# TABLE OF CONTENTS

## PART 1

### NEW SPD PROCESSES

**MANUFACTURING OF NANOSTRUCTURED AL/WCP METAL-MATRIX COMPOSITES BY ACCUMULATIVE PRESS BONDING** .......................................................... 1  
S Amirkhanlou, M Ketabchi, N Parvin, S Khorsand, F Carreño

**EFFECT OF PROCESSING CYCLES ON ALUMINUM/TUNGSTEN CARBIDE COMPOSITES PREPARED BY CONTINUAL ANNEALING AND PRESS BONDING PROCESS** .......................................................... 6  
S Amirkhanlou, M Ketabchi, N Parvin, S Khorsand, F Carreño

**INTEGRAL SHEET METAL DESIGN VIA SEVERE PLASTIC DEFORMATION – STATE OF THE ART AND FUTURE CHALLENGES** .......................................................... 10  
E Bruder, V Kaune, C Müller

**INCREMENTAL ECAP AS A NOVEL TOOL FOR PRODUCING ULTRAFINE GRAINED ALUMINIUM PLATES** .......................................................... 19  
L Olejnik, W Chrominski, A Rosochowski, M Lipinska, M Lewandowska

**DEVELOPMENT OF EXTRUSION-TORSION SIMULTANEOUS PROCESSING FOR GRAIN REFINEMENT IN MAGNESIUM ALLOYS** .......................................................... 29  
M Farui, T Aida

**TWIST CHANNEL MULTI-ANGULAR PRESSING (TCMAP) AS A METHOD FOR INCREASING THE EFFICIENCY OF SPD** .......................................................... 36  
R Kocich, L Kuciecka, A Machackova

**STUDY OF STIRRED LAYERS ON 316L STEEL CREATED BY FRICTION STIR PROCESSING** .......................................................... 46  
C Langlade, A Roman, D Schlegel, E Gete, M Folea

**INVESTIGATION OF A NEW SHEAR DEFORMATION METHOD FOR THE PRODUCTION OF NANOSTRUCTURES IN LOW-CARBON STEEL** .......................................................... 57  
A G Raab, M V Chukin, G N Aleshin, G I Raab

**THE INNOVATION POTENTIAL OF ECAP TECHNIQUES OF SEVERE PLASTIC DEFORMATION** .......................................................... 62  
G Raab

**INCREMENTAL ECAP OF THICK CONTINUOUS PLATES – MACHINE AND INITIAL TRIALS** .......................................................... 69  
A Rosochowski, L Olejnik

**EXPERIMENTAL INVESTIGATION ON THE PERFORMANCE OF AN IMPROVED EQUAL CHANNEL ANGULAR PRESSING DIE** .......................................................... 75  
S Surendarnath, K Sankaranarayanasamy, B Ravisankar

**MICROSTRUCTURE OF TITANIUM DEFORMED BY WARM EXTRUSION WITH FORWARD-BACKWARD ROTATING DIE** .......................................................... 83  
K Szwietrnia, A Morawiec, M Bieda, J Kavalko

**MICROSTRUCTURE EVOLUTION DURING SEMI CONTINUOUS EQUAL CHANNEL ANGULAR EXTRUSION PROCESS OF INTERSTITIAL-FREE STEEL** .......................................................... 89  
B Yan, S Jiao, D Zhang

### SURFACE SPD

**INFLUENCE OF SURFACE MECHANICAL ATTIRITION TREATMENT ON THE OXIDATION BEHAVIOR OF 316L STAINLESS STEEL AT 750 °C** .......................................................... 96  
S Benafia, D Retraint, B Panicaud, J L G Poussard

**SURFACE MICROSTRUCTURE MODIFICATION IN SQUARE EXTRUDED AL-NB POWDER COMPOSITES BY SHOT PEENING** .......................................................... 103  
H Brokmeier, M C Avalos, R E Bolmaro, E Mouaad

**SURFACE FLOW IN SEVERE PLASTIC DEFORMATION OF METALS BY SLIDING** .......................................................... 112  
A Mahato, Y Guo, H Yeung, S Chandrasekar

**EFFECT OF SURFACE NANOSTRUCTURE ON TENSILE AND LOW CYCLE FATIGUE BEHAVIOR OF AL 2014 ALLOY** .......................................................... 120  
K Chattopadhyay, V Pandey, N C S Srinivas, V Singh
MICROSTRUCTURES OF TRIBOLOGICALLY MODIFIED SURFACE LAYERS IN TWO-PHASE ALLOYS
C G Figueroa, I Ortega, Y H Jacobo, A Ortiz, A E Bravo, R Schouwenaars

136

MECHANICAL NANO-STRUCTURATION OF A C45 STEEL UNDER REPEATED NORMAL IMPACTS
G Kermouche, C Langlade

148

PLASTIC DEFORMATION TO ENHANCE PLASMA-ASSISTED NITRIDING: ON SURFACE CONTAMINATION INDUCED BY SURFACE MECHANICAL ATTENTION TREATMENT
Y Samih, M Novelli, T Thiriet, B Bolle, N Alian, J-J Fundenberger, G Marcos, T Cserevicz, T Grosdidier

157

FATIGUE PROPERTIES OF A BIOMEDICAL 316L STEEL PROCESSED BY SURFACE MECHANICAL ATTENTION
Z Sun, M Chemkhi, P Kanoute, D Retraint

163

POWDER CONSOLIDATION

173

STRENGTH AND DUCTILITY ENHANCEMENT IN NANOSTRUCTURED AI6063 WITH A BIMODAL GRAIN SIZE DISTRIBUTION
M S Oskooie, H Asgharzadeh

MICROSTRUCTURAL EVOLUTION IN IMMISCIBLE ALLOYS PROCESSED BY HIGH-PRESSURE TORSION
A Bachmaier, E Neubauer, M Kitzmantel, R Pippan, C Motz

