

Table of Contents

Preface

Ductilisation of Fe-Based Metallic Glasses

A.R. Yavari and A. Inoue 3

Nanostructure Synthesis and Amorphization during Cold Rolling

J.H. Perepezko, R.J. Hebert and R.I. Wu 11

Significance of the Heat of Mixing for the Amorphization of Multilayers by Deformation Processing

R.J. Hebert and J.H. Perepezko 21

Novel Multicomponent Amorphous Alloys

B. Cantor, K.B. Kim and P.J. Warren 27

Consolidation of Partially Amorphous Al-Fe-Zr Alloys

C.A.D. Rodrigues, D.R. Leiva, K.R. Cardoso, C.S. Kiminami and W.J. Botta Filho 33

Glass-Forming Ability of Mg-Cu-Co-Y Alloy

H. Men, J. Xu and M.C. Yang 39

Formation of Glassy $\text{Ti}_{50}\text{Cu}_{20}\text{Ni}_{24}\text{Si}_4\text{B}_2$ Alloy by High-Energy Ball Milling

L.C. Zhang and J. Xu 47

Glass Formation of Containerless Levitated $\text{Zr}_{55}\text{Al}_{10}\text{Ni}_5\text{Cu}_{30}$ Alloy Containing Oxygen

M.F.d. Oliveira, M.J. Kaufman, W.J. Botta Filho and C.S. Kiminami 53

Phase Evolution and Microstructural Characterisation of High-Energy Ball Milled Al-Si-Fe-Ni Alloys

R.D. Sá Lisboa, M.N.R.V. Perdigão, C.S. Kiminami and W.J. Botta Filho 59

Single Activation Enthalpy of Diffusion in a ZrTiCuNiBe Bulk Glass Around the Glass Transition After Structural Relaxation

T. Zumkley, V. Naundorf, M.P. Macht and G. Froberg 65

Viscosity of Mechanically Alloyed Amorphous Zr-Cu-Al-Ni Matrix Composites in the Supercooled Liquid Region

S. Deledda, J. Eckert and L. Schultz 71

Transformations in Primary Crystallites in (Fe,Ni)-Based Metallic Glasses

A.L. Greer and I.T. Walker 77

Quasicrystal Formation, Phase Selection and Crystallization Kinetics in Zr-Cu-Ni-Al Based Metallic Glasses

U. Köster, D. Zander and R. Janlewing 89

Formation of Quasicrystals and Crystallization Sequence in the $\text{Zr}_{46.8}\text{Ti}_{8.2}\text{Cu}_{7.5}\text{Ni}_{10}\text{Be}_{27.5}$ Bulk Glass

M.P. Macht, S. Mechler, M. Müller and N. Wanderka 99

Generation and Annihilation of Nanocrystalline Nucleus in Undercooled Pd-Cu-Ni-P Particle

N. Nishiyama and A. Inoue 105

Extremely Low Critical Cooling Rate for $\text{Pd}_{43}\text{Ni}_{10}\text{Cu}_{27}\text{P}_{20}$

J. Schroers and W.L. Johnson 111

Comparative Analysis of Crystallization of $\text{Al}_{85}\text{RE}_8\text{Ni}_5\text{Co}_2$ (RE = Rare-Earth Metals) Metallic Glasses with and without Supercooled Liquid Region

D.V. Louzguine-Luzgin and A. Inoue 117

Electrical Discharge Assisted Ball Milling: a Promising Materials Synthesis and Processing Method

A. Calka and D. Wexler 125

Atmospheric and Milling-Device Effects on the Activation Energy for Crystallization of a Partially Amorphized Ni-Mo Alloy

R. Martínez-Sánchez, I. Estrada-Guel, D. Jaramillo-Vigueras, S.D. De la Torre, C. Gaona-Tiburcio and J. Guerrero-Paz 135

Modeling of Fast Microcontact Interactions of Solids during Milling, Mechanical Alloying and Mechanical Activation by Dynamic Nanoindentation Technique

