.X. Zhong, X.F. Yu, A.H. Huang, Y.F. Wang, Y.L. Man and S.S. Cui	
<b>Coarsening Behavior of Precipitates in a Conventional Cast Nickel Base Superalloy during Long Term Thermal Exposure</b>	452
Q. Zeng, P. Yan, J.C. Zhao, L.F. Zhang and L. Li	
<b>Deformation and Damage Features of a 4.5% Re Nickel-Based Single Crystal Superalloy during Creep at Medium Temperature</b>	459
D.L. Shu, S.G. Tian, J. Wu and Z.G. Guo	
<b>Creep Behavior of a Re-Free Nickel-Based Single Crystal Superalloy at High Temperature</b>	466
S. Liang, S.G. Tian, Z.G. Guo, Y.C. Xue and D.L. Shu	
<b>First-Principles Investigation of the Site Occupancy and Elastic Properties of Y in <math>\gamma</math>-Co<sub>3</sub>(Al,W)</b>	473
Q. Yao, Y. Wang, Y.H. Zhu and X.L. Zhu	
<b>Improvement of Tensile Property of Ni-Based a Single Crystal Superalloy by Ru Addition</b>	477
Z.X. Shi, J.R. Li, S.Z. Liu and M. Han	
<b>Effect of Mo on As-Cast Microstructure of a Modified 718 Alloy</b>	483
F. Qi, W.R. Sun, X. Xin, D. Jia and Z.Q. Hu	
<b>Composition and Mechanical Property of DD6 Superalloy Revert</b>	488
Q.H. Wu, J. Zhang and Y.S. Luo	
<b>Heat Treated Microstructure and Mechanical Properties of K492M Alloy</b>	493
X.H. Li, L. Li, X. Tang and Q.D. Gai	
<b>Effects of Re on Microstructure of Ni<sub>3</sub>Al-Based Single Crystal Superalloys</b>	498
J.Y. Chen, M. Xue, X. Tang and L.M. Cao	
<b>Hot Working Behavior of Casting Thermo-Span Alloy</b>	504
L.X. Yu, Z.B. Zhang, L.J. Huang, W.H. Zhang, X. Xin, F. Liu, F. Qi, D. Jia and W.R. Sun	
<b>Effects of Pouring Temperature on the Tensile Properties and Fracture Behavior of Single Crystal Superalloy DD6</b>	511
J. Xiong, J.R. Li, M. Han and H.L. Yuan	

<b>Heat Treatment Microstructures of a Directionally Solidified Nickel Base Superalloy under High Temperature Gradient</b>	519
W.G. Zhang, X.M. Yi and C.A. Feng	
<b>Effects of High Temperature Treatments on PPB's in a P/M Superalloy</b>	525
Y. Tao, J. Ja and J.P. Zhao	
<b>Study on Fracture Morphologies of Nickel Based P/M Superalloy</b>	531
X.Q. Hou, Y.H. He and T. Jiang	
<b>Effect of Slow Cooling Treatment on Microstructure and Dynamic Recrystallization of FGH96 Alloy</b>	538
Y.F. Feng, X.M. Zhou, J.W. Zou, G.F. Tian and W.X. Wang	
<b>Grain Refinement of GH4169G Alloy by the Combination of Heat Treatment and Cold Deformation</b>	543
L.J. Huang, F. Qi, W.R. Sun, P.T. Hua, F. Liu, L.X. Yu, X. Xin and Z.Q. Hu	
<b>Effects of Cooling Rates after Solution Heat Treatment on the Creep Behavior of Directionally Solidified CM-247LC Superalloy</b>	549
M.S. Chiou, A.C. Yeh, S.R. Jian and C.M. Kuo	
<b>Directional Solidification Behavior of CMSX-6 Superalloy</b>	554
S. Zheng, Y.L. Jia and J. Tang	
<b>Effect of Long-Term Aging on the Microstructures and Stress Rupture Properties of a Ni-Based Single Crystal Superalloy at 980°C</b>	560
J.W. Xu, L.L. Cui and H.W. Wang	
<b>Hot Deformation Characteristics of Spray Formed Nickel Based P/M Superalloy</b>	565
N. Liu, Z. Li, G.Q. Zhang, H. Yuan, W.Y. Xu and Y. Wang	
 <b>Advanced Composites</b>	
<b>Electronic Failure Analysis of Plate-Capacitors Bonding with Conductive Adhesives</b>	569
Z.M. Song, H.W. Li, B. Wang, Q.T. Cao, Y.L. Hu and Q. Zhang	
