

Association of Metallurgical Engineers of Serbia
Faculty of Technology and Metallurgy, University of Belgrade
Institute for Technology of Nuclear and Other Mineral Raw Materials
Institute of Chemistry, Technology and Metallurgy
Vinca Institute of Nuclear Sciences
Serbian Foundrymen's Society

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2019

Metallurgical & Materials
Engineering Congress
of South-East Europe

BOOK OF ABSTRACTS

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Dragomir Glišić
Branislav Marković
Vaso Manojlović

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PREFACE

The Fourth Metallurgical & Materials Engineering Congress of South-East Europe (MME SEE 2019) is a biannual meeting of scientists, professionals, and specialists working in the fields of metallurgical and materials engineering. The aim of the Congress is to present current research results related to processing/structure/property relationships, advances in processing, characterization, and applications of modern materials.

Congress encompasses a wide range of related topics and presents the current views from both academia and industry: Future of metals/materials industry in South-East European countries; Raw materials; New industrial achievements, developments and trends in metals/materials; Ferrous and nonferrous metals production; Metal forming, casting, refractories and powder metallurgy; New and advanced ceramics, polymers and composites; Characterization and structure of materials; Recycling and waste minimization; Corrosion, coating, and protection of materials; Process control and modeling; Nanotechnology; Sustainable development; Welding; Environmental protection; Education; Accreditation & certification.

The Editors hope that Congress will stimulate new ideas and improve the knowledge in the field of metallurgical and materials engineering.

The Congress is organized jointly by the Association of Metallurgical Engineers of Serbia, Faculty of Technology and Metallurgy, University of Belgrade, Institute for Technology of Nuclear and Other Mineral Raw Materials, Institute of Chemistry, Technology and Metallurgy, Vinca Institute of Nuclear Sciences and Serbian Foundrymen's Society.

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Editors

Content

Plenary Lectures	1
Elinor Rombach, Bernd Friedrich INNOVATIVE RECYCLING OF POLYMETALLIC EOL-PRODUCTS - CHALLENGES AT THE INTERFACE OF THE PROCESS CHAIN	3
Wang Xindong, Tian Jinglei, Liu Hongqiang, Hou Changjiang APPLICATION AND PRACTICE OF MULTI-POLLUTANT COOPERATIVE CONTROL TECHNOLOGY FOR FLUE GAS IN IRON AND STEEL INDUSTRY	4
Haibei Wang PRESENT DEVELOPMENT AND TENDENCY ABOUT THE TREATMENT OF SECONDARY RESOURCE IN CHINA.....	5
Ş. Hakan Atapek CORSON ALLOYS: EFFECT OF MICROSTRUCTURAL FEATURES ON THE PROPERTIES	6
Invited lectures	7
Mile B. Djurdjevic, Franz Josef Feikus, Ricardo Fernandez Gutierrez PROPERTIES OF CAST ALUMINUM ALLOYS SUITABLE FOR PRODUCTION OF E-MOBILITY COMPONENTS.....	9
Batric Pesic, Ian Ehram ELECTRODEPOSITION OF LANTHANUM IN ROOM TEMPERATURE IONIC LIQUID ELECTROLYTE	10
Srecko Stopic, Bernd Friedrich HYDROMETALLURGICAL TREATMENT OF PRIMARY AND SECONDARY MATERIALS IN THE PRODUCTION OF THE CRITICAL METAL OXIDES.....	11
Aleksandra Daković, Milica Spasojević CATIONIC SURFACTANTS MODIFIED KAOLIN – EFFICIENT ADSORBENTS FOR MYCOTOXINS.....	12
Oral presentations	13
Varužan Kevorkijan INITIAL STEPS ON THE ROAD TO THE DIGITALISATION OF THE IMPOL ALUMINIUM INDUSTRY	15