181

INFLUENCE OF COMPOSITION, GRAIN SIZE, AND OXIDE PARTICLES ON THE STRENGTH OF CONSOLIDATED BALL-MILLED IRON
J A Benito, V Gregoire, C Casas, J M Cabrera

189

THE FRACTURE STRENGTH OF CRYOMILLED 99.7 AL NANOPOWDERS CONSOLIDATED BY HIGH FREQUENCY INDUCTION SINTERING
E A El-Danaf, M Baig, A A Almajid, M S Soliman

196

DEFORMATION BEHAVIOR OF Cu-COMPOSITES PROCESSED BY HPT
L Kraemer, S Wurster, R Pippan

205

HARMONIC STRUCTURE FORMATION AND DEFORMATION BEHAVIOR IN A (α + γ) TWO PHASE STAINLESS STEEL
M Ota, K Sawai, M Kawakubo, S K Vajpai, K Ameyama

214

INVESTIGATION OF THE STRUCTURAL AND MICROWAVE DIELECTRIC PROPERTIES OF MECHANICALLY ALLOYED Fe60Co40 POWDERS
F Otmane, S Bergheul, S Triaa, M Azzaz

221

DEFORMATION BEHAVIOR OF HIGH SPEED STEEL/LOW CARBON STEEL COMPOSITE WITH HARMONIC STRUCTURE BY MM/SPS PROCESS
Y Tsuzuki, H Fujivara, H Miyamoto, K Ameyama

227

HIGH PERFORMANCE Ti-6Al-4V ALLOY BY CREATION OF HARMONIC STRUCTURE DESIGN
S K Vajpai, K Ameyama, M Ota, T Watanabe, R Maeda, T Sekiguchi, G Dirras, D Tingaud

231

ANNEALING EFFECT ON MECHANICAL PROPERTIES OF Ti-AL ALLOY/PURE Ti HARMONIC-STRUCTURED COMPOSITE BY MM/SPS PROCESS
R Yoshida, T Tsuda, H Fujivara, H Miyamoto, K Ameyama

242

CONTRIBUTION OF SHEAR DEFORMATION TO GRAIN REFINEMENT AND DENSIFICATION OF IRON POWDER CONSOLIDATED BY HIGH PRESSURE TORSION
Y J Zhao, R Massion, T Grosdidier, L S Toth

248

MODELING OF SPD PROCESSES AND MICROSTRUCTURES

257

FEM SIMULATION OF MICROSTRUCTURE REFINEMENT DURING SEVERE DEFORMATION
O I Bylya, M K Sarangi, N V Ovchininkova, R A Vasin, E B Yakushina, P L Blackwell

LOCALIZATION OF PLASTIC DEFORMATION AND MECHANICAL TWINNING IN DYNAMICAL CHANNEL ANGULAR PRESSING
E N Borodin, A E Mayer

267

NON-ISOTHERMAL ANALYSIS OF DIE CORNER GAP FORMATION FOR MATERIALS DEFORMED BY MULTI-PASS ECAP
N Medeiros, L P Moreira

278
PARAMETRIC STUDY OF UNCONSTRAINED HIGH-PRESSURE TORSION-FINITE ELEMENT ANALYSIS ................................................................. 288
A Halloumi, M Busquet, S Descartes

PROCESSING ULTRAFINE-GRAINED ALUMINUM ALLOY USING MULTI-ECAP-CONFORM TECHNIQUE ............................................. 299
E Fakhretdinova, G Raab, O Ryzhikov, R Valiev

FROM CONVENTIONAL TO SEVERE SHOT PEENING TO GENERATE NANOSTRUCTURED SURFACE LAYER: A NUMERICAL STUDY .......... 307
S M Hassani-Gangaraj, A Moridi, M Guagliano

EFFECT OF SLIDING VELOCITY ON FRICTION-INDUCED MICROSTRUCTURAL EVOLUTION IN COPPER ....................................................... 316
G Jacquet, G Kermouche, C Courbon, D Tumbajoy, J Rech

MODELLING OF TEXTURE EVOLUTION AND GRAIN REFINEMENT ON COMPLEX SPD PATHS ................................................................. 327
K Kowalczyk-Gajewska, S Stupkiewicz, K Frydrych, H Petryk

USING FINITE ELEMENT MODELLING TO EXAMINE THE FLOW PROCESS AND TEMPERATURE EVOLUTION IN HPT UNDER DIFFERENT CONSTRAINING CONDITIONS ........................................... 337
P H R Pereira, R B Figueiredo, P R Cetlin, T G Langdon

ULTRA-FINE GRAINED AL-MG ALLOYS WITH SUPERIOR STRENGTH VIA PHYSICAL SIMULATION ................................................................. 347
I Sabirov, N Enikeev, V Kazykhanov, R Valiev, M Murashkin

NUMERICAL SIMULATION OF HPT PROCESSING ................................................................. 355
P Verleysen, F Van Den Abeele, J Degrieck

EFFECT OF FRICTION IN DUAL EQUAL CHANNEL LATERAL EXTRUSION USING FINITE ELEMENT SIMULATION ................................................................. 361
W Xiaoqi, S Qingnan, Q Huarong, L Zhaohua

A STUDY OF PLASTIC DEFORMATION BEHAVIOR DURING HIGH PRESSURE TORSION PROCESS BY CRYSTAL PLASTICITY FINITE ELEMENT SIMULATION ................................................................. 367
P T Wei, C Lu, K Tieu, G Y Deng

SPD IMPROVEMENTS

EFFECT OF GEOMETRIC PARAMETERS ON DEFORMATION BEHAVIOR OF SIMPLE SHEAR EXTRUSION ................................................................. 378
E Bagherpour, F Qods, R Ebrahimi

