UNIVERSITY
OF ZIELONA GÓRA

INSTITUTE OF MATERIALS
AND BIOMEDICAL
ENGINEERING

POLISH SOCIETY OF
MECHANICAL ENGINEERS
AND TECHNICIANS

II International Conference
Engineering Materials
Safety – Environment – Technology
(EMSET 2021)
10 – 11. 06. 2021

Video conference will be support by Google Meet

The invitation will be sent to the email address. **Please check Spam.**

10 (Thursday).06. 2021 r.	
10.00 – 11.00	Social event (Video and voice test)
11 (Friday). 06.2020 r.	
10.00 – 10.30	**Opening ceremony** **prof. Wojciech Strzyżewski** Rector of the University of Zielona Góra Rektor Uniwersytetu Zielonogórskiego **prof. Roman Stryjski** Director of the Institute of Materials and Biomedical Engineering Dyrektor Instytutu Inżynierii Materiałowej i Biomedycznej **prof. Adam Bydałek** Research Group of Metallurgy and Materials Engineering Kierownik Katedry Metalurgii i Inżynierii Materiałowej **MSc. Ryszard Furtak** Polish Society of Mechanical Engineers and Technicians Stowarzyszenie Inżynierów i Techników Mechaników Polskich
10.30 – 11.30	**Session I .** Chairman - Martin Kučerka, Maciej Wędrychowicz **MULTIVARIATE STATISTICS APPLIED TO THE IRON ORE SINTERING PROCESS** Daniel Fernández-González, Cristian Gómez Rodríguez, Luis Felipe Verdeja González **RESEARCH ON THE RELEASE OF DANGEROUS COMPOUNDS FROM THE INORGANIC SAND MOLDS** Mariusz Holtzer, Rafał Dańko, Agnieszka Roczniak, Sara Tapola, Angelika Kmita **COMPARISON OF SORPTION CAPACITY OF SELECTED SORBENTS** Martin Zachar **A NEW INSIGHT ON THE NEW GENERATION OF HIGH STRENGTH COPPER-MAGNESIUM ALLOYS DEDICATED FOR METAL WORKING** Paweł Strzępek Speaking time shall not exceed fifteen minutes: 10 minutes – presentation + 5 minutes discussion
11.30 – 11.45	**A virtual tour of Zielona Góra and the building of the Faculty of Mechanical Engineering (part. 1)**
11.45 – 12.00	**HAZARDOUS AND EXPLOSIVE MATERIALS – Poster session *(virtual)*** **HAZARDOUS SUBSTANCES IN OUR ENVIRONMENT** Lilla Horváth (lilly1701d@gmail.com) **ON THE VERGE OF TOMORROW WITH THE EQUIPMENT OF TODAY** Roland Bánhegyi, Sándor Rácz (racz.sandor@uni-nke.hu) **PRESENT CHALLANGES FOR FIRE PROTECTION** Péter Pántya (pantya.peter@uni-nke.hu) ***Posters are on the website of the EMSET2021 Conference.*** ***By June 07, 2021, questions may be submitted to the authors.***