Özer E., Ayvaz M., Zalaoglu D., Übeyli M. X-RAY DIFFRACTION ANALYSIS ON MECHANICALLY ALLOYED ALUMINUM COMPOSITE POWDERS CONSISTING OF NANO ALUMINA PARTICLES AND MULTIWALL CARBON NANOTUBES	16
Franjo Kozina, Zdenka Zovko Brodarac, Mitja Petrič INVESTIGATION OF EQUILIBRIUM AND NON-EQUILIBRIUM SOLIDIFICATION OF Al-2.2Mg-2.1Li ALLOY	17
Zalaoglu D., Özer E., Übeyli M. ON THE COMPRESSIBILITY BEHAVIOR OF ALUMINUM COMPOSITE POWDERS BEARING VARIOUS FRACTIONS OF TITANIUM DIBORIDE PARTICULATES	18
Vasiliki Karmali, Evangelos Petrakis, Konstantinos Komnitsas VALORIZATION OF LEACHING RESIDUES OF LATERITES FOR THE PRODUCTION OF INORGANIC POLYMERS	19
Željko Kamberović, Milisav Ranitović, Marija Korać, Jovana Đokić, Nataša Gajić, Nikola Jovanović INTEGRATED RECYCLING OF THE CRITICAL RAW MATERIALS FROM WASTE ELECTRONICS.....	20
Jelena Brankov, Anton Oršula, François Ponchon, Róbert Findorák, Mária Fröhlichová, Jaroslav Legemza, Filip Bakaj THE INFLUENCE OF THE ADDITION OF DIFFERENT TYPES OF LIME ON THE SINTERING PROCESS	21
Sanping Liu SCIENTIFIC COOPERATION THROUGH JOINT LABORATORY AND THE PRESENT DEVELOPMENT AND TENDENCY ABOUT NICKEL LATERITE METALLURGY PROCESS	22
Milena Matijasevic-Clarke CERTIFICATION PROCESS FOR THE MANUFACTURE OF METALLIC PARTS AND COMPONENTS USING ADDITIVE MANUFACTURING 3D PRINT TECHNOLOGY	23
Dejan Momčilović, Ivana Atanasovska, Ognjen Ristić STATISTICAL ANALYSIS OF SHEAR STRENGTH OF WELDS IN WELDED FABRIC FOR CIVIL ENGINEERING WITH APPLICATION OF NEW TOOL DESIGN	24
M. Kazasidis, T. Volkov-Husovic, S. Yin1, R. Lupoi THE EFFECT OF INCONEL 718 ADDITION ON THE CAVITATION EROSION OF NICKEL MATRIX COLD SPRAYED COATINGS.....	25
S. Kovacevic, R. Pan, D.P. Sekulic, S.Dj. Mesarovic COMPOSITION DEPENDENCE OF INTERFACE ENERGY AS A DRIVING FORCE FOR DIFFUSION BONDING OF CERAMICS.....	26
Jovana Ruzic, Stanislav Gyoshev, Nikolay Stoimenov, Dimitar Karastoyanov INVESTIGATION OF METAL POWDERS USING X-RAY COMPUTED TOMOGRAPHY	27

Gülşah Aktaş Çelik, Şeyda Polat, Ş. Hakan Atapek, Maria-Ionna T. Tzini, G. N. Haidemenopoulos THERMODYNAMIC MODELLING OF 3C-6Si-1W-1Al DUCTILE CAST IRON	28
--	----

Poster presentations..... 29

Mustafa Kalifa, Nataša Z. Tomić, Marija M. Vuksanović, Sanja Stevanovic, Veljko Đokić, Tatjana Volkov Husović, M. Jančić Heinemann, Aleksandar D. Marinković EFFECT OF POLYHEDRAL OLIGO SILSESQUIOXANES (POSS) PARTICLES ON CAVITATION RESISTANCE OF HYBRID COMPOSITE FILMS	31
--	----

Tatjana Volkov Husović, Stjepan Kožuh, Ivana Ivanić, Milica Vlahović, Sanja Martinović, Mirko Gojić CAVITATION EROSION BEHAVIOR OF THE CuAlNi SHAPE MEMORY SAMPLES	32
--	----

Veljko V. Savić, S. D. Matijašević, V. S. Topalović ¹ , S. V. Smiljanić, J. D. Nikolić, S. N. Zildžović, S. R. Grujić GLASS- CERAMICS OBTAINED FROM COPPER MINE TAILINGS AND GLASS CULLETS	33
--	----

Vladimir Topalović, Srđan Matijašević, Jelena Nikolić, Marija Đošić, Veljko Savić, Sonja Smiljanić, Snežana Grujić CHARACTERIZATION OF LANTHANUM-DOPED PHOSPHATE GLASS.....	34
---	----

Mladen Bugarcic, Milan Milivojevic, Gvozden Jovanovic, Dragana Milosevic Aleksandra Dakovic, Jovica Stojanovic SYNTHESIS AND CHARACTERIZATION OF COMPOSITES BASED ON EXPANDED VERMICULITE AND FERRITE SPINELS.....	35
---	----

Vladan Ćosović, Nadežda Talijan, Aleksandar Ćosović, Ljubiša Balanović, Milena Premović, Duško Minić EFFECT OF In ₂ O ₃ ADDITION ON STRUCTURE AND PROPERTIES OF HIGH-ENERGY MECHANICALLY MILLED Ag-SnO ₂	36
--	----