Y.I. Golovin, V.I. Ivolgin, V.V. Korenkov, A.I. Tyurin and B.Y. Farber 141

Effect of Sintering Conditions on The Martensitic Transformation in a MA and SPS Sintered Cu-50 at.% Co Alloy	
L. Díaz-Barriga Arceo, E. Orozco, K. Tsuchiya, M. Umemoto and V.M. López-Hirata	147
Consolidation of Mechanically Alloyed Fe-27at%Al at High Pressure	
G. González, L. D'Angelo, J.L. Ochoa and D. Bonyuet	153
The Influence of Milling Intensity on Mechanical Alloying	
G. González, L. D'Angelo, J.L. Ochoa, B. Lara and E. Rodriguez	159
Structural and Chemical Characterization of Cu-Ag and Ni-Ag Nanocomposites Synthesized by High-Energy Ball Milling	
S. Zghal, P. Bhattacharya, R. Twesten, F. Wu and P. Bellon	165
Mechanically Alloyed (Fe_{0.5}Cu_{0.5})_{100-x}Zr_x Alloys	
P. Crespo, P. Marín, P. Agudo, M.C. Alócén, A. Hernando, A. Garcia Escorial, J. Eckert, S. Roth and L. Schultz	175
Evolution of Structure in the Disordered Nanocrystalline Fe₇₅Si₂₅ Alloy under Heat Treatment	
E.P. Yelsukov, V.M. Fomin, O.M. Nemtsova and D.A. Shklyayev	181
Amorphization and Reactivity of Silicon Induced by Mechanical Treatment	
A.N. Streletskii, A.V. Leonov, I.V. Beresteskaia, S.N. Mudretsova, A.F. Majorova and P.J. Butyagin	187
Formation and Stability of Metastable Pd(Zr) Solid Solution Developed during Ball Milling and/or Heat Treatment of Pd₃Zr	
G.L. Katona, M. Kis-Varga and D.L. Beke	193
Characterization of Alloyed Cementite Produced by Mechanical Alloying and Spark Plasma Sintering	
M. Umemoto, Z.G. Liu, D.Y. Liu, H. Takaoka and K. Tsuchiya	199
Structural Investigations of CuZr Prepared by Mechanical Alloying	
A. Al-Hajry, M. Al-Assiri, S. Al-Heniti, S. Enzo, J. Hefne, A. Al-Shahrani and A.E. Al-Salami	205
A Neutron Small-Angle Scattering Study of the HfPd System	
A. Al-Hajry, M. Al-Assiri, S. Enzo, K.S. Na, N. Cowlam, J. Hefne, L. Jones, F. Delogu and H. Brequel	211
Synthesis and Characterization of Nickel, Cobalt and Iron Raney Catalysts Prepared by Mechanical Alloying and Alkaline Leaching	
J. Angeles-Islas, M. Arzola-Mendoza, B.H. Zeifert, J.G. Cabañas-Moreno, H.A. Calderón, H. Yee-Madeira and R. Zamorano	217
NiAl-Al₂O₃ Nanocomposite Powders Formed by Reactive Milling	
D. Oleszak	223
Diamond Synthesis by Mechanically Induced Detonation	
A.R. Torosyan, V.S. Baghdasaryan, V.G. Martirosyan, S.G. Aloyan, H.G. Balayan, H.V. Navasardyan and S.A. Barseghyan	229
Chemomechanical Effects Accompanying Mechanochemical Reactions and Creep	
E.M. Gutman	235
Preparation of Disperse Ceramic Materials by Soft Mechanochemical Synthesis	
E.G. Avvakumov, L.G. Karakchiev, A.A. Gusev and O.B. Vinokurova	245
A New Mechanochemical Method for Metal Coating	
A.R. Torosyan, J.R. Tuck, A.M. Korsunsky and S.A. Barseghyan	251
Mechanochemical Reduction of Copper Sulfide	
P. Baláz, L. Takacs, J.Z. Jiang, V. Soika and M. Luxová	257
Mechanochemical Treatment of Scrap Tire Rubber	
M. Magini, F. Cavalieri and F. Padella	263
Growth of Fe Oxide Whisker from Fe-Cu and Fe-Ag Supersaturated Solid Solution Nanoparticles	
Y. Todaka, K. Tsuchiya and M. Umemoto	269
Neutron Diffraction Study of Nanocrystalline Oxycarbide Glasses Prepared by Sol-Gel	
H. Brequel, S. Enzo, F. Babonneau and P.G. Radaelli	275
Production of Nanostructured CoO, Co₃O₄ and NiO Particles by Mechanically Induced Reactions	
G. García-Pacheco, J.G. Cabañas-Moreno, H. Yee-Madeira, F. Cruz-Gandarilla and M. Umemoto	281