12.00 – 12.30	**Break (Virtual coffe/lunch) A virtual tour of Zielona Góra and the building of the Faculty of Mechanical Engineering (part. 2)**
12.30– 13.30	**Session II.** Chairman – Conor MacDonnell, Franciszek Bydałek **USE OF A PHOSPHORUS WASTEWATER RECOVERY PRODUCT (STRUVITE)TO ENHANCE SUBTROPICAL SEAGRASS RESTORATION** MacDonnell, C., Bydalek, F., Osborne, T., Thornton, A., Barbour, S., Leonard, D., Makinia, J. and Inglett, P.W. **DEVELOPMENT OF WASTE VALORISATION TECHNOLOGIES: ENABLING BIOMASS SUSTAINABILITY AND CIRCULAR ECONOMY** Stephen S. Doliente, Freya Ann G. Cabantog, Kristine Iannah A. Lawas, Angelica Ariel U. Mawili **SUSTAINABLE MANUFACTURING PROCESS IN WOOD MACHINING** Alena Očkajová, Richard Kminiak, Martin Kučerka **RESEARCH ON THE DEVELOPMENT OF A NEW TECHNOLOGY FOR THE PRODUCTION OF RAILWAY AND TRAM TRACTION EQUIPMENT WITH THE USE OF EXHAUSTED RAILWAY SCRAP** Michał Sadzikowski, Grzegorz Kiesiewicz Speaking time shall not exceed fifteen minutes: 10 minutes – presentation + 5 minutes discussion
13.30 – 13.45	**Break (Refreshments & Networking)**
13.45 – 14.45	**Session III.** Chairman – Daniel Fernández-González, Patryk Krupa **COKE REACTIVITY INDEX (CRI) AND COKE STRENGTH AFTER REACTION (CSR) CORRELATION: APPLICATION TO COKES FOR THE FERROALLOYS INDUSTRY** Daniel Fernández-González, Cristian Gómez Rodríguez, Luis Felipe Verdeja González **INFLUENCE OF CONSOLIDATION METHOD ON SELECTED PROPERTIES OF MIXTURES OF ZIRCONIUM AND COPPER POWDERS** Adam Zwoliński, Lucyna Jaworska, Tomasz Skrzekut, Piotr Noga, Grzegorz Boczkal, Paweł Pałka, Marcin Podsiadło **DUST MEASUREMENT IN SELECTED AREAS OF THE FACULTY OF NATURAL SCIENCES, MATEJ BEL UNIVERSITY** Martin Kučerka, Alena Očkajová, Richard Kminiak **BEHAVIORAL PSYCHOLOGY AND ITS POSSIBLE CONTRIBUTION TO GREEN MANUFACTURING** Agnieszka Wiatrowska Speaking time shall not exceed fifteen minutes: 10 minutes – presentation + 5 minutes discussion
14.45 – 15.00	**Conference summary**

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MULTIVARIATE STATISTICS APPLIED TO THE IRON ORE SINTERING PROCESS

Daniel Fernández-González[1], Cristian Gómez Rodríguez[1],
Luis Felipe Verdeja González[1]

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Sintering is a process that consists in the thermal agglomeration of a mixture of fines that comprise iron ore, recycled iron and steelmaking products, slag-forming elements, and solid combustible (coke). The process has as objective obtaining a charge with the suitable physical-chemical and mechanical properties to be fed into the blast furnace. The control and automatization of systems for the ironmaking and steelmaking industry allow improving the labor productivity, getting sinter with high yield and optimal quality (mechanical and chemical), as well as saving energy. We propose in this research the utilization of multivariate statistics to stablish relationships between different sinter quality requirements and sinter raw materials and sintering process parameters. Several of the most important quality parameters of the sintered product are determined by means of complex and long tests: RDI, Reduction Degradation Index; RI, Reducibility Index; TI, Tumbler Index. This way, if they could be determined by means of mathematical correlations from other parameters (for example, chemical composition of the sinter or quantity of sinter raw materials), it could be possible to obtain the value of the above-mentioned parameters in shorter times and before the raw materials were sent to the sintering machine. We present here an example of the possibilities that multivariate statistics offer to determine RDI, TI and RI for limited data. Using big data (data collected for different variables and long periods of time) it would be possible to obtain better correlations, or to study some different combinations of variables. It would be also possible to extend the obtained information to fuzzy logic models applied to the sintering process.

Company name: Nanomaterials and Nanotechnology Research Center (CINN), Spanish Council for Scientific Research (CSIC), University of Oviedo (UO), Principality of Asturias (PA)

Country: Spain

City: El Entrego,

Topic: Design and processing of iron and steel materials, metal alloy materials ….