NEW UNIQUE ECAP SYSTEM WITH ULTRASOUND AND BACKPRESSURE ................................................................. 392
T Donic, M Martikan, B Hadzima

PROBLEMS ASSOCIATED WITH USE OF THE LOGARITHMIC EQUIVALENT STRAIN IN HIGH PRESSURE TORSION ................................................................. 408
J J Jonas, C Aranas Jr

TECHNOLOGICAL ASPECTS OF PREPARATION OF NANOSTRUCTURED TITANIUM WIRE USING A CONFORM MACHINE ................................................................. 416
M Zemko, T Kubina, J Dlouhý, M Kover, J Hodek

NANOSP Activity in UFA and International Cooperation ................................................................. 424
N Reshetnikova, M Salakhova

COMPARISON OF MECHANICAL AND MICROSTRUCTURAL PROPERTIES OF CONVENTIONAL AND SEVERE PLASTIC DEFORMATION PROCESSES ................................................................. 430
V Szombathelyi, G Krallics

REASSESSMENT OF TEMPERATURE INCREASE AND EQUIVALENT STRAIN CALCULATION DURING HIGH-PRESSURE TORSION ................................................................. 439
A P Zhilyaev, T G Langdon

SPD METALLURGY-STEEL

MICROSTRUCTURAL EVOLUTION OF METASTABLE AUSTENITIC STEEL DURING HIGH-PRESSURE TORSION AND SUBSEQUENT HEAT TREATMENT ................................................................. 446
S Chen, A Shibata, L J Zhao, S Gao, Y Z Tian, N Tsuji
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFFECT OF TEMPERATURE AND STRAIN ON THE FORMATION OF ELONGATED FINE</td>
<td>452</td>
</tr>
<tr>
<td>GRAINED STRUCTURE IN MIDDLE CARBON STEEL DURING LARGE PLASTIC</td>
<td></td>
</tr>
<tr>
<td>DEFORMATION</td>
<td></td>
</tr>
<tr>
<td>O K Dedyulina, N D Stepanov, G A Salishchev</td>
<td></td>
</tr>
<tr>
<td>MICROSTRUCTURE EVOLUTION IN ULTRAFINE-GRAINED INTERSTITIAL FREE</td>
<td>462</td>
</tr>
<tr>
<td>STEEL PROCESSED BY HIGH PRESSURE TORSION</td>
<td></td>
</tr>
<tr>
<td>M Janecek, T Krajnak, J Strasky, J Cizek, D J Lee, H S Kim, J Gubicza</td>
<td></td>
</tr>
<tr>
<td>MICROSTRUCTURE, PROPERTIES, AND FAILURE CHARACTERISTICS OF MEDIUM-</td>
<td>471</td>
</tr>
<tr>
<td>CARBON STEEL SUBJECTED TO SEVERE PLASTIC DEFORMATION</td>
<td></td>
</tr>
<tr>
<td>M V Karavaeva, S K Kiseleva, M M Abramova, A V Ganeev, R Z Valiev</td>
<td></td>
</tr>
<tr>
<td>DEFORMATION ANALYSIS ON F138 AUSTENITIC STAINLESS STEEL: ECAE AND</td>
<td>477</td>
</tr>
<tr>
<td>ROLLING</td>
<td></td>
</tr>
<tr>
<td>N S De Vincentis, M C Avalos, A M Klaugua, V L Sordi, N Schell, H-G Brokmeier, R E Bolmaro</td>
<td>488</td>
</tr>
<tr>
<td>COMPARISON OF THE MICROSTRUCTURE AND THE MECHANICAL PROPERTIES OF</td>
<td></td>
</tr>
<tr>
<td>AX41 MAGNESIUM ALLOY PROCESSED BY EX-ECAP VIA THREE DIFFERENT ROUTES</td>
<td></td>
</tr>
<tr>
<td>A, BC AND C</td>
<td></td>
</tr>
<tr>
<td>T Krajnak, K Mathis, M Janecek, J Gubicza</td>
<td>497</td>
</tr>
<tr>
<td>MODELING THE EFFECT OF DEFORMATION ON STRENGTH OF A FE-23MN-0.3C-1.5AL T WIP STEEL</td>
<td></td>
</tr>
<tr>
<td>P Kasakin, A Belyakov, R Kaibyshev, D Molodov</td>
<td></td>
</tr>
<tr>
<td>MICROSTRUCTURE EVOLUTION IN A 316L STAINLESS STEEL SUBJECTED TO</td>
<td>505</td>
</tr>
<tr>
<td>MULTIDIRECTIONAL FORGING AND UNIDIRECTIONAL BAR ROLLING</td>
<td></td>
</tr>
<tr>
<td>M Odnobokova, A Kipelova, A Belyakov, R Kaibyshev</td>
<td></td>
</tr>
<tr>
<td>PROCESSING OF LOW CARBON STEEL BY DUAL ROLLS EQUAL CHANNEL EXTRUSION</td>
<td>513</td>
</tr>
<tr>
<td>S Razu, L Cizek, M Salajka, J Kedron, S Tysar</td>
<td></td>
</tr>
<tr>
<td>MICROSTRUCTURES AND DEFORMATION BEHAVIOR OF NANO-GRAINED AND</td>
<td>524</td>
</tr>
<tr>
<td>ULTRAFINE-GRAINED HIGH-MN AUSTENITIC STEEL FABRICATED BY ASYMMETRIC-</td>
<td></td>
</tr>
<tr>
<td>SYMMETRIC ROLLING</td>
<td></td>
</tr>
<tr>
<td>B Fu, L Fu, H Wang, W Wang, A Shan</td>
<td></td>
</tr>
<tr>
<td>TENSILE BEHAVIOR OF AN AUSTENITIC STAINLESS STEEL SUBJECTED TO</td>
<td>533</td>
</tr>
<tr>
<td>MULTIDIRECTIONAL FORGING</td>
<td></td>
</tr>
<tr>
<td>M Tikhonova, J Sorokopudova, E Bondareva, A Belyakov, R Kaibyshev</td>
<td></td>
</tr>
<tr>
<td>EFFECT OF LARGE PLASTIC DEFORMATION ON MICROSTRUCTURE AND MECHANICAL PROPERTIES OF A TWIP STEEL</td>
<td>539</td>
</tr>
<tr>
<td>Z Yanushkevich, A Belyakov, R Kaibyshev, D Molodov</td>
<td></td>
</tr>
<tr>
<td>NANOSCALE LAMELLAE IN AN OXIDE DISPERSION STRENGTHENED STEEL</td>
<td>550</td>
</tr>
<tr>
<td>PROCESSED BY DYNAMIC PLASTIC DEFORMATION</td>
<td></td>
</tr>
<tr>
<td>Z B Zhang, O V Mishin, N R Tao, W Pantleon</td>
<td></td>
</tr>
<tr>
<td>PRIOR THERMO-MECHANICAL PROCESSING TO MODIFY STRUCTURE AND</td>
<td>555</td>
</tr>
<tr>
<td>PROPERTIES OF SEVERELY DEFORMED LOW CARBON STEEL</td>
<td></td>
</tr>
<tr>
<td>J Znuk, R Lapovok, G I Raub</td>
<td></td>
</tr>
</tbody>
</table>