Reaction Kinetics and Microstructural Evolution during the Heating of High Energy Ball Milled Al-TiO₂ and Al-V₂O₅ Composite Powders D.L. Zhang, D. Ying and G. Adam	287
Solid State Reactions between V₂O₅ and C during Mechanochemical Processing and Heating of V₂O₅/C Composite Powders D.L. Zhang and G. Adam	293
Spark Plasma Sintering of Alumina-Cr and -Nb Composites S.D. De la Torre, D.E. García, N. Claussen, R. Janßen, Y. Nishikawa, H. Miyamoto, R. Martínez-Sánchez, D. Ríos-Jara and A. García-Luna	299
Nanostructured Metastable β-Titanium Based Alloy F. Prima, P. Vermaut, I. Thibon, D. Ansel, J. Debuigne and T. Gloriant	307
Synthesis and Properties of Al-Based Amorphous and Nanocrystalline Thin Films L. Berger, J.W. Mrosk, C. Ettl and H.J. Fecht	315
Formation of Nanocrystalline Ferrite in Fe-0.89C Spheroidite by Ball Milling M. Umemoto, Z.G. Liu, Y. Xu and K. Tsuchiya	323
Processing and Properties of Dense Cu Nanocomposites E.Y. Gutmanas, A. Trudler and I. Gotman	329
Precursor-Derived SiC/Si₃N₄ Nano/Nano Composites: Synthesis, Structure and Phase Evolution at High Temperatures M. Weinmann, A. Zern, M. Hörz, F. Berger, K. Müller and F. Aldinger	335
Single-Step Preparation of Nanocomposites S. Mathur, M. Veith, H. Shen and S. Hüfner	341
Gas-Phase Combustion Synthesis of Tin Oxide Nanoparticles D.L. Hall, P.V. Torek, C.R. Schrock, T.R. Palmer and M.S. Wooldridge	347
Preparation and Characterization of Cr-O Films Grown by Low-Temperature Chemical Vapor Deposition F. Barradas-Olmos, J.R. Vargas-García and J.J. Cruz-Rivera	353
Structure/Property Relationship in Silicon Oxycarbide Glasses and Ceramics Obtained via the Sol-Gel Method H. Brequel, S. Enzo, S. Walter, G.D. Sorarù, R. Badheka and F. Babonneau	359
Structural Investigation of Silicon Carbonitride Glasses by Neutron Diffraction H. Brequel, S. Enzo, G. Gregori, H.J. Kleebe and A.C. Hannon	365
Solid Solution Behavior of Ce_xZr_{1-x}O₂ Nanopowders Prepared by Flame Spray Pyrolysis of Solvent-Borne Precursors A.C. Sutorik and M.S. Baliai	371
Recent Developments in Mechanochemical Nanoparticle Synthesis P.G. McCormick and T. Tsuzuki	377
Thermal Stability of Nanostructured Electrodeposits G.D. Hibbard, U. Erb, K.T. Aust, U. Klement and G. Palumbo	387
Microstructure and Thermal Stability of Electrodeposited Nanocrystalline Nickel M. Hourai, P. Holdway, A. Cerezo and G.D.W. Smith	397
Microstructural Investigation of Grain Stability in Cryomilled Inconel 625 K.H. Chung, J.S. Lee, R. Rodriguez, D.H. Shin and E.J. Lavernia	403
Thermally Stable Nanocrystalline Al-Mg Alloy Powders Produced by Cryomilling F. Zhou, R. Rodriguez and E.J. Lavernia	409
Tensile Properties of Bulk Nanocrystalline Hexagonal Cobalt Electrodeposits A.A. Karimpoor, U. Erb, K.T. Aust, Z. Wang and G. Palumbo	415
Modelling of Equal Channel Angular Pressing for Ultrafine-Grained Metals H.S. Kim, M.H. Seo, S.I. Hong, H.R. Lee, B.S. Chun and K.H. Lee	421
Study of Embedded Lead-Tin Nanoparticles in Aluminum Matrix V. Bhattacharya, P. Bhattacharya and K. Chattopadhyay	427
Spin Dynamics of Nanostructured La_{2/3}Ca_{1/3}MnO₃ G.F. Goya, H.R. Rechenberg and M.R. Ibarra	433
Bulk Fe-Based Metallic Glass with Extremely Soft Ferromagnetic Properties T.D. Shen, U. Harms and R.B. Schwarz	441
Disordered Magnetism at the Grain Boundary of Pure Nanocrystalline Iron A. Hernando, P. Crespo, M.S. Flores, L. Del Bianco and F. Briones	447