Nela Petronijević, Srđan Stanković, Dragana Radovanović Ivšić, Željko Kamberović, Miroslav Sokić, Branislav Marković, Snežana Zildžović SOFTWARE SIMULATION OF THE PROPOSED INTEGRAL TREATMENT OF ACIDIC WASTEWATERS AND OVERBURDEN OF THE CEROVO COPPER MINE.....	37
---	----

Srđan Stanković, Nela Petronijević, Dragana Radovanović-Ivšić, Željko Kamberović, Miroslav Sokić, Branislav Marković, Aleksandra Patarić PROPOSAL FOR INTEGRAL TREATMENT OF THE ACIDIC WASTEWATERS AND OVERBURDEN OF THE CEROVO COPPER MINE.....	38
---	----

Vladimir Pavkov, Gordana Bakić, Vesna Maksimović, Branko Matović, Aleksandar Maslarević CHARACTERIZATION OF METAL-GLASS COMPOSITES MATERIAL.....	39
--	----

Marija Mihailović, Aleksandra Patarić CHARACTERIZATION OF Ti6Al4V ALLOY OBTAINED BY HOT FORGING PROCESS	40
--	----

Hasan Avdušinović, Almaida Gigović-Gekić, Šehzudin Dervišić HIGH TEMPERATURE TRANSFORMATION OF THE AUSFERRITE MICROSTRUCTURE	41
Nada Ilić, Ljubica Radović THE INFLUENCE OF PREFORMS QUALITY ON STEEL CARTRIDGE CASE PRODUCTION	42
Jelena Marinković, Ljubica Radović RESISTANCE OF EN AW-7075 ALLOY IN T6 AND T77 TEMPER TO THE EXFOLIATION AND INTERGRANULAR CORROSION	43
Alen Delić, Mirsada Oruč, Milenko Rimac, Almaida Gigović-Gekić, Raza Sunulahpašić THE INFLUENCE OF SOLUTION ANNEALING ON MICROSTRUCTURE AND MECHANICAL PROPERTIES HEAT-RESISTANT CAST STEEL HK30 MODIFIED BY NIOBIUM	44
S. Laketić, M. Rakin, M. Momčilović, J. Ciganović, Dj. Veljović, I. Cvijović-Alagić SURFACE MODIFICATION OF A TITANIUM IMPLANT MATERIAL BY A PICOSECOND Nd: YAG LASER IN AIR AND ARGON ATMOSPHERE	45
T. D. Bradarić, Z. M. Slović END-BLOW CARBON CONTROL IN SMALL CAPACITY CONVERTERS - CHARACTERISTICS AND POSSIBLE IMPROVEMENTS	46
Aleksandar Vasić, Vaso Manojlović, Željko Kamberović SOFTWARE FOR THE REGULATION OF BURDEN DESCENDING SPEED THROUGH BLAST FURNACE	47
Vesna Alivojvodić, Aleksandra Vučinić, Nela Petronijević POSITION OF CRITICAL RAW MATERIALS WITHIN THE CONCEPT OF CIRCULAR ECONOMY	48
Slavica Mihajlović, Živko Sekulić, Marina Blagojev, Vladan Kašić QUARTZ SAND PROCESSING METHODS FOR THE APPLICATION IN WATER GLASS PRODUCTION	49
Jelena Petrović, Marija Petrović, Marija Mihajlović, Marija Kojić, Marija Koprivica, Zorica Lopičić, Jelena Milojković GRAPE POMACE HYDROCHARS AS POTENTIAL ADSORBENTS OF Cd(II) AND Al(III) FROM AQUEOUS SOLUTIONS	50
Marija Petrović, Jelena Petrović, Tatjana Šoštarić, Marija Kojić, Marija Koprivica, Mirko Grubišić, Zorica Lopičić ALKALI MODIFIED CORN COB HYDROCHAR AS BIOSORBENT OF Mn ²⁺ IONS FROM AQUEOUS SOLUTIONS	51
Gülşah Aktaş Çelik, Şeyda Polat, Ş. Hakan Atapek, Maria-Ionna T. Tzini, G. N. Haidemenopoulos MICROSTRUCTURAL AND THERMAL CHARACTERIZATION OF 3.2C-5Si-1W NOVEL DUCTILE CAST IRON	52