**SPD METALLURGY-TI**

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICROSTRUCTURE AND MECHANICAL PROPERTIES OF CONTINUOUS EQUAL</td>
<td>563</td>
</tr>
<tr>
<td>CHANNEL ANGULAR PRESSED TITANIUM</td>
<td></td>
</tr>
<tr>
<td>G S Dyakonov, C F Gu, L S Toth, R Z Valiev, I P Semenova</td>
<td></td>
</tr>
<tr>
<td>EFFECT OF HIGH PRESSURE TORSION ON THE AGING KINETICS OF Î–TITANIUM T 15MO ALLOY</td>
<td>569</td>
</tr>
<tr>
<td>S Gattina, I Semenova, M Janecek, J Strasky</td>
<td></td>
</tr>
<tr>
<td>MICROSTRUCTURES AND MECHANICAL PROPERTIES OF Ti5553 ALLOY PROCESSED BY HIGH-PRESSURE TORSION</td>
<td>575</td>
</tr>
<tr>
<td>B Z Jiang, S Emura, K Tsuchiya</td>
<td></td>
</tr>
<tr>
<td>ULTRAFINE-GRAINED STRUCTURE FORMATION IN Ti-6AL-4V ALLOY VIA WARM</td>
<td>582</td>
</tr>
<tr>
<td>SWAGING</td>
<td></td>
</tr>
<tr>
<td>M Klimova, M Boeva, S Zherebtsov, G Salishchev</td>
<td></td>
</tr>
<tr>
<td>EQUAL CHANNEL ANGULAR PRESSING AT TEMPERATURES OF 77-575 K OF TITANIUM</td>
<td>588</td>
</tr>
<tr>
<td>GRADE 2: MICROSTRUCTURE AND MECHANICAL PROPERTIES</td>
<td></td>
</tr>
<tr>
<td>A V Podolskii, H P Ng, I A Psaruk, E D Tabachnikova, R Lapovok</td>
<td></td>
</tr>
</tbody>
</table>
MECHANICAL PROPERTIES AND MICROSTRUCTURE OF 6061 ALUMINUM ALLOY SEVERELY DEFORMED BY ARB PROCESS AND SUBSEQUENTLY AGED AT LOW TEMPERATURES ................................................................. 721
D Terada, Y Kameida, Z Horita, K Matsuda, S Hirosawa, N Tsuji

AN ELECTRON BACK-SCATTERED DIFFRACTION STUDY ON THE MICROSTRUCTURE EVOLUTION OF SEVERELY DEFORMED ALUMINUM AI6061 ALLOY .......................................................... 726
M Vaseghi, A K Taheri, H S Kim

COMPARISON BETWEEN ARB AND CARB PROCESSES ON AN AA5754/AA6061 COMPOSITE ................. 732
K Verstraete, A-L Helbert, F Brisset, T Baudin

SPD METALLURGY-CU

MICROSTRUCTURE EVOLUTION DURING ANNEALING OF AN SPD-PROCESSED SUPERSATURATED CU – 3 AT.% AG ALLOY ................................................................. 733
J Guibica, Z Hegedüs, J L Lábár, V S Sarma, A Kauffmann, J Freudenberg

TRANSMISSION ELECTRON MICROSCOPE INVESTIGATIONS ON CU-AG ALLOYS PRODUCED BY HIGH-PRESSURE TORSION ................................................................. 746
K S Kormouz, B Yang, R Pippan

MICROSTRUCTURE EVOLUTION OF CU – 22 % IN ALLOY SUBJECTED TO THE HIGH PRESSURE TORSION A Korneva, B Strumal, O Kogtenkova, Y Ivanisenko, A Wierzchicka- Miernik, A Klimanetov, P Zieba

MICROSTRUCTURE EVOLUTION IN A CU-CR-ZR ALLOY DURING WARM INTENSE PLASTIC STRAINING R Mishnev, I Shakhova, A Belyakov, R Kaibyshev

MICROSTRUCTURE AND PROPERTIES OF ULTRAFINE GRAINED STRUCTURE OF CU-ZN-SI ALLOY FABRICATED BY HEAVY COLD ROLLING ................................................................. 769
H Miura, T Kobayashi, M Kobayashi