Magnetism and Structure of Nanoparticles and Mesoscopic Systems A.Y. Yermakov, M.A. Uimin, A.A. Mysik, A.Y. Korobeinikov, A.V. Korolyov, N.V. Mushnikov, T. Goto, V.S. Gaviko and N.N. Shchegoleva	455
Structural and Magnetic Characterization of High-Coercive Ball-Milled Hard Magnetic (SmCo₅) + Antiferromagnetic (NiO) Composites J. Sort, J. Nogués, S. Suriñach, J.S. Muñoz Domínguez, E. Chappel, F. Dupont, G. Chouteau and M.D. Baró	465
⁵⁷Fe Mössbauer Spectroscopy Study of FeSi₂ Powders Prepared by Water Atomization K. Tokumitsu and M. Wada	473
Structural Change and ⁵⁷Fe Mössbauer Spectroscopy Study of Mechanically Alloyed Fe₂C Powder K. Tokumitsu and M. Umemoto	479
Properties of Fe and Co Nanoparticles Synthesized by Chemical Vapor Condensation C.J. Choi, X.L. Dong, B.K. Kim and J.H. Ahn	485
Magnetic and Transport Properties of Mechanosynthesized FeCr₂S₄ Sulfospinel G.F. Goya	491
Influence of the B Content on the Structural and Magnetic Properties of Fe₆₀Mn₁₀Al_{30-x}B_x Prepared by Mechanical Alloying M.M. Rico, J. Sort, S. Suriñach, J.S. Muñoz Domínguez, J.M. Grenèche, G.A. Pérez Alcázar and M.D. Baró	497
Structure of Fe-Ag Super-Laminates Fabricated by Repeated Rolling and Mechanically Alloyed Fe-Ag Powder T. Yoshioka, M. Yasuda, H. Miyamura, S. Kikuchi and K. Tokumitsu	503
High Strength Nanocrystalline Mg-Based Alloys A. Inoue, Y. Kawamura, M. Matsushita and K. Hayashi	509
Some Unresolved Issues Concerning Mechanical Behavior of Nanocrystalline Metals J.R. Weertman	519
High Energy Milling of Si-Doped Titanium Aluminides— General Problems and Potential Applications G. Fanta, R. Bohn, T. Klassen and R. Bormann	521
Rapidly Solidified Powder Metallurgy Magnesium Alloys with Novel Mechanical Properties Y. Kawamura, K. Hayashi, A. Inoue and T. Masumoto	529
Use of a Cobalt-Based Metallic Glass for Joining MoSi₂ to Stainless Steel R.U. Vaidya, P. Rangaswamy, D.P. Butt, A. Misra, D.E. Gallegos, R.G. Castro and J.J. Petrovic	535
Superplastic Forging of ZrTiCuNiBe-Bulk Glass for Shaping of Microparts T. Zumdkey, S. Suzuki, M. Seidel, S. Mechler and M.P. Macht	541
Microstructural and Deformation Characteristics of a Laminated Amorphous/Nanocrystalline Alloy, Zr₆₇Nb₆Cu₁₄Ni₁₀Al₃ A.K. Ghosh and S.C. Medeiros	547
Development of Welding Technologies in Bulk Metallic Glasses Y. Kawamura, Y. Ohno and A. Chiba	553
On the Atomic Force Microscopy Characterization of Some Zr-Based Metallic Glasses: Anomalous Electrostatic Behavior T. Benamer, A. Touhami and A.R. Yavari	559
Nanocrystalline Al-Based Alloys for Elevated Temperature Applications S. Purushotham and A.K. Ghosh	565
Determination of the Mechanical Properties of Nanocrystalline Fe-Cr-Based Thermal Spray Coatings G. Bürkle, F. Banhart, A. Sagel, C. Wanke, G. Croopnick and H.J. Fecht	571
Microstructural Evolution and Mechanical Flow of 6061 Al during Equal Channel Angular Pressing B.S. Moon, M.H. Seo, Y.S. Kim, K.H. Lee, H.S. Kim and S.I. Hong	577
Anomalous Elastic Properties of Metal-Metal Interfaces U. Harms and R.B. Schwarz	583
Mechanical Activation of Granite Rock Dust: Strength Development in Portland Cement Concrete and Lime Mortars P.C. Lessard and M. Havens-Cook	589
Bulk Shape Memory NiTi with Refined Grain Size Synthesized by Mechanical Alloying W.C. Crone, A.N. Yahya and J.H. Perepezhko	597

Mechanosynthesis of Hydrogen Storage Alloys G.X. Liang, J. Huot and R. Schulz	603
Electrochemical Properties of Nanocrystalline Sn-Based Alloys for Lithium Batteries J.H. Ahn, Y.J. Kim and C.J. Choi	609
Synthesis of B2-Structured Mg Alloys by Mechanical Alloying, and their Hydriding Properties S. Hwang and C. Nishimura	615
Microstructural Characterisation of a Rapidly Solidified Mm(NiCoMnAl)₅ Hydride-Forming Alloy S. Gulbrandsen-Dahl, J.K. Solberg, R. Brateng and R. Tunold	621
Oxidation of Glassy and Nanocrystalline Zr₇₀Pd₃₀ Alloys L. Jastrow, M. Meuris, U. Köster, N. Froumin and D. Eliezer	627
H₂S-Sensing Properties of Nanocrystalline SnO₂ Powder Produced by Mechanochemical Milling Ü. Kersen	633
Unusual Metastable Ion-Conducting States in Ionic Salt- Oxide Nanocomposites N.F. Uvarov, V.G. Ponomareva, G.V. Lavrova and L.I. Brezhneva	639
Synthesis of Biomaterials by Mechanochemical Transformation G. González, R. Villalba and A. Sagarzazu	645