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RESEARCH ON THE RELEASE OF DANGEROUS COMPOUNDS FROM THE MOULDING SANDS

Mariusz Holtzer[1], Rafał Dańko[1], Agnieszka Roczniak[1], Sara Tapola[2], and Angelika Kmita[3]*

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The intensively developing foundry industry consumes large amounts of natural resources, energy and metals as well as generates significant amounts of gases and solid wastes, which influence the natural environment and work condition . In foundry plants metal casting can be done with various methods. One of the most important method preferred around the world is sand casting. Moulding sands, in which castings are produced, can be bound by organic binders (e.g. furan, phenol–formaldehyde resins), inorganic binders (water glass, aluminosilicates) or by bentonite. Under an influence of high temperatures of liquid metal there is a hazard of emitting from a mould dangerous substances: benzene, toluene, ethylbenzene, xylenes (BTEX) and Polycyclic Aromatic Hydrocarbons (PAHs) groups. The gas evolution performance of the mould is a very important index, which is directly related to the quality of casting. The main reason for testing the emission of compounds from the BTEX or PAHs group is that some of these compounds show carcinogenic and / or mutagenic properties, e.g. benzene (BTEX) or benzo (a) pyrene (PAHs). Moulding sands bound by organic binders (phenol-formaldehyde; furan), inorganic binders and green sand, were subjected to investigations.

Company name: AGH University of Science and Technology

City: Krakow

Country: Poland

Topic: green design, manufacturing and machining processes

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COMPARISON OF SORPTION CAPACITY OF SELECTED SORBENTS

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Sorbents are used to capture dangerous substances. Sorbents are most commonly used in loose form. Loose sorbents are mainly used to dispose of petroleum products such as fuels (petrol or diesel fuel) and lubricants (engine, gear or hydraulic oil) leaked from vehicles [2,3,8]. The Fire and Rescue Service in Slovakia current-ly uses sorbents Absodan plus, Expanded perlite, Eko-Dry plus and Reo amos. Sorption capacity is one of the most monitored parameters of sorbents [7,8]. The aim of the paper is to compare the maximum sorption ca-pacity as determined in accordance with ASTM F726-2012 and the real sorption capacity on asphalt surfaces in sorption of engine oil 10W 40 and diesel fuel. For real sorption capacity on a rigid surface (asphalt), the measured values were of a lower order than the maximum sorption capacity.

Company name: Technical Universityin Zvolen, Department of Fire Protection

Country: Slovensko

City: Zvolen

Topic: alternate materials/material substitution

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A NEW INSIGHT ON THE NEW GENERATION OF HIGH STRENGTH COPPER-MAGNESIUM ALLOYS DEDICATED FOR METAL WORKING

Paweł Strzępek

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Relentless pursue towards the improvement of the set of materials properties nowadays creates the opportunities for the scientists worldwide to design new alloys almost every day. The research is focused on developing of manufacturing technology of a new generation of high strength CuMg alloys based on the process of metallurgical synthesis, continuous casting and subjecting the manufactured products to heat treatment in order to activate the precipitation hardening process. The alloys obtained in this way will be used as the batch material for metal working processes, i.e. cold drawing process of round profiles and hot forging and subsequent mechanical processing, which will allow to obtain finished products for the automotive or transport industry, but primarily electrotechnical industry due to the high set of mechanical and electric properties. A noticeable advantage of these alloys will be the reduction of production costs through the alloying additive in the form of magnesium with a simultaneous significant increase in the listed properties. The final result of the research will be the design of production technology for products from a new generation of high-strength CuMg alloys, which are currently not produced on an industrial scale in Poland or in the world, which proves their innovation. Products obtained based on the designed technology will be fully competitive, and in many respects will outweigh the products currently used on the market made of other, commonly used alloys in terms of both utility and technological properties, and the lower cost of production will allow for quick implementation and effective sale of products manufactured based on designed technology.