NANOSTRUCTURING OF PURE METALS BY SEVERE PLASTIC DEFORMATION AT CRYOGENIC TEMPERATURES ................................................................. 776
V V Popov, E N Popova, V P Pilyugina, D D Kaznetsov, A V Stolbovsky

EFFECT OF MULTIDIRECTIONAL FORGING AND EQUAL CHANNEL ANGULAR PRESSING ON ULTRAFINE GRAIN FORMATION IN A CU-CR-ZR ALLOY ................................................................. 786
I Shakhova, A Belyakov, R Kaibyshev

EFFECT OF ECAP ON MICROSTRUCTURE AND MECHANICAL PROPERTIES OF CU-14FE MICROCOMPOSITE ALLOY ................................................................. 793
N D Stepanov, A N Kozin, G A Salishchev, N E Khlebova, V I Pantyry

SPD METALLURGY-VARIOUS METALS

PHASE TRANSFORMATIONS DURING HIGH-PRESSURE TORSION (HPT) IN TITANIUM, COBALT AND GRAPHITE ................................................................. 804
K Edalati, Z Horita

MICROSTRUCTURES AND MECHANICAL PROPERTIES OF PURE TANTALUM PROCESSED BY HIGH-PRESSURE TORSION ................................................................. 811
Y Huang, N Maury, N X Zhang, T G Langdon

EVOLUTION OF HARDNESS, MICROSTRUCTURE, AND STRAIN RATE SENSITIVITY IN A ZN-22% AL EUTECTOID ALLOY PROCESSED BY HIGH-PRESSURE TORSION ................................................................. 819
M Kawasaki, H-J Lee, I-C Choi, J-I Jang, B Ahn, T G Langdon

MICROSTRUCTURE REFINEMENT IN CU-FE ALLOY USING HIGH PRESSURE TORSION ................................................................. 829
A Lukyanov, A Charokova, A Filatov, E Levin, R Valiev, D Gunderov, E Antipov

STRUCTURE AND PROPERTIES OF NANOSTRUCTURED COBALT PROCESSED BY HIGH PRESSURE TORSION AT TEMPERATURES OF 300 AND 77 K ................................................................. 834
A V Podolskiy, D Geist, E Schaffler, E D Tabakhnkova, M J Zehetbauer

INVESTIGATION OF MICROSTRUCTURE AND MECHANICAL PROPERTIES OF CU/ZNO NANO COMPOSITE PRODUCED BY ARB PROCESS ................................................................. 846
M Shahhosseiny, F Qods

TEMPERATURE DEPENDENT MECHANICAL PROPERTIES AND THERMAL ACTIVATION PLASTICITY OF NANOCRYSTALLINE AND COARSE GRAINED NI-18.75 AT.% FE ALLOY ................................................................. 853
E D Tabakhnkova, A V Podolskiy, S N Smirnov, I A Psaruk, P K Liao
SUPERPLASTICITY

THE CHARACTERISTICS OF TWO-PHASE AL-CU AND ZN-AL ALLOYS PROCESSED BY HIGH-PRESSURE TORSION .................................................. 865
M Kawasaki, T G Langdon

STRAIN WEAKENING AND SUPERPLASTICITY IN A BI-SN EUTECTIC ALLOY PROCESSED BY HIGH-PRESSURE TORSION ........................................... 874
C T Wang, T G Langdon

SHAPE MEMORY APPLICATIONS

EFFECT OF MULTIAXIAL DEFORMATION MAX-STRAIN ON THE STRUCTURE AND PROPERTIES OF Ti-Ni ALLOY .................................................. 883
I Y Khmelevskaya, R Kawalla, S D Prokoshkin, V S Komarov

INFLUENCE OF THE STRAIN RATE AND DEFORMATION TEMPERATURE ON THE DEFORMABILITY OF Ti-Ni SMAS: A PRELIMINARY STUDY ........................................ 890
A Kreitberg, S Prokoshkin, V Brailovski, D Gunderov, M Khomutov

NANOSTRUCTURED TITANIUM NICKELIDE: REALIZATION OF ABNORMALLY HIGH RECOVERY STRAIN ..................................................... 902
E Ryklina, S Prokoshkin, K Vachiyan

SHAPE MEMORY EFFECT OF NiTi ALLOY PROCESSED BY EQUAL-CHANNEL ANGULAR PRESSING FOLLOWED BY POST DEFORMATION ANNEALING ................. 915
H Shahmir, M Nili-Ahmadabadi, T G Langdon

SPD FOR BIO-APPLICATIONS

MICROSTRUCTURE AND MECHANICAL PROPERTIES OF AN Mg-3Zn-0.5Zr-5Ha NANOCOMPOSITE PROCESSED BY ECAE ........................................ 922
J Li, Y Huang

HIGH FATIGUE STRENGTH AND ENHANCED BIOCOMPATIBILITY OF UFG CP Ti FOR MEDICAL INNOVATIVE APPLICATIONS .......................... 930
A V Polyakov, I P Semenova, R Z Valiev

SPD MATERIAL FOR ENERGY STORAGE

IMPROVEMENT OF HYDROGEN STORAGE PROPERTIES OF MAGNESIUM ALLOYS BY COLD ROLLING AND FORGING ....................................... 936
J Huot, S Amira, J Lang, N Skryabina, D Fruchart

EXPLORING SEVERAL DIFFERENT ROUTES TO PRODUCE Mg- BASED NANOMATERIALS FOR HYDROGEN STORAGE ........................................ 944
D R Leiva, I F Chanchetti, R Floriano, T T Ishikawa, W J Botta

SPD FOR ELECTRICAL APPLICATIONS

MICROSTRUCTURE FEATURES AND MECHANICAL PROPERTIES OF A UFG Al-Mg-Si ALLOY PRODUCED VIA SPD ........................................ 953
E Bobruk, I Sabirov, V Kazykhanov, R Valiev, M Marashkin

