

# Table of Contents

## Preface

## Chapter 1: Properties and Processing of Structural Metals

<b>Experimental Bench Tests on the Corrosion Resistance and the Environmental Safety of Structural Materials of the Cooling System of Nuclear Power Plant</b>	
P. Kuznetsov and O. Biedunkova	3
<b>The Iron-Carbon System: Genesis and Morphology of the Eutectic Involving Hyper-Cementite Carbide</b>	
V. Mazur	11
<b>The Role of Cell Collapse Mechanism in Mechanical Performance of Aluminium Foam Fabricated by Melt Processing</b>	
O. Byakova, S. Gnyloskurenko, A. Vlasov, Y. Yevych, N. Semenov and D. Kytranov	21
<b>Features of Microstructural Evolution and Corrosion Behavior of Ti6Al4V Titanium Alloy Fabricated from Elemental Powder Blends</b>	
S. Lavrys, I. Pohrelyuk, D.G. Savvakin, K. Shliakhetska and M.O. Danyliak	29
<b>Method for the Determination of Rational Constructional and Technological Parameters for the Processes of Powder Materials Forming</b>	
A. Mikhailov, Y. Shtefan, O. Mikhailov and M. Shtern	37
<b>Optimization and Evaluation of Mechanical and Electrochemical Properties of Ferritic Stainless Steel Welding Using Taguchi Design</b>	
M.F. Benlamnouar, N. Bensaid, M.O. Azzoug, T. Saadi, M. Zidani and R. Badji	45
<b>Peculiarities Formation of Welded Joints under the External Electromagnetic Influence</b>	
S.Y. Maksimov, O.M. Berdnikova, O.A. Prilipko, T. Alekseenko and Y. Polovetskyi	57

## Chapter 2: High-Entropy and Amorphous Alloys

<b>Nanocrystallization Behaviour of Amorphous Co<sub>67</sub>Fe<sub>4</sub>Cr<sub>7</sub>Si<sub>8</sub>B<sub>14</sub> Alloy</b>	
Y. Nykyryu, S. Mudry, Y. Kulyk and I. Shtablavyi	67
<b>Estimation of the Lattice Parameter and Lattice Distortion Based on the Results of <i>Ab Initio</i> Study of Structural Fragments of TiVZrNbMo, TiVZrNbHf, and TiVZrNbTa Multicomponent Alloys</b>	
N. Rozhenko, L. Ovsianikova and V. Kartuzov	77
<b>Thermophysical Properties of Cu-Based Subsystems of High-Entropy Alloys</b>	
Y. Plevachuk, L. Romaka, I. Janotova, P. Svec, D. Janičkovič, R. Novakovic and V. Poverzhuk	85
<b>Application of CALPHAD Method for Predicting of Concentration Range of Amorphization of Transition Metals Melts</b>	
P. Agraval, M. Turchanin, L. Dreval and A. Vodopyanova	99
<b>Structure and Properties of Melt-Quenched Al<sub>4</sub>CoCrCuFeNi High-Entropy Alloy</b>	
O.I. Kushnerov, V.F. Bashev and S.I. Ryabtsev	111
<b>Low-Temperature Elastic Properties of Molybdenum Doped Non-Equiatomic High Entropy Alloys of the Fe-Co-Ni-Cr System</b>	
Y. Semerenko, E. Tabachnikova, T. Hryhorova, S. Shumilin and V. Zoryansky	119

## Chapter 3: Protective Coatings

<b>Microstructure and Tribological Behavior of Plasma Sprayed (Ti,Cr)C-Ni Composite Coatings</b>	
M. Storozhenko, O. Umanskyi, O. Melnyk, O. Terentyev, T. Chevychelova, V. Varchenko, O. Koval, V. Brazhevsky and O. Chernyshov	127
<b>The Formation of C-S Coatings by Electrospraying Alloying with the Use of Special Process Media</b>	
O. Haponova, V. Tarelnyk, N. Tarelnyk and P. Kurp	135

## **The Structure of Boride Diffusion Coatings Produced on Selected Grades of Structural Steels**

M. Góral, B. Kościelniak, K. Ochał, T. Kubaszek, J. Jopek and M. Drajewicz 145

## **Influence of Ni Content on Microstructure and Hardness of Nickel-Graphite Abradable Seal Coatings Produced by Plasma Spraying**

O. Umanskyi, O. Kushchev, M. Storozhenko, I. Martsenyuk, O. Terentyev, V. Brazhevsky, R. Kostiunik, O. Chernyshov and T. Mosina 151

## **Structural and Tribology Properties of Ti-Al-C Coatings Deposited by Vacuum Arc Method**

V. Podhurska, O. Kuprin, M. Bortnitskaya, O. Ostash, T. Prikhna, R. Chepil, V. Sverdun, I. Kolodiy and V. Belous 157

## **The Influence of Plasma Spraying Parameters on Microstructure and Porosity of Bronze-Polyester Coatings for Plain Bearings Applications**

M. Góral, T. Kubaszek, B. Kościelniak and D. Stawarz 167

## **Strength and Crack Resistance Structural Criteria of Composite Coatings Produced by the Method of Multi-Chamber Detonation Spraying**

V. Korzhik, O.M. Berdnikova, P. Stukhliak, O. Kushnarova, J.J. Zhao and I. Skachkov 173

## **Chapter 4: Ceramics and Composite Materials**

### **Cermet Powders Based on TiAl Intermetallic for Thermal Spraying**

O. Burlachenko, N. Vigiliantska and C. Senderowski 183

### **Structural and Mechanical Properties of SiC-Rich By-Products of the Metal Grade Si Process**

T. Hafner, J. Hafner, F. Kimm, V. Bovda, O. Bovda, O. Kuprin, A. Pikalov, K. Lentsov, P. Schikhaylo, Y. Onyschuk, A. Tarasuk, V. Podhurska, B. Vasyliv, O. Shcheretsky, I. Vorona and R. Yavetskiy 193

### **Effect of Crystallization Properties of Continuous Basalt Fibers on Thermal Stability of Composite Materials**

S. Ivanitskii and Y. Chuvashov 201

### **Features of the Structural Formation of Tungsten Single Crystals in the Shape of Hollow Rotational Bodies**

Y. Nikitenko, V. Shapovalov, V. Yakusha, O. Gnizdylo and O.M. Berdnikova 207

## **Chapter 5: Special Nanomaterials**

### **Spark Plasma Sintering of a Ceramic Material with a LaLuO<sub>3</sub> Perovskite-Type Structure**

V. Kolesnichenko, Y. Yurchenko, O. Kornienko, M. Zamula, A. Samelyuk, O. Shyrokov, T. Tomila, A. Ragulya and A. Kotko 217

### **Modeling of Photovoltaic Characteristics of a TiO<sub>2</sub>/Porous-Si/Si-Based Heterojunction Solar Cell**

A. Dyadenchuk 229

### **Synthesis of 2D-Material(G,GO,rGO,h-BN)-Magnetic(Fe,Fe<sub>3</sub>O<sub>4</sub>)Nanocomposites**

L. Chkhartishvili, S. Makatsaria, N. Barbakadze, O. Tsagareishvili, T. Batsikadze, S. Kekutia, V. Mikelashvili, K. Davitadze, T. Minashvili, M. Japaridze, M. Stephanishvili and R. Chedia 239

### **Structure and Characteristics of Opal - Bi<sub>12</sub>GeO<sub>20</sub> and Opal - NaBi(MoO<sub>4</sub>)<sub>2</sub> Nanocrystalline Composites**

M. Derhachov, V. Moiseienko, B. Abu Sal and A. Latyshova 255