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Company name: AGH University of Science and Technology, Faculty of Non Ferrous Metals

City: Krakow

Country: Poland

Topic: non-ferrous materials

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HAZARDOUS SUBSTANCES IN OUR ENVIRONMENT

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Hazardous substances — liquids, gases, or solids that endanger the health or safety of workers — occur in almost every workplace. Under current legislation, the risks associated with these substances must be adequately addressed. Working with hazardous substances can range from mild eye and skin irritation to serious health problems such as birth defects and cancer. The effects may be acute or long-term, and some substances may have a cumulative effect. Risks due to the harmful effects of biological or chemical agents may increase as a result of new technologies, the expansion of sectors and changes in work organization methods. In the environmental sector, for example, innovative technologies may lead to a misinterpretation of certain risks. Manufacturers and suppliers should be provided throughout the supply chain with information on the risks posed by chemicals and how to manage those risks. The Regulation is also directly linked to the Classification, Labeling and Packaging of Substances and Mixtures (CLP) Regulation, which sets out warning and precautionary statements as well as pictograms, which are important sources of information for occupational safety. Nanomaterials also occur in nature, such as in a volcanic cloud, and as a by-product of human activity, such as in the exhaust gases of diesel engines or in tobacco smoke. But it is especially worth paying attention to artificial nanomaterials. These are now found in a very wide range of products and applications. The health effects of nanomaterials are a matter of serious concern. The main effects of nanomaterials are in the lungs, resulting in inflammation, tissue damage, fibrosis and tumor formation, but they can also damage the cardiovascular system. The EU is working hard to balance economic growth with the need to protect the environment. To this end, it has set ambitious targets for reducing greenhouse gas emissions, increasing energy efficiency, promoting renewable energies and reducing waste.

Company name: National Directorate General for Disaster Management
City: Budapest
Country: Hungary

Topic: hazardous and explosive materials

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ON THE VERGE OF TOMORROW WITH THE EQUIPMENT OF TODAY

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Pursuing safety is important from several aspects when examining firefighting interventions. On the one hand, safety provides the required confidence for the interveners and, at the same time, establishes trust and confidence towards our organisation. On the other hand, it implies a number of tasks to improve on for those examining the interventions.Fire fighting in buildings fitted with solar cells has not been analysed in great extent in Hungary or abroad. We may as well conclude that the appropriate regulations have not been developed and safe intervention tactics are yet to be described. Missing the suitable professional experience and the diversity of technologies make it more difficult to examine act of collaboration in order to achieve common goals like the safety of the intervening fire fighters in the light of the revealed deficiencies. The topic. The development of adequate agreements between the legal regulations and the available firefighting equipment could become an international. It is a highly important task to familiarise with the intervening staff all possible sources of danger, and to elaborate on the necessary firefighting routines and tactics to handle energised solar cells. Following up the evolution of solar cells is essential in firefighting and that involves the development of firefighting equipment.

Company name: Fire Department Pécs/ National University of Public Service, Faculty of Law Enforcement, Department of Fire Protection and Rescue Management

Country: Hungary

City: Budapest

Topic: hazardous and explosive materials

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PRESENT CHALLENGES FOR FIRE PROTECTION

Péter Pántya

University of Public Service, Faculty of Law Enforcement, Institute for Disaster Management, Department for Fire Protection and Rescue Operations Management, Pantya.Peter@uni-nke.hu (P.P.)

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During present days, in the field of energy storing a good solution can be using of lithium-ion batteries. In this way for the producing, factory side or for the field of different transportation we can get a well usable energy container system. The lithium-ion batteries has wide range of great possibilities comparing the other, older type of batteries (e.g. nickel–cadmium batteries). The issues may appear by accidents or mistakes during production or maintenance processes. If these events starts thermal runaways, the traditional ways to suppress the fire and manage the situations can ineffective. The special needs for the field of Fire Protection in these cases generate more experiments. The aim is to find more and effective ways for the fire protection and fire intervention sides also.