HIGH STRENGTH AND HIGH ELECTRICAL CONDUCTIVITY OF UFG Al-2%Fe ALLOY ACHIEVED BY HIGH-PRESSURE TORSION AND AGING .................. 959
J M Cubero-Sesin, M Arita, M Watanabe, Z Horita

ENHANCED STRENGTH AND ELECTRICAL CONDUCTIVITY IN ULTRAFINE-GRAINED Cu-Cr ALLOY PROCESSED BY SEVERE PLASTIC DEFORMATION ........ 967
R K Islamgaliev, K M Nesterov, Y Champion, R Z Valiev

THE ELECTRICAL CONDUCTIVITY OF CUCRZr ALLOY AFTER SPD PROCESSING .............................................................. 973
M Lipinska, P Bazarnik, M Lewandowska
MECHANICAL PROPERTIES AND ELECTRICAL CONDUCTIVITY OF AL 6101 AND 6201 ALLOYS PROCESSED BY HYDRO-EXTRUSION

Z Pakiela, K Ludwichowska, J Ferenc, M Kućzyk

CORROSION OF SPD MATERIALS

IRRADIATION RESISTANCE OF A NANOSTRUCTURED 316 Austenitic Stainless Steel

P B R Rajan, I Monnet, E Hug, A Etienne, N Enikeev, C Keller, X Sauvage, R Valiev, B Radiguet

EFFECT OF DEFORMATION ROUTE ON THE DEVELOPMENT OF LOW CN Fe-20%Cr ALLOY BY EQUAL CHANNEL ANGULAR PRESSING

M Rifai, H Miyamoto, H Fujisawa

GB BEHAVIOR

THE EFFECT OF STRAIN RATE ON TENSILE BEHAVIOR AND DEFORMATION MECHANISMS OF ULTRAFINE-GRAINED ALUMINUM

K V Ivanov, E V Naydenkin

MODELING NITRIDING ENHANCEMENT RESULTING FROM THE NANOPEENING TREATMENT OF A PURE IRON

V Lacaille, G Kermouche, D-Y T Spinel, E Feulvarch, C Morel, J-M Bergheau

EFFECT OF DISLOCATION AND GRAIN BOUNDARY ON DEFORMATION MECHANISM IN ULTRAFINE-GRAINED INTERSTITIAL-FREE STEEL

K Nakazawa, S Itoh, T Matsunaga, Y Matsukawa, Y Satoh, Y Murase, H Abe

THE SIGNIFICANCE OF SELF-ANNEALING IN TWO-PHASE ALLOYS PROCESSED BY HIGH-PRESSURE TORSION

N X Zhang, M Kawasaki, Y Huang, T G Langdon

GB SEGREGATION

HIGH STRENGTH STATE OF UFG STEEL PRODUCED BY SEVERE PLASTIC DEFORMATION

N A Enikeev, X Sauvage, M M Abramova, M Y Murashkin, B Z Valiev

ON THE NATURE OF HIGH-STRENGTH STATE OF CARBON STEEL PRODUCED BY SEVERE PLASTIC DEFORMATION

A V Ganeev, M V Karavaeva, X Sauvage, E Courtois-Manara, Y Ivanisenko, R Z Valiev

MICRO-MECHANICS

CONTINUUM NANOMECHANICS FOR NANOCRYSTALLINE AND ULTRAFINE GRAIN MATERIALS

E C Aifantis

PLASTIC DEFORMATION TREATED AS MATERIAL FLOW THROUGH ADJUSTABLE CRYSTAL LATTICE

P Minakowski, J Hron, J Kratochvíl, M Kružík, J Málek

ROTATIONAL DEFECTS AS STABILISING ELEMENTS IN SPD MATERIALS

H Rössner, G Wilde

MULTIPLE DISLOCATION PILE-UPS IN SMALL GRAINS AT SMALL STRAINS: IMPLICATIONS FOR THE HALL-PETCH RELATIONSHIP AND BACKSTRESS SCREENING

R Schouvenaars, V H Jacobo, A Ortiz

GB ENGINEERING FOR ADVANCED PROPERTIES

THE INFLUENCE OF TEMPERATURE ON MICROSTRUCTURE AND MICROHARDNESS IN HIGH-PRESSURE TORSION OF LOW-CARBON STEEL

G G Maier, E G Astafurova, V S Koshkovkina, G V Chomyakova, E V Naydenkin, P D Odessky, S V Dobatkin
ON BASAL-PRISMATIC TWINS IN MAGNESIUM ........................................................... 1104
A Ostapovets, P Molnář, R Gröger

MICROSTRUCTURE CHARACTERIZATION

CHARACTERIZATION OF ULTRAFINE GRAINED CU-NI-SI ALLOYS BY ELECTRON
BACKSCATTER DIFFRACTION .......................................................................................... 1111
J Altenberger, H A Kuhn, M Gholami, M Mhaede, L Wagner
X-RAY LINE PROFILE ANALYSIS OF EQUAL CHANNEL ANGULAR PRESSING PROCESSED
CU ......................................................................................................................................... 1121
B Jóni, V Gonda, B Verő, T Ungár
QUANTITATIVE CHARACTERISTICS OF INHOMOGENEOUS MICROSTRUCTURE IN UFG
COPPER .......................................................................................................................... 1127
P Kral, M Kvapilova, J Dvorak, P Ponizil, O Sedivy, K Helisova
DISLOCATION DENSITY OF FCC METALS PROCESSED BY ARB .................................. 1133
Y Miyajima, T Ueda, H Adachi, T Fujii, S Onaka, M Kato