Silvana Dimitrijević, Mirjana Rajčić Vujasinović, Stevan Dimitrijević, Zoran Stević, Aleksandra Ivanović STABILITY OF GOLD COMPLEX BASED ON MERCAPTOTRIAZOLE IN ALKALINE MEDIA	53
Stevan Dimitrijević, Željko Kamberović, Dimitrije Stevanović, Silvana Dimitrijević, Marija Korać EFFECT OF ALUMINA COATINGS ON CORROSION BEHAVIOR OF X10CrAlSi7 STEEL IN SULFURIC ACID	54
Dragan Manasijević, Tamara Holjevac Grgurić, Ljubiša Balanović, Uroš Stamenković, Milan Gorgievski, Mirko Gojić MICROSTRUCTURAL AND THERMAL ANALYSIS OF Cu–Al–Mn–Ag SHAPE MEMORY ALLOYS	55
Ivana Manasijević, Ljubiša Balanović, Uroš Stamenković, Duško Minić, Milan Gorgievski THERMAL CONDUCTIVITY OF THE LOW-MELTING Bi–In EUTECTIC ALLOYS	56
Natalija Dolić, Zdenka Zovko Brodarac, Franjo Kozina EVALUATION OF EN AW-5083 ALUMINUM ALLOY INGOTS HOMOGENEITY BY MEASURING HARDNESS	57
Z. Slović, K. Raić, T. Bradarić, B. Bulko, P. Demeter, N. Slović TUNDISH METALLURGY – ROUTE TO CLEAN STEEL MANUFACTURING	58
Aleksandra Ivanovic, Silvana Dimitrijevic, Stevan Dimitrijevic Cu-Ni-Sn: INVESTIGATION OF THE EFFECT OF B AND Li ON MECHANICAL PROPERTIES	59
Natasa Djordjević, Nina Obradović, Miroslav Sokić, Branislav Marković, Aleksandra Patarić, Nela Petronojević Bi ₂ O ₃ INFLUENCE ON ELECTRONIC CERAMICS SINTERING PROCESS AND FINAL PROPERTIES	60
Natasa Djordjević, Nina Obradović, Miroslav Sokić, Branislav Marković, Aleksandra Patarić, Nela Petronojević ACTIVATION AND RELAXATION TIME INFLUENCE ON CORDIERITE CERAMICS	61
Hu Lianxi, Yuan Yuan, Shen Jingyuan FABRICATION AND PROPERTIES OF CU-BASED COMPOSITE REINFORCED WITH ULTRAFINE WC AND NANO Al ₂ O ₃ PARTICLES BY POWDER METALLURGY PROCESS	62
Marko Pavlović, Marina Dojčinović, Radica Prokić-Cvetković, Ljubiša Andrić SYNTHESIS AND CHARACTERIZATION OF NEW REFRACTORY COATINGS BASED ON BASALT	63
Sonja Milićević, Sanja Martinović, Ndue Kanari, Milica Vlahović, Frederic Diot, Ana Popović, Marija Kojić, Sanja Šešlija REMOVAL OF COPPER BY PELLETIZED FLY ASH	64

Aleksandar M. Spasic, Vaso Manojlovic, Mica Jovanovic ELECTROCOALESCENCE PROCESS BASED ON ELECTROHYDRODYNAMICS PRINCIPLES	65
Özlem Özgenç, Ebru Bilici, Sefa Durmaz EFFECT OF WATERBORNE ACRYLIC VARNISHES CONTAINING BARK EXTRACT ON THE WEATHERING PERFORMANCE OF IMPREGNATED WOOD	66
A. K. Vardanyan, N. S. Vardanyan, A. S. Khachatryan, Z. S. Melkonyan BIOLEACHING OF PYRITE BY MIXED CULTURES OF IRON AND/OR SULPHUR OXIDIZING BACTERIA ISOLATED IN ARMENIA.....	67
Zoran Janjušević, Zoran Karastojković, Jovica Stojanović CONCEPTION OF TEXTURE IN METALLURGY, SCIENCE OF MATERIALS, GEOMORPHOLOGY, AND ARTS	68
Stefan Dikić, Dragomir Glišić, Nenad Radović, Abdunnaser Hamza Fadel INTRAGRANULAR NUCLEATION OF FERRITE IN TITANIUM-VANADIUM MICROALLOYED MEDIUM-CARBON STEEL DURING ISOTHERMAL TRANSFORMATION	69
G. Jovanović, D. Glišić, N. Radović, A. Patarić FINITE ELEMENT ANALYSIS OF THE CLEAVAGE FRACTURE IN MEDIUM CARBON V AND TiV MICROALLOYED FORGING STEELS	70
Jelenka Vitomir, Miljana Popović, Ljubica Radović, Nada Ilić, Endre Romhanji AGE HARDENING BEHAVIOR OF Al-Mg-Si ALLOYS WITH DIFFERENT Mg AND Si CONTENT	71
Chaozhen Zheng, Shuchen Qin, Sanping Liu, Haibei Wang, Dan Zhang, Kaixi Jiang STUDY ON ROASTING PROCESS AND SILICON BEHAVIOR OF HIGH-SILICON ZINC CONCENTRATE	72
Gréta Maruškinová, Tomáš Havlík, Ludovít Parilák HYDROMETALLURGICAL TREATMENT OF EAF DUST BY ALKALINE LEACHING WITH THE AIM TO PRODUCE ZINC OXIDE WITH SPECIFIC CHARACTERISTICS	73
T. F. de Souza, M. Wolfart Jr, A. S. Rocha STUDY OF A COLD DRAWING PROCESS BY SIMULATION AND EXPERIMENTAL TESTS	74
Nada Štrbac, Miroslav Sokić, Duško Minić, Kristina Božinović, Mladen Bugarčić, Jovica Stojanović, Aleksandra Mitovski OXIDATION ROASTING OF PENTLANDITE SAMPLES AT ELEVATED TEMPERATURES	75
Sanping Liu, Haibei Wang, Kaixi Jianga, Chaozhen Zhenga A NOVEL LEACHING PROCESS FOR LATERITE NICKEL ORE	76

