

# Table of Contents

## Preface and Conference Photo

### Methods of Electron Crystallography as Tools for Materials Analysis

W. Neumann, H. Kirmse, I. Häusler, C. Grosse, P. Moeck, S. Rouvimov, M. Beekman, R. Atkins, D.C. Johnson and K. Volz

1

### Characterization of Grain Boundary Geometry in the TEM, Exemplified in Si Thin Films

J.L. Lábár, Á.K. Kiss, S. Christiansen and F. Falk

7

### Orientation and Phase Mapping in TEM Microscopy (EBSD-TEM Like): Applications to Materials Science

E.F. Rauch, M. Véron, S. Nicolopoulos and D. Bultreys

13

### The Art and Application of Large Angle Convergent Beam Electron Diffraction

E. Jezierska

16

### Cathodoluminescence and Electroluminescence of Semiconductor Structures in SEM

M. Pluska, A. Czerwiński, J. Ratajczak, A. Szerling and J. Kątcki

20

### Secondary Electron Detector with the Unipotential Lens Structure for Variable Pressure/Environmental SEM

W. Słówko and M. Krysztof

24

### A Quantitative Analytical Method for the Identification and Characterization of Mineralized Nanoparticles in Food Supplements

S. Richter, K. Riediger and A. Nester

28

### Physical and Chemical Studies of Bacterial Bioaerosols at Wastewater Treatment Plant Using Scanning Electron Mikroscopy and X-Ray Photoelectron Spectroscopy

J. Płoszaj, E. Talik, Z. Piotrowska-Seget and J.S. Pastuszka

32

### 3D Imaging and Metrology of Yttria Dispersoids in INCOLOY MA956 by Electron Tomography

A. Kruk, B. Dubiel and A. Czyrska-Filemonowicz

37

### 3D Imaging of Strengthening Particles in Cr-V-Mo (13HMF) Steel Using FIB/SEM Tomography

W. Osuch, A. Kruk, G. Michta and A. Czyrska-Filemonowicz

41

### Three-Dimensional Visualization and Metrology of Nanoparticles in Inconel 718 by Electron Tomography

K. Kulawik, A. Kruk, B. Dubiel and A. Czyrska-Filemonowicz

45

### Martensitic Transformation in Ti<sub>50</sub>Ni<sub>25</sub>Cu<sub>25</sub> Shape Memory Alloy Studied by EBSD

T. Goryczka and J. Lelątko

49

### Investigations of Fine Grained Metallic Materials by Means of Orientation Maps in Transmission Electron Microscope

M. Bieda

53

### Phase Identification in Nickel-Based Superalloys Using EBSD/SEM and Electron Diffraction in STEM

B. Chmiela, M. Sozańska and K. Rodak

58

### High Resolution EBSD/SEM Analysis of PLZT Ferroelectric Crystals in Low Vacuum Conditions - A few Practical Remarks

K. Berent and M. Faryna

62

### Study of Silicon Nanoparticles Formation in Silicon Nitride

J. Ratajczak, K. Hejduk, M. Lipiński, T. Piotrowski, M. Pluska, A. Łaszcz and A. Czerwiński

66

### Structural and Chemical Characterization of Al(Ga)N/GaN Quantum Well Structures Grown by Plasma Assisted Molecular Beam Epitaxy