MATERIAL BEHAVIOR

FLOW BEHAVIOUR OF MAGNESIUM ALLOY AZ31B PROCESSED BY EQUAL-CHANNEL
ANGULAR PRESSING ......................................................................................................... 1140
M S Arun, U Chakkingal
PRODUCTION OF ULTRAFINE GRAINED ALUMINUM BY CYCLIC SEVERE PLASTIC
DEFORMATION AT AMBIENT TEMPERATURE ................................................................... 1149
P Bereczki, V Szombathelyi, G Králíček
ENHANCED CREEP PROPERTIES OF COPPER AND ITS ALLOYS PROCESSED BY ECAP .......... 1159
J Dvorak, P Kral, M Svoboda, M Kvapilova, V Sklenička
MICROSTRUCTURE AND MECHANICAL PROPERTIES OF ULTRAFINEGRAINED MG-ZN-
CA ALLOY ......................................................................................................................... 1167
O Kulyasova, R Islamguliev, Y Zhao, R Valev
STRAIN HARDENING BEHAVIOR OF ARMCO IRON PROCESSED BY ECAP ..................... 1172
J A M Bolaños, O F H Cobos, J M C Marrero
ANALYSIS ON DYNAMIC TENSILE EXTRUSION BEHAVIOR OF UFG OFHC CU.................. 1180
K-T Park, L Park, H J Kim, S B Kim, C S Lee
SHEAR BANDS FORMATION AFTER A STRAIN PATH CHANGE FOR AA1050 ALLOY PRE-
DEFORMED BY ECAP AND SUBSEQUENTLY PLANE STRAIN COMPRESSED ....................... 1186
H Paul, A Tarasek, W Wajda, K Berent
MECHANICAL PROPERTIES AND PECULIAR FEATURES OF ENERGY DISSIPATION OF
ULTRAFINE-GRAINED ALUMINUM ALLOYS UNDER DYNAMIC DEFORMATION ................ 1195
A Petrova, I Brodova, E Shorokhov, O Plekhov, O Naimark

