

# Table of Contents

## Preface

<b>Mechanical Alloying of Bulk Metallic Glass Forming Systems</b>	
J. Eckert	3
<b>Bulk Mechanical Alloying for Productive Processing of Functional Alloys</b>	
T. Aizawa and K. Tokumitsu	13
<b>Synthesis of Amorphous and Nanostructured Materials by Gas Solid Reactions</b>	
K.- Müller, M. Kubis, P. Oleinek, G. David, A. Handstein, O. Gutfleisch and L. Schultz	23
<b>Mixing of Elements during Mechanical Alloying of Powder Mixtures of Fe and of T (T=V, Cr, Mn)</b>	
T. Ziller, G. Le Caér and P. Delcroix	33
<b>Mechanically-Driven Solid State Amorphization and Nanocrystallization in Selenium</b>	
K. Lu, F.Q. Guo and Z.H. Jin	43
<b>Synthesis and Properties of Mechanically Alloyed and Ball Milled High Strength Amorphous or Quasicrystalline Al-Alloys</b>	
F. Schurack, I. Börner, J. Eckert and L. Schultz	49
<b>Solid State Amorphization of Fe<sub>50</sub>Nb<sub>50</sub> Powders during Mechanical Alloying</b>	
C.K. Lin, P.J. Desré, S.W. Kao, G.S. Chen, R.F. Louh and Y. Hwu	55
<b>Mechanically Attrited Superconducting Y-TM-Borocarbides (TM=Ni, Pd)</b>	
A. Gümbel, L. Ledig, D. Hough, C.G. Oertel, W. Skrotzki, J. Eckert and L. Schultz	61
<b>Formation of Cu-Zr-Ti Amorphous Alloys with Significant Supercooled Liquid Region by Mechanical Alloying</b>	
P.J. Desré, C.K. Lin, G.S. Chen, R.F. Louh and K.C. Chen	67
<b>Explosive Formation of Titanium and Zirconium Oxide during Milling under O<sub>2</sub> Gas</b>	
K. Tousimi, W.J. Botta Filho and A.R. Yavari	73
<b>Investigation of Combustion Reactions under Different Milling Conditions</b>	
M. Puttaswamy, Y. Chen, B. Jar and J.S. Williams	79
<b>Mechanical Alloying of the Fe<sub>1-x</sub>M<sub>x</sub> (M=Si, Ge, Sn). A Comparative Study</b>	
A.F. Cabrera, F.H. Sánchez and L. Mendoza-Zélis	85
<b>Ball Milling of Fullerene and Mechanical Alloying of Fullerene-Metal Systems</b>	
M. Umemoto, Z.G. Liu, K. Masuyama and K. Tsuchiya	93
<b>Mechanically Milled Nanocrystalline Cubic Titanium Trialuminide and Iron Aluminide Intermetallics</b>	
R.A. Varin, J. Bystrzycki, A. Calka and D. Wexler	103
<b>The Study of Structural Evolution and Thermal Stability of Ball-Milled Ti-Al and Ti-Al-Mn-Nb Nanocrystalline Powders</b>	
F. Zhang, L. Lu, M.O. Lai and T.F. Liang	109
<b>Mechanical Alloying in Fe<sub>2</sub>O<sub>3</sub>-MO (M: Zn, Ni, Cu, Mg) Systems</b>	
S. Mørup, J.Z. Jiang and L. Gerward	115
<b>Mechanochemical Treatment of Haematite - Neutron Diffraction Investigation</b>	
E. Wu, S.J. Campbell, W.A. Kaczmarek, M. Hofmann, S.J. Kennedy and A. Studer	121
<b>Mechanochemical Treatment of BaFe<sub>12</sub>O<sub>19</sub> - Mössbauer Investigation</b>	
E. Wu, S.J. Campbell, W.A. Kaczmarek and M. Hofmann	127
<b>Mechanical Alloying and Milling of Zn-Rich Zn-Al-Cu Alloys</b>	
V.M. López-Hirata, Y.H. Zhu, J.C. Rodríguez-Hernández, M.L. Saucedo-Muñoz and E.M. Arce Estrada	133
<b>Change in Structure of Mechanically Alloyed Fe-50%Al Powder</b>	
M. Hashii	139
<b>Activated and/or Liquid Phase Sintering of Mechanically Milled Nanocrystalline Powders</b>	
J.H. Ahn and Y. Kim	147
<b>Sintering and Evolution of the Microstructure of Nanocomposite Powders Ag-SnO<sub>2</sub> Prepared by Reactive Milling</b>	
N. Lorrain, L. Chaffron and C. Carry	153