Haibei Wang, Zeljko Kamberović, Sanping Liu, Kaixi Jiang, Shuchen Qin, Chaozhen Zheng STUDY ON A NOVEL CHLORIDIZING VOLATILIZATION PROCESS FOR THE TREATMENT OF JAROSITE.....	77
Dragana Radovanović, Marija Štulović, Nela Petronijević, Vesna Nikolić, Željko Kamberović LEACHING OF SOLIDIFIED/STABILIZED METALLURGICAL WASTE UNDER ENVIRONMENTAL CONDITIONS	78
Tatjana Šoštarić, Zorica Lopičić, Marija Kojić, Marija Koprivica, Katarina Pantović Spajić, Dragana Ranđelović, Srđan Stanković REMOVAL OF Mn(II) IONS FROM SYNTHETIC SOLUTION USING ADSORBENTS BASED ON APRICOT AND PEACH SHELLS	79
AUTOR INDEX.....	81

SYNTHESIS AND CHARACTERIZATION OF NEW REFRACTORY COATINGS BASED ON BASALT

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Basalt is a hard volcanic rock. Good technical properties make basalt an important raw material for the production of glass and glass-ceramics for the application in various departments of industry. It is a cheap and widespread raw material for the synthesis of different products such as basalt wool, basalt fibers, basalt plastics, composite materials. The new application of basalt is to obtain refractory coatings and application in foundries and protection against fire, corrosion, and erosion. The basic components of the foundry coatings are refractory filler, binder, additives, and solvent. Preparation of basalt-based filler is done by grinding and mechanical activation at grain diameter 20 μ m. The composition of the coating was determined about the parameters of the casting process and ranged within limits: filler 92-95%; binder 2,2-2,5%; additives 0,5-1,5% and solvent to the density of coating: 2 g/cm³. Coating suspension with this density showed high sedimentation stability (below 4.5% of precipitated matters for 24h). These foundry coating can enable the development of new methods of casting alloys with casting temperature over 1200°C.

Composition of basalt-based protective coatings was determined by research and ranged within the limits: 80-85% refractory filler, 12-17% binder based on epoxy resin, with organic additives and solvent. To characterize the coating, an ultrasonic vibration method with a stationary sample was used in accordance with the ASTM G32 standard. The mass loss of samples in the function of the cavitation time was monitored. Sample surface degradation level was quantified by using the image analysis. During the test, changes in sample morphology were monitored by means of the scanning electron microscopy method. Cavitation rate was determined as an indicator of the resistance of the coating under the effect of cavitation. It has been shown that the cavitation rate in the case of coatings applied to metal surfaces is higher ($v = 0.108$ mg/min) than in the case of coatings applied to non-metallic surfaces ($v = 0.0435$ mg/min). In order to achieve greater resiliency of the coating under the effect of cavitation, good adhesion of the coating and a higher coating thickness are important. Test results can provide an estimate of the resistance of coat layers in similar operating conditions. These coatings are intended for the protection of metallic and non-metallic surfaces, parts of equipment in metallurgy and mining.

Keywords: basalt, refractory coating, cavitation resistance, mass loss, image analysis.

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