INNOVATIVE CHARACTERIZATION TECHNIQUES

HIGH-PRESSURE TORSION OF Ti: SYNCHROTRON CHARACTERIZATION OF PHASE
VOLUME FRACTION AND DOMAIN SIZES ......................................................................... 1202
R E Bolmaro, V L Sordi, M Ferrante, H-G Brokmeier, M Kawasaki, T G Langdon
ANISOTROPIC AND HETEROGENEOUS DEVELOPMENT OF MICROSTRUCTURES,
COMBINING LABORATORY/SYNCHROTRON X-RAYS AND EBSD ON A FEW SPD
METALLIC SYSTEMS .......................................................................................................... 1209
R E Bolmaro, N S De Vincentis, E Benatti, A M Kliauga, M C Avalos, N Schell, H-G Brokmeier
ON THE_ATOMIC_FORCE_MICROSCOPY_CHARACTERIZATION_OF_VOID_EVOLUTION_IN
SEVERELY PLASTIC DEFORMED PURE IRON .................................................................... 1218
N Forouzanmehr, N Nili-Ahmadabadi
TWINS IN ASYMMETRICALLY ROLLED AZ31 ANALYZED WITH A TRANSMISSION
ELECTRON MICROSCOPE ORIENTATION MAPPING TOOL ............................................ 1225
E F Rauch, M Forget, G Kapelški
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEXTURE EVOLUTION</td>
<td></td>
</tr>
<tr>
<td>Recrystallization temperature influence upon texture evolution of a</td>
<td>1232</td>
</tr>
<tr>
<td>SPD processed Ti-Nb-Ta-Zr-O alloy</td>
<td></td>
</tr>
<tr>
<td>V D Cojocaru, D Raducanu, D M Gordin, I Cinca, I Thibon, A Caprarescu</td>
<td></td>
</tr>
<tr>
<td>The texture development of ECAP processed AA1050 aluminum, before and</td>
<td>1240</td>
</tr>
<tr>
<td>After a final anneal: effect of the initial texture</td>
<td></td>
</tr>
<tr>
<td>M C V Vega, B H Piva, R E Bolmaro, M Ferrante, A M Kliauga</td>
<td></td>
</tr>
<tr>
<td>Effect of back pressure on material flow and texture in ECAP of</td>
<td>1249</td>
</tr>
<tr>
<td>aluminum</td>
<td></td>
</tr>
<tr>
<td>A Panigrahi, N Scheerbaum, P Chekhonin, J Scharnweber, B Beausir, M</td>
<td></td>
</tr>
<tr>
<td>Hockauf, S Sankaran, W Skrotzki</td>
<td></td>
</tr>
<tr>
<td>Influence of deformation temperature on texture evolution in HPT</td>
<td>1262</td>
</tr>
<tr>
<td>deformed NiAl</td>
<td></td>
</tr>
<tr>
<td>C Tränkner, R Chulist, W Skrotzki, B Beausir, T Lippmann, J Horky, M</td>
<td></td>
</tr>
<tr>
<td>Zehetbauer</td>
<td></td>
</tr>
<tr>
<td>Enabling shear textures and fine-grained structures in magnesium sheet</td>
<td>1268</td>
</tr>
<tr>
<td>by machining-based deformation processing</td>
<td></td>
</tr>
<tr>
<td>D Sagapuram, M Efe, K P Trumble, S Chandrasekar</td>
<td></td>
</tr>
<tr>
<td>Grain Refinement</td>
<td></td>
</tr>
<tr>
<td>Nanocrystalline structures and tensile properties of stainless steels</td>
<td>1278</td>
</tr>
<tr>
<td>processed by severe plastic deformation</td>
<td></td>
</tr>
<tr>
<td>A Belyakov, M Odnobokova, A Kipelova, K Tsazaki, R Kaibyshev</td>
<td></td>
</tr>
<tr>
<td>Twinning induced nanostructure formation during cryo-deformation</td>
<td>1289</td>
</tr>
<tr>
<td>M Klimova, G Dyakovon, S Zherebtsou, G Salishchev, D Molodov</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
</tr>
<tr>
<td>Near threshold fatigue crack growth in ultrafine-grained copper</td>
<td>1297</td>
</tr>
<tr>
<td>M Arzaghi, S Fintová, C Sarrazin-Baudoux, L Kunz, J Petit</td>
<td></td>
</tr>
<tr>
<td>Initiation of fatigue cracks in AZ91 Mg alloy processed by ECAP</td>
<td>1306</td>
</tr>
<tr>
<td>S Fintová, L Kunz</td>
<td></td>
</tr>
<tr>
<td>Low-cycle fatigue of Fe-20%Cr alloy processed by equal-channel angular pressing</td>
<td>1314</td>
</tr>
<tr>
<td>Y Kaneko, R Tomita, A Vinogradov</td>
<td></td>
</tr>
<tr>
<td>How severe plastic deformation at cryogenic temperature affects</td>
<td>1322</td>
</tr>
<tr>
<td>strength, fatigue, and impact behaviour of Grade 2 titanium</td>
<td></td>
</tr>
<tr>
<td>A Mendes, A M Kliauga, M Ferrante, V L Sovdi</td>
<td></td>
</tr>
<tr>
<td>Influence of UFG structure formation on mechanical and fatigue</td>
<td>1331</td>
</tr>
<tr>
<td>properties in Ti-6Al-7Nb alloy</td>
<td></td>
</tr>
<tr>
<td>V V Polyakova, V N Anumalasetty, I P Semenova, R Z Valley</td>
<td></td>
</tr>
<tr>
<td>Fatigue behavior of ultrafine-grained medium carbon steel processed</td>
<td></td>
</tr>
<tr>
<td>by severe plastic deformation</td>
<td>1339</td>
</tr>
<tr>
<td>C Rabing, Y Ivanisenko, E Kerscher</td>
<td></td>
</tr>
<tr>
<td>Effect of deformation structure on fatigue behavior of an Al-Mg-Sc</td>
<td>1347</td>
</tr>
<tr>
<td>alloy</td>
<td></td>
</tr>
<tr>
<td>D Zhemchuzhnitakova, R Kaibyshev</td>
<td></td>
</tr>
<tr>
<td>Metallic Glasses</td>
<td></td>
</tr>
<tr>
<td>Nano-crystal formation of Mg-Cu-Gd amorphous ribbon deformed by</td>
<td>1352</td>
</tr>
<tr>
<td>forced cold rolling</td>
<td></td>
</tr>
<tr>
<td>J S Park, E S Park</td>
<td></td>
</tr>
<tr>
<td>Formation of amorphous states in Ti50Ni25Cu25 alloy subjected to severe plastic deformation: nanoglass issue</td>
<td>1359</td>
</tr>
<tr>
<td>V Y Slesarenko, D A Gunderov, P G Ulyanov, R Z Valle</td>
<td></td>
</tr>
<tr>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>NANOCRYSTALLIZATION OF ZR-CU-NI-AL-AU GLASSY ALLOYS DURING SEVERE</td>
<td>1364</td>
</tr>
<tr>
<td>PLASTIC DEFORMATION</td>
<td></td>
</tr>
<tr>
<td>M Yamada, R Kamisato, T Yamasaki, H Adachi, K Tsuchiya, Y Yokoyama</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>LATE-NUMBERED PAPERS</td>
<td></td>
</tr>
<tr>
<td>EFFECT OF BACK PRESSURE ON THE THERMAL STABILITY OF SEVERELY</td>
<td>1371</td>
</tr>
<tr>
<td>DEFORMED COPPER</td>
<td></td>
</tr>
<tr>
<td>Y Wang, R Lapovok, J T Wang, Y Estrin</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>ELECTRICAL CONDUCTIVITY AND MECHANICAL PROPERTIES OF CU-0.7WT% CR</td>
<td>1381</td>
</tr>
<tr>
<td>AND CU-1.0WT% CR ALLOYS PROCESSED BY SEVERE PLASTIC DEFORMATION</td>
<td></td>
</tr>
<tr>
<td>L Kommel, A Pokatilov</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>PLENARY LECTURE PAPERS</td>
<td></td>
</tr>
<tr>
<td>A MULTI-SCALE MODEL FOR TEXTURE DEVELOPMENT IN ZR/NB NANOLAYERED</td>
<td>1388</td>
</tr>
<tr>
<td>COMPOSITES PROCESSED BY ACCUMULATIVE ROLL BONDING</td>
<td></td>
</tr>
<tr>
<td>M Ardeljan, M Knezevic, T Nizolek, I J Beyerlein, S J Zheng, J S</td>
<td></td>
</tr>
<tr>
<td>Carpenter, R J McCabe, N A Mara, T M Pollock</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>PROCESSING MAGNESIUM ALLOYS BY SEVERE PLASTIC DEFORMATION</td>
<td>1412</td>
</tr>
<tr>
<td>R B Figueiredo, M T P Aguilar, P R Cetlin, T G Langdon</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>UNDERSTANDING THE BIOLOGICAL RESPONSES OF NANOSTRUCTURED METALS AND</td>
<td>1421</td>
</tr>
<tr>
<td>SURFACES</td>
<td></td>
</tr>
<tr>
<td>T C Lowe, R A Reiss</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>MICROSTRUCTURE EVOLUTION OF A MULTIPHASE SUPERALLOY PROCESSED BY</td>
<td>1438</td>
</tr>
<tr>
<td>SEVERE PLASTIC DEFORMATION</td>
<td></td>
</tr>
<tr>
<td>X Sauvage, S Mukhtarov</td>
<td></td>
</tr>
<tr>
<td>Author Index</td>
<td></td>
</tr>
</tbody>
</table>