<b>Comparative Study of Barium Ferrite Prepared by Mechanical Milling and Co-Precipitation</b>	159
W.K. Ng, J. Ding and L. Lu	
<b>Atomic Processes during Mechanical Compounding with Metal Hydroxides</b>	167
M. Senna	
<b>Mechanochemical Synthesis of Boron Nitride Nanotubes</b>	173
Y. Chen, J.F. Gerald, J.S. Williams and P. Willis	
<b>Short Range Order Evolution during the Nitrification of IVb Metals</b>	179
L. Mendoza-Zélis, M.A. Bab, L.C. Damonte and F.H. Sánchez	
<b>Solid State Reduction of Iron Oxide by Ball-Milling</b>	185
T. Nasu, K. Tokumitsu, K. Miyazawa, A.L. Greer and K. Suzuki	
<b>Mechanical Processing of Nanometric Magnesium Titanate Precursors</b>	191
J. Zabicky, G. Kimmel, E. Goncharov and N. Hazan	
<b>Structural Investigation of Milled <math>\alpha</math>-Fe and Barium Ferrite Nano-Mixtures</b>	197
W.A. Kaczmarek, S.J. Campbell and M. Schmidt	
<b>Gas-Phase Hydrolysis of Tetraethyl Orthosilicate (TEOS)</b>	203
J. Zabicky and H. Realpe	
<b>Mechanochemical Reactions on Copper-Based Compounds</b>	209
H.L. Castricum, H. Bakker and E.K. Poels	
<b>Mechanochemical Processing of Complex Sulphide Ores</b>	215
P. Baláz	
<b>Synthesis and Processing of Ultrafine Mg-PSZ Powder</b>	221
A.C. Dodd and P.G. McCormick	
<b>Deformation Induced Transformations of B2 FeAl and FeRh</b>	229
A.R. Yavari, D. Negri, E. Navarro, A. Deriu, A. Hernando and W.J. Botta Filho	
<b>Synthesis and Processing of Nanostructured Cr<sub>3</sub>C<sub>2</sub>-NiCr Coatings using Mechanical Milling and HVOF</b>	237
J. He, M. Ice and E.J. Lavernia	
<b>Easy Glass Formation in La- and Pd-Based Alloys by Bridgman Solidification</b>	247
T.T. Goh, X. Hu, Z.P. Lu and Y.Y. Li	
<b>Al-Fe-Nd Powders Prepared by Gas Atomisation</b>	253
K.R. Cardoso, A. Garcia Escorial, M. Lieblich, A.R. Yavari and W.J. Botta Filho	
<b>Solidification of Germanium, Al-Based and Pd-Based Alloys under High Pressure</b>	259
W.K. Wang, D.W. He, M. He, F.X. Zhang, X.S. Lao, C.S. Kiminami, L.L. Sun, Y.F. Xu and K.H. Kuo	
<b>Deformation-Induced Effect of Phase Instability of Nanocrystalline Alloys</b>	265
A.Y. Yermakov, V.L. Gapontzev, V.V. Kondratyev and Y.N. Gornostyrev	
<b>Metastable Phase Formation and Microstructure Evolution from Undercooled Eutectic Melts</b>	275
M. Leonhardt, H.-. Lindenkreuz, W. Löser and J. Eckert	
<b>Mechanically Activated Self-Propagating High Temperature Synthesis (MASHS) Applied to the MoSi<sub>2</sub> and FeSi<sub>2</sub> Phase Formation</b>	281
C. Gras, E. Gaffet, F. Bernard, F. Charlot and J.C. Niepce	
<b>Nanocrystalline FeAl Synthesis by MASHS with <i>In Situ</i> and Post Mortem Characterizations</b>	287
F. Charlot, E. Gaffet, F. Bernard, C. Gras and J.C. Niepce	
<b>Nano-Scaled Multilayered Bulk Materials Manufactured by Repeated Pressing and Rolling in the Ag-Fe and Cu-Fe Systems</b>	293
P.H. Shingu, K.N. Ishihara, A. Otsuki, M. Hashimoto, N. Hasegawa, I. Daigo and B. Huang	
<b>Nanosized Lead-Cadmium Inclusions in Aluminum</b>	299
L. Sarholt, E. Johnson, A. Johansen, T.B. Stibius Jensen, A.B. Stibius Jensen and U. Dahmen	
<b>Synthesis and Properties of Ti-Based Bulk Amorphous Alloys with a Large Supercooled Liquid Region</b>	307
K.B. Kim	
<b>Characterisation of Crystalline and Magnetic Nanostructures by Small Angle Neutron Scattering</b>	315
A. Wiedenmann	