J. Borysiuk, P. Dłużewski, Z. Zytkiewicz, M. Sobańska, K. Kłosek and B. Łucznik

70

### Wurtzite-to Amorphous-to Cubic Phase Transition of GaN<sub>1-X</sub>As<sub>X</sub> Alloys with Increasing as Content

Z. Liliental-Weber, R. dos Reis, A. Levander, K.M. Yu, W. Walukiewicz, S.V. Novikov and C.T. Foxon

74

### Study of Oxides Formed in HfO<sub>2</sub>/Si Structure for High-k Dielectric Applications

A. Łaszcz, A. Czerwiński, J. Ratajczak, A. Taube, S. Gieraltowska, A.B. Piotrowska and J. Kątcki

78

### Ni-Based Ohmic Contacts to Silicon Carbide Examined by Electron Microscopy

M. Wzorek, A. Czerwiński, A.V. Kuchuk, J. Ratajczak, A.B. Piotrowska and J. Kątcki

82

<b>Crystallization and Microstructure of Co<sub>0.75</sub>Ni<sub>0.25</sub>Si<sub>2</sub> Solid Solution</b>	86
W. Gurdziel, Z. Wokulski, G. Dercz and J. Krawczyk	
<b>Nanotexture Studies of NiTi Shape Memory Alloy after Severe Plastic Deformation with the Use of TEM</b>	90
D. Stróż, J. Palka and Z. Lekston	
<b>SEM EBSD and TEM Structure Studies of <math>\alpha</math>-Brass after Severe Plastic Deformation Using Equal Channel Rolling Followed by Groove Pressing</b>	94
S. Rusz, J. Dutkiewicz, M. Faryna, W. Maziarz, L. Rogal, J. Bogucka, K. Malanik, J. Kedroń and S. Tylśar	
<b>Crystallographic Aspects of Deformation and Recrystallization in ECAP-Processed AA3104 Aluminium Alloy</b>	98
H. Paul, T. Baudin, A. Tarasek and F. Brisset	
<b>Microstructure of the Ni-W Solid Solution Prepared by Levitation and after High Pressure Torsion Severe Plastic Deformation</b>	104
T. Czeppe, A. Sypień, G.F. Korznikova and A. Korznikov	
<b>Near Grain Boundary Behavior of Aluminum Bicrystals Deformed in Plane Strain Conditions</b>	108
W. Wajda and H. Paul	
<b>Microstructure and Texture Evolutions in AA1200 Aluminum Alloy Deformed by Accumulative Roll Bonding Method</b>	112
J. Bogucka, H. Paul, M. Bieda and T. Baudin	
<b>Gradient Microstructure of FeCr30Co8 Hard Magnetic Alloy Subjected to Plastic Deformation by Tension Combined with Torsion at 700 and 720°C</b>	116
A. Korneva	
<b>Effect of Rapid Solidification on the Structure and Mechanical Properties of AZ91 Magnesium Alloy</b>	120
T. Tokarski	
<b>Microstructure of LaNi<sub>5</sub> Base Nanopowders Produced by High Energy Ball Milling</b>	124
J. Kusiński, K. Kowalski, S. Kac, P. Matteazzi, M. Krebs, J. Morgiel and S. Cochet	
<b>Microstructure of AgNi and AgSnBi Powders Consolidated by CEC</b>	130
M.W. Richert, J. Richert, M. Książek, A. Hotłoś, P. Pałka, M. Perek-Nowak and M. Maślanka	
<b>Correlation between SEM and X-Ray Diffraction Imaging of Defect Structure in Single-Crystal Ni-Based Superalloy</b>	135
W. Bogdanowicz, R. Albrecht, J. Sieniawski, K. Kubiak and A. Onyszko	
<b>TEM Analyses of Microstructure Evolution in Ex-Service Single Crystal CMSX-4 Gas Turbine Blade</b>	139
B. Dubiel and A. Czyska-Filemonowicz	
<b>Degradation of Microstructure after Service in ZhS6k Superalloy with Diffusive Aluminide Coating</b>	143
M. Sozańska, B. Chmiela, M. Kianicova and J. Cwajna	
<b>High Temperature Deformation of Superalloy Inconel 718</b>	147
A. Nowotnik	
<b>Structural Perfection of a Single Crystal Nickel-Based CMSX-4 Superalloy</b>	151
A. Onyszko, W. Bogdanowicz and J. Sieniawski	
<b>Structure-Property Relationship in a Haynes® 242™ Alloy Subjected to Long-Term Exposure at 650°C</b>	156
E. Stępińska and S. Dymek	
<b>Structure and Morphology of Thin Films Deposited by Pulsed Laser Deposition Technique</b>	160
A. Radziszewska	
<b>Microstructure Investigation in Thin Films WO<sub>3</sub> Produced by Pulsed Laser Deposition</b>	164
A. Kopia	
<b>Microstructural Investigations of Ca and La Doped CoO Thin Films Prepared by Pulsed Laser Deposition Technique</b>	168
Ł. Cieniek and J. Kusiński	
<b>THEED Study of CrTe Thin Films Obtained by Pulsed Laser Deposition</b>	172
P. Sagan and M. Kuzma	
<b>TEM and CL Investigations of Pd Nanograins Included in Carbonaceous Film</b>	177
K. Sobczak, P. Dłużewski, B.S. Witkowski, J. Dabrowski, M. Kozłowski, E. Kowalska and E. Czerwosz	