<b>Design, Preparation and Microwave-Absorbing Properties of Sandwich-Structure Radar-Absorbing Materials Reinforced by Glass and SiC Fibres</b>	573
H.T. Liu and H.F. Cheng	
<b>Squeeze Cast Co-Continuous AlN/Al Composites</b>	580
Y. Lu, J.L. Li, J.F. Yang, Q.Z. Jing, J.J. Li and P. Li	
<b>Preparation and Thermal Stability Properties of Epoxy Matrix/Nano-SiO<sub>2</sub> Composites</b>	588
Q. Lin, Z.J. Song and J.L. Xie	
<b>Preparation and Microstructure Characterizations of Novel C/C-Zr(Hf)B<sub>2</sub>-Zr(Hf)C-SiC Composites</b>	593
J.W. Li, X. Wei, W.G. Zhang and M. Ge	
<b>Catalytic Mechanism of Dioctyldilauryltin on the Dealcoholized RTV-2 Silicone Rubber</b>	598
L.L. Shi, J.W. Zheng, Y. Ying, L.Q. Jiang, S.L. Che and L. Qiao	
<b>Theoretical Thermodynamic Analysis and Phase Analysis of AZ91D/Flyash Composites</b>	604
H.C. Chu, S.R. Yu, C.X. Wang and Q. Lou	
<b>Effect of Milling Time on Microstructure of CNTs/Al5083 Composites Powder by High Energy Milling</b>	608
Z. Li, X.L. Cai, F. Yi, M.J. Yu and C. Hu	
<b>Preparation of Al<sub>2</sub>O<sub>3</sub> Based Nano-Micro Composite Gradient Self-Lubricating Ceramic Tool Materials</b>	613
M.D. Yi, C.H. Xu, Z.Q. Chen and G.Y. Wu	
<b>Interaction between Polyacrylonitrile (PAN) and Plasticizer at Different Temperature: Infrared Analysis</b>	617
X. Li, C.Y. Liu, A.W. Qin, X.Z. Zhao, B.M. Ma and C.J. He	
<b>Effect of Graphite on the Friction and Wear Properties of Cu-Based Friction Materials</b>	621
J.D. Wei and H. Chen	
<b>Porous AlN Ceramics Fabricated by Carbothermal Reduction</b>	627
Y. Lu, J.L. Li, J.F. Yang and P. Li	
<b>Influences of Heat Treatment on Microstructure and Wear Resistance of WC<sub>p</sub>/40CrNi2Mo Metal Matrix Composites</b>	632
L. Yang, L.Q. Deng, Y. Han and Y.L. Han	

<b>Distribution of WC Particle in Cast Steel and its Effect on Abrasion Resistance</b> Y. Han, A.L. Zhang, L. Yang, L.Q. Deng and Y.L. Han	638
<b>Microstructure and Properties of Tungsten Copper Composite Material</b> T.B. Guo, J.Y. Zhao and Y.T. Ding	646
<b>Freestanding FeCrAl-Y<sub>2</sub>O<sub>3</sub> Amorphous/Crystalline Composite Coating Fabricated by Electron-Beam Physical Vapor Deposition</b> X. Lin, G.P. Song, H.S. Gou, Y.J. Zhao, Y. Chen, Y. Sun, S.Y. Zhao and X.D. He	652
<b>Mechanical Property of FeCrAl-Y<sub>2</sub>O<sub>3</sub> Foil Fabricated by EBPVD</b> X. Lin, G.P. Song, H.S. Gou, Y.J. Zhao, Y. Chen, Y. Sun, S.Y. Zhao and X.D. He	657
<b>A New Cutting Wire Prepared by Copper-Diamond Composite Electroplating</b> Z.Y. Wang, J.W. Zheng, W. Cai, L. Qiao, Y. Ying, L.Q. Jiang and S.L. Che	662
<b>Microstructure and Texture Evolution of Cu–Nb Nano-Composite Wire during Heat-Treatment</b> Z.Y. Sun, X.F. Yang, L.P. Deng and Q. Liu	668
<b>Influence of Deformation on Precipitation Behavior of 2024Al Alloy</b> S.X. He, X. Wang, B.R. Ma, Y. Shi, W.X. Zhang, M. Zhu, L.T. Jiang and G. Wu	674
<b>Research Progress of Interface on Diamond/Copper Composites for Thermal Management</b> P.P. Wang, H. Guo, X.M. Zhang, F.Z. Yin, Y.M. Fan and Y.Y. Han	680
<b>Finite Element Analysis of the Effect of Particle Shape on the Thermal Conductivity in Diamond/Cu Composites</b> H. Guo, Y.Y. Han, X.M. Zhang, F.Z. Yin, Y.M. Fan and P.P. Wang	689