<b>Fivefold Twinning in Nanosized Particles and Nanocrystalline Thin Films - Ubiquitous Metastable Structures</b>	
H. Hofmeister	325
<b>Reactivity in High-Energy Ball Milling Induced Self-Sustaining Reactions</b>	
R. Tomasi, E.M.J.A. Pallone and W.J. Botta Filho	333
<b>Microstructural Precursors for Decomposition of Nitrided Stainless Steels: A Comparison of Plasma Immersion Ion Implantation (PI<sup>3</sup>) and Reactive Ball Milling</b>	
X. Li, D. Wexler and A. Calka	339
<b>Structure of Mechanically Alloyed Ni-Mo Powders</b>	
D. Oleszak, V.K. Portnoy and H. Matyja	345
<b>Amorphization Kinetics of Ni<sub>60</sub>Nb<sub>40</sub> during Mechanical Alloying</b>	
P. Schumacher, M.H. Enayati and B. Cantor	351
<b>Influence of Mechanical Alloying on Precipitation in Aluminium Alloy</b>	
L. Lu, M.O. Lai, C.F. Wu and C. Breach	357
<b>Change in the Short Range Order in the Al — γ-MnOOH Mixed Systems by Mechanical Stressing</b>	
S. Sekino, T. Isobe, M. Senna, T. Shinohara, F. Wagatsuma, K. Sumiyama and K. Suzuki	363
<b>Identification of Primary Crystals in ZrTiCuNiBe Metallic Bulk Glasses</b>	
N. Wanderka, Q. Wei, I. Sieber, U. Czubayko and M.P. Macht	369
<b>Investigation of Nanoporous Carbon Powders Produced by High Energy Ball Milling and Formation of Carbon Nanotubes during Subsequent Annealing</b>	
Y. Chen, J. Fitz Gerald, L.T. Chadderton and L. Chaffron	375
<b>Structures, Properties and Responses to Heat Treatment of Melt-Spun Cu-La Alloys</b>	
L.K. Tan, Y.Y. Li, S.C. Ng and L. Lu	381
<b>Nanostructures of Fe-Based Alloys</b>	
W.J. Botta Filho, D. Negri and A.R. Yavari	387
<b>Local Structure of Amorphous Canonical Systems</b>	
P.K. Hung, D.K. Belashchenko, V.M. Chieu, N.T. Duong, V.V. Hoang and T.B. Van	393
<b><sup>57</sup>Fe Mössbauer Spectroscopy of Mechanically Alloyed Fe-50at.% Al Powder</b>	