Company name: University of Public Service, Faculty of Law Enforcement, Institute for Disaster Management, Department for Fire Protection and Rescue Operations Management

Country: Hungary

City: Budapest

Topic: hazardous and explosive materials

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USE OF A PHOSPHORUS-BASED WASTEWATER RECOVERY PRODUCT (STRUVITE)TO ENHANCE SUBTROPICAL SEAGRASS RESTORATION

MacDonnell, C.[1], Bydałek, F.[2], Osborne, T.[3], Thornton, A.[3], Barbour, S.[1], Leonard, D.[1], Makinia, J.[4] and Inglett, P.W.[1]

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Seagrasses are in decline worldwide, and their restoration is relatively expensive and unsuccessful compared to other coastal systems. Fertilization, a popular restoration technique, can improve seagrass growth, but can also excessively release nutrients and pollute the surrounding ecosystem. A slow release fertilizer may reduce excessive nutrient discharge while still providing resources to the seagrass's rhizosphere. In this study, struvite (magnesium ammonium phosphate), a relatively insoluble fertilizer sustainably harvested in wastewater treatment plants, was compared to OsmocoteTM (14:14:14 NPK), a popular polymer coated controlled release fertilizer commonly used in seagrass restoration. Two experiments compared the effectiveness of both fertilizers in a subtropical mesocosm setup. In the first experiment, single 0.5 mg of P per g DW doses of OsmocoteTM and struvite fertilizers were added to seagrass plots inside a six meter diameter flow-through mesocosm. Seagrass shoot counts were significantly higher in plots fertilized with struvite than both the OsmocoteTM and unfertilized controls (p 0.0001). A significant difference in total phosphorus concentrations was observed in porewater samples of OsmocoteTM vs struvite and controls (p 5 mg/L) but more than the controls (p 0.0001). A subsequent experiment, using smaller doses (0.01 and 0.025 mg of P per gram DW added), also found that the struvite treatments performed better than OsmocoteTM, with 16-114% more aboveground biomass (10-60% higher total biomass) while releasing less nitrogen and phosphorus. These results indicate the relatively rapid dissolution of OsmocoteTM may pose problems to restoration efforts, especially in concentrated doses and possibly leading to seagrass stress. In contrast, struvite may function as a slow release fertilizer applicable in seagrass and other coastal restoration efforts.

Company name: University of Florida/ University of Bath/ Gdańsk University of Technology
Country: United States, United Kingdom, Poland
City: Gainesville, Bath, Gdańsk
Topic: alternate materials/material substitution

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DEVELOPMENT OF WASTE VALORISATION TECHNOLOGIES: ENABLING BIOMASS SUSTAINABILITY AND CIRCULAR ECONOMY

Stephen S. Doliente[1*], Freya Ann G. Cabantog[1], Kristine Iannah A. Lawas[1], Angelica Ariel U. Mawili[1]

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Given the energy and climate security goals of many countries, biomass is one of the fastest growing renewable resources being consumed globally. Currently, first generation crops, which are rich in either sugars or oils, are the main supply of biomass. However, these biomass resources require intensive amounts of land, water, and energy for their cultivation and processing that can negatively impact our food, water, energy and environment systems. There is a need to utilise alternative biomass resources such that it can be truly a sustainable. Moreover, their utilisation should enable circular economy development, wherein wastes are looped back into the supply chain becoming avenues for additional products, services, and/or income. To circumvent these gaps, utilising abundant residues and by-products from farming, forestry, and their subsequent processing. Rice husk and corn cobs, produced in large amounts, are mostly discarded and burnt. Glycerol, a by-product of the biodiesel industry, are underutilised. These wasted biomass resources can be transformed by appropriate technologies that could create novel opportunities. In this presentation, three waste valorisation technologies are going to be highlighted, which are rice husk-based silica gel production, corn cob biochar via microwave pyrolysis, and glycerol-potassium carbonate deep eutectic solvent synthesis. Silica gel was prepared by calcining acid-leached rice husk into ash and then through a sol-gel method. The silica gel precipitated at pH 5 and seed-to-gel ratio of 1:1 showed good desiccation performance. The rice-husk based silica gel was also shown to be 54% cheaper than commercially prepared silica gel. Using a domestic microwave, biochar was produced from size reduced corn cobs with iron(III) chloride as catalyst and pyrrole as microwave absorber. At exposure time of 5 minutes and microwave power of 450 watts, biochar yield was 53% with 67% carbon content, which has potential solid biofuel applications. Deep eutectic solvent was synthesised by mixing in 1:6 ratio the potassium carbonate and glycerol. The carbon dioxide solubility in the deep eutectic solvent is 3.34 g CO2/g., which is strongly governed by physical absorption. While these developed waste valorisation technologies are at an early stage, they demonstrate the production of higher-value products and/or services that could help enhance sustainability of biomass.