<b>Effect of Silicon Additions in CrSi (10, 20, 30, 40 at. % Si) Magnetron Targets on Microstructure of Reactively Deposited (Cr,Si)N Coatings</b>	182
J. Grzonka, R. Mania, J.L. Lábár and J. Morgiel	
<b>TEM Investigations of Damage Caused by Indentation of Multilayer TiN/Ti/a-C-H Coatings</b>	188
Ł. Major	
<b>Electron Microscope Investigation of PVD Coated Aluminium Alloy Surface Layer</b>	192
T. Tański and K. Labisz	
<b>TEM Studies of Structure of Ag Base Nanocomposite Strengthened with Amorphous NiNbTiZr Alloy Intended for Electric Contact Materials</b>	198
J. Dutkiewicz, L. Lityńska-Dobrzańska, K. Berent, M. Woch and M. Osadnik	
<b>TEM Investigation of Metal/Ceramic Interfaces in AA7475/AlN or Al<sub>2</sub>O<sub>3</sub> Nano-Composites</b>	202
M. Gajewska, J. Dutkiewicz, L. Lityńska-Dobrzańska and J. Morgiel	
<b>Optimization of Structure and Magnetic Properties of NdFeBTi Nanocomposite Magnets</b>	206
D. Derewnicka, P. Dłużewski, M. Spyra and H. Krztoń	
<b>Characterization of Al<sub>65.0</sub>Cu<sub>32.9</sub>Co<sub>2.1</sub> Alloy Containing Nanofibres</b>	212
J. Krawczyk, W. Bogdanowicz, G. Dercz and W. Gurdziel	
<b>Formation and Properties of Amorphous/Crystalline Ductile Composites in Ni-Ag-P Immiscible Alloys</b>	216
K. Ziewiec, P. Małczewski, G. Boczkal and K. Prusik	
<b>SEM and TEM Characterization of NiAl<sub>2</sub>O<sub>4</sub> Spinel Phase in Al<sub>2</sub>O<sub>3</sub> Matrix Ni Composite</b>	222
K. Konopka, L. Lityńska-Dobrzańska and J. Dutkiewicz	
<b>Characterization of Composite Based on Al–Cu–Co Alloy</b>	226
W. Bogdanowicz, J. Krawczyk and R. Albrecht	
<b>Microstructure and Mechanical Properties of PVD Nanocrystalline Layers</b>	230
K. Lukaszkowicz and J. Konieczny	
<b>Microstructure and Deposition Relations in Alumina Particle Strengthened Ni-W Matrix Composites</b>	234
P. Indyka, E. Beltowska-Lehman, M. Bieda, J. Morgiel and L. Tarkowski	
<b>Microstructure, Chemistry and Mechanical Properties of the Ni/AgBiCuSn/Ni Interconnections</b>	239
A. Sypień, L. Lityńska-Dobrzańska, A. Wierzbicka-Miernik and P. Zieba	
<b>Morphology and Chemical Composition of Ag/In/Ag Interconnections</b>	243
P. Skrzyniarz, L. Lityńska-Dobrzańska and P. Zieba	
<b>Microstructure and Properties of Hot Compacted Al-12 wt% Zn-3 wt% Mg-1.5 wt% Cu Melt Spun Ribbons</b>	247
L. Lityńska-Dobrzańska, J. Dutkiewicz, W. Maziarz, M. Faryna, K. Stan and A. Kanciruk	
<b>SEM and TEM Studies of Magnetic Shape Memory NiCoMnIn Melt Spun Ribbons</b>	251
W. Maziarz	
<b>TEM Study of Quasicrystals in Al-Mn-Fe Melt-Spun Ribbon</b>	255
K. Stan, L. Lityńska-Dobrzańska, J. Dutkiewicz, L. Rogal and A.M. Janus	
<b>Structure of Nitride and Nitride/Oxide Layers Formed on NiTi Alloy</b>	259
J. Lelątko, M. Freitag, J. Rak, T. Wierzchoń and T. Goryczka	
<b>Positive Hydrogen Effect in Structure Surface Layers on Ti Alloy</b>	263
M. Sozańska and H. Garbacz	
<b>Electron Microscopy Investigation of Ageing Behavior in a Cu–Ni–Si Alloy</b>	267
S. Dymek, P. Kwaśniewski, M. Blicharski and T. Knych	
<b>TEM Study of Ni-Mn-Co-In Ferromagnetic Shape Memory Alloys</b>	271
K. Prusik, K. Bałdys and D. Stróż	
<b>Tin Pest and Tin Oxidation on Tin-Rich Lead-Free Alloys Investigated by Electron Microscopy Methods</b>	275
A. Czerwiński, A. Skwarek, M. Płuska, J. Ratajczak and K. Witek	
<b>Structural and Mechanical Features of Rapidly Solidified Al-2Fe-2Ni-5Mg Alloy</b>	279
A. Kula, L. Blaz and M. Sugamata	
<b>VM12 Steel for Advanced Power Generation Plants – Metrology of the Precipitates by Electron Microscopy</b>	283
A. Zielińska-Lipiec, A. Czyrska-Filemonowicz and T. Kozięć	
<b>Microstructural Investigation of the Ferritic GX12CrMoVNbN9-1 (GP91) Cast Steel</b>	287
G. Golański and P. Wieczorek	

<b>Alloying the near Surface Layer of Stainless Steel with Rare Earth Elements (REE) Using High Intensity Pulsed Plasma Beams (HIPPB)</b>	
B. Sartowska, J. Piekoszewski, L. Waliś, M. Barlak, I. Calliari, K. Brunelli, J. Senatorski and W. Starosta	292
<b>Characterization of Precipitation Process in T24 Steel after Long-Term Ageing</b>	
G. Golański, J. Kępa, P. Wieczorek and K. Prusik	296
<b>Identification of Phases in Alloy Steels after Quenching and after Isothermal Quenching</b>	
J. Smalc-Koziorowska, E. Jezierska and W. Świątnicki	301
<b>Microstructural Changes Induced during Hydrogen Charging Process in Stainless Steels with and without Nitrided Layers</b>	
B. Gołębiowski and W. Świątnicki	305
<b>Transmission Electron Microscopy Studies of X210CrW12 and 100CR6 Thixo-Cast Steels</b>	
L. Rogal and J. Dutkiewicz	311
<b>The Degradation of Microstructure of AlCu4Ni2Mg Aluminium Alloy after Prolonged Annealing at Elevated Temperature</b>	
M. Wierzbńska and J. Sieniawski	315
<b>Transformation of Intermetallic Phases in 6066 Aluminium Alloy during its Homogenization</b>	
G. Mrowka-Nowotnik	319
<b>SEM and TEM Microstructure Characterization of a Commercial Purity Aluminum after Laser Treatment</b>	
M. Rozmus-Górnickowska, Ł. Major and J. Morgiel	323
<b>TEM Investigation of Interfaces Formed between Saffil<sup>TM</sup> Fibers and AA6061 and En Ac 44200 Aluminium Alloys</b>	
M. Pomorska, J. Kaczmar, J. Morgiel and K. Naplocha	327
<b>TEM Characterization of a 7042 Aluminum FSW Joint</b>	
M. Kopyściański, S. Dymek and C. Hamilton	331