M. Hashii and K. Tokumitsu	399
<b>Atomic Distribution Change of Fe-Cu Solid Solutions Prepared by Mechanical Alloying</b>	
K. Tokumitsu	405
<b>Structural Properties of Silicon Oxycarbide Powders Obtained by SOL-GEL Method</b>	
H. Brequel, G.D. Sorarù, F. Babonneau, D. Bahloul-Hourlier and S. Enzo	411
<b>A Study of Al<sub>75</sub>Mo<sub>25</sub> Nanocrystalline Alloys by X-Ray and Neutron Diffraction</b>	
S. Enzo, G. Mulas, F. Delogu and R. Frattini	417
<b>Surface Stress Problem in Heterogeneous Mechanochemical Reactions</b>	
E.M. Gutman	425
<b>On the Modelling of Ultra-Fine Grained Materials</b>	
M. Bush and H.S. Kim	437
<b>Computer Simulation of Diffusion in Disordered Systems</b>	
P.K. Hung, V.V. Hoang, T.D. Hanh and P.N. Nguyen	443
<b>Oxidation Process of Nanocrystalline Ni in Ni-Al<sub>2</sub>O<sub>3</sub>-ZrO<sub>2</sub> Mixture</b>	
N.A. Mariano and S.E. Kuri	449
<b>Grain Growth in Particle-Containing Metastable Microstructures</b>	
P.A. Manohar and M. Ferry	455
<b>Crystallization, Thermal and Elastic Properties of Zr-Ti-Cu-Ni-Be-C Bulk Amorphous Alloy under High Pressure</b>	
W.H. Wang, R.J. Wang, D.W. He, D.Q. Zhao, M.X. Pan and W.K. Wang	463
<b>The Thermal and Mechanical Behavior of the Vitreloy Type (Zr<sub>100-x</sub>Ti<sub>x</sub>)<sub>55</sub>(Ni<sub>45</sub>Cu<sub>55</sub>)<sub>22.5</sub>Be<sub>22.5</sub> Bulk Metallic Glasses</b>	
C.C. Hays, P. Kim and W.L. Johnson	469
<b>Thermal Stability and Decomposition of Nanostructural Iron Nitrides Made by Reactive Ball Milling of Iron in Ammonia</b>	
K. Brzózka, M. Gawronski, K. Jezuita, T. Szumiata, D. Wexler and A. Calka	475
<b>Influence of Nanocrystallization on Corrosion Resistance of Fe<sub>84</sub>Nb<sub>7</sub>B<sub>9</sub> Amorphous Alloy</b>	
C.A.C.d. Souza, M.F.d. Oliveira, W.J. Botta Filho and C.S. Kiminami	481