Company name: University of Bath

Country: United Kingdom

City: Bath

Topic: clean and sustainable manufacturing processes

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SUSTAINABLE MANUFACTURING PROCESS IN WOOD MACHINING

Alena Očkajová[1*], Richard Kminiak[2], Martin Kučerka[1**]
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From the point of view of the concept of sustainability, each production process is characterized by 6 supporting pillars, which need to be examined at each input and output and set parameters to obtain the final product quality, with minimal energy and other input materials and minimal impact on labor and environment. In our article we will give an example for sawing and milling wood on selected machinery.

Company name: Matej Bel University, Faculty of Natural Sciences/ Technical University in Zvolen, Department Wooworking

Country: Slovensko

City: Banská Bystrica ,

Topic: wood materials

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RESEARCH ON THE DEVELOPMENT OF A NEW TECHNOLOGY FOR THE PRODUCTION OF RAILWAY AND TRAM TRACTION EQUIPMENT WITH THE USE OF EXHAUSTED RAILWAY SCRAP

Michał Sadzikowski[1*], Grzegorz Kiesiewicz[1]

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The current large trend in the development of rail and tram transport in Poland and Europe forces the manufacturers of rail components to provide constant supplies of a new generation of materials and technological solutions in the field of railway and tram traction equipment. On the other hand, the constantly growing prices of raw materials are directly related to the increase in the prices of traction equipment, forcing manufacturers to seek ways to lower the prices of their products while ensuring sufficient properties and high-quality products. As part of one of the research projects conducted at the Faculty of Non-Ferrous Metals AGH University of Science and Technology in Cracow, together with KUCA Sp. z o.o. from Stargard Szczeciński in Poland, research began on the development of a comprehensive technology for the production of modern traction equipment with the use of depleted copper scrap of railway origin (mainly copper scrap carrying ropes and contact lines). Modern traction equipment at KUCA is manufactured on the basis of two types of alloys that ensure appropriate operational properties: CuNi2Si and CuZn37Ni1Si0.5. As part of the undertaken research, an analysis of the possibility of using scrap carrying ropes and contact lines for the process of metallurgical synthesis and casting the charge for die forging in the form of bars of various diameters was carried out. The main assumption of the research project was to use the charge during the metallurgical synthesis process in the form of at least 80% of scrap. As a result of the conducted research, the potential of using this type of scrap for the metallurgical synthesis process and, as a result, for the production of fully-fledged traction equipment was determined.

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Company name: AGH University of Science and Technology, Faculty of Non-Ferrous Metals

Country: Poland

City: Krakow

Topic: recycling and re – manufacturing of materials and components

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COKE REACTIVITY INDEX (CRI) AND COKE STRENGTH AFTER REACTION (CSR) CORRELATION: APPLICATION TO COKES FOR THE FERROALLOYS INDUSTRY

Daniel Fernández-González[1*], Cristian Gómez Rodríguez[1], Luis Felipe Verdeja González[1]

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Coke is a fundamental fuel and reductant for different metallurgical processes. Quality requirements are well-known for the iron and steelmaking process. However, there is still few information about the quality requirements in the case of other metallurgical processes. We propose in this research work to apply mathematical correlations to stablish a relationship between two important parameters used to define the quality of a metallurgical coke: coke reactivity index (CRI) and coke strength after reaction (CSR). In the case of the ferroalloys industry (FeMn and SiMn), they use a wide variety of cokes to obtain ferroalloys in the electric furnace. The utilization of different coke qualities is consequence of the lack of coke batteries in the ferroalloys factories and due to a policy of prices. The adequate quality is represented by the reactivity, defined by the CRI, and the degradability, defined by the CSR, which might involve inadequate coke consumptions and problems in the operation of the furnace. The existence of an easy method to measure one of the quality parameters and the existence of