<b>Calorimetric and Mössbauer Studies of the Nanocrystallized Fe<sub>90</sub>Zr<sub>7</sub>B<sub>3</sub> Alloy</b>	487
N. Lécaudé, J.C. Perron, N. Randrianantoandro and J.M. Grenèche	
<b>A Comparative Study of the Nanocrystallization in Finemet and Nanoperm-Type Amorphous Ribbons</b>	493
N. Lécaudé and J.C. Perron	
<b>Nanocrystallization Studies of a Melt-Quenched Ni<sub>81</sub>P<sub>19</sub> Amorphous Alloy</b>	499
A. Revesz, J. Lendvai and I. Bakonyi	
<b>An Electrocatalytic Study of Mechanically Alloved Cu-Ni Alloys</b>	507
E.M. Arce Estrada, N.E. Torres-González and V.M. López-Hirata	
<b>Raney Type Surfaces Prepared by High Energy Ball Milling: Application to the Synthesis of Electroanalysts for the Sodium Chlorate Industry</b>	513
H. Razafitrimo, M. Blouin, L. Roué, D. Guay, J. Huot and R. Schulz	
<b>Nanocrystalline Soft Magnetic Materials: A Decade of Alloy Development</b>	521
K. Suzuki	
<b>Correlation between Magnetic and Structural Parameters in Fe-40Al at % Nanostructured Alloys</b>	531
X. Amils, J. Nogués, J.S. Muñoz Domínguez, S. Suriñach and M.D. Baró	
<b>Magnetic Properties of Rapidly Quenched RE-Fe-Al Alloys with RE=Nd and Y</b>	539
J. Ding, Y.Y. Li and X.Z. Wang	
<b>Low-Temperature Magnetic Behavior of Ball-Milled Copper Ferrite</b>	545
G.F. Goya, H.R. Rechenberg and J.Z. Jiang	
<b>Simulation of Structure and Magnetic Properties of Amorphous Ni</b>	551
V.V. Hoang, T.B. Van and P.K. Hung	
<b>Magnetic Properties of Fe-Cu Solid Solutions Prepared by Mechanical Alloying</b>	557
K. Tokumitsu	
<b>The Ductility Problem in Nanocrystalline Materials</b>	565
C.C. Koch and T.R. Malow	
<b>Mechanical Properties of Intermetallic/Ceramic Composites Prepared by High Energy Milling</b>	575
R. Bohn, G. Fanta, R. Günther, B. Dickau, T. Klassen, F. Gärtner, H.R. Maier and R. Bormann	
<b>The Effect of Grain Size on the Mechanical Properties of NiAl Produced by Mechanical Alloying</b>	581
S.J. Hwang	
<b>Compressibility of Ball-Milled Nanocrystalline Materials Determined at High Pressure: First Results</b>	587
E. Gaffet, C. Meunier, S. Vives and J.-. Itié	
<b>On the Cyclic Behavior of Ultra-Fine Grained Copper Produced by Equi-Channel Angular Pressing</b>	593
S. Hashimoto, Y. Kaneko, K. Kitagawa, A. Vinogradov and R. Valiev	
<b>Semi-Solid Plasticity of Nanocrystalline Cu-Mg-TiC Alloys Prepared by Mechanical Alloying</b>	599
Y. Ogino, B.L. Shen and T. Yamasaki	
<b>Acoustic Emission and Strain Localization in Ultra-Fine Grained Copper Produced by Equi-Channel Angular Pressing</b>	607
A. Vinogradov, V. Patlan and K. Kitagawa	
<b>Structure and Hydrogen Sorption Properties of Ball Milled Mg Dihydride</b>	615
R. Schulz, J. Huot, G.X. Liang, S. Boily and A. Van Neste	
<b>Nanostructured Colloidal Metal and Semiconductor Particles</b>	623
M. Giersig	
<b>Novel Thermal Properties of Nanostructured Materials</b>	629
J.A. Eastman, U.S. Choi, S. Li, G. Soyez, L.J. Thompson and R.J. DiMelfi	
<b>Hardness and Corrosion Performance of Nanocrystalline Iron Powder Prepared by Ball Milling: Comparison with Different Iron Obtained by Conventional Methods</b>	635
O. Elkedi, H.S. Cao and P. Fluzin	
<b>On Corrosion of Ultra-Fine Grained Copper Produced by Equi-Channel Angular Pressing</b>	641
A. Vinogradov, T. Mimaki, S. Hashimoto and R. Valiev	
<b>Some Peculiarities in the Relaxation of Amorphous Ribbons Annealed by Joule Heating under Stresses</b>	647
F. Alves, J.M. Grenèche, A. Houzali, N. Lécaudé and J.C. Perron	

**Experimental Investigation of the Formation Enthalpies of the Zr-Cu-Al Amorphous Alloys**

A.A. Turchanin, S.A. Dogel, I.A. Tomilin and K.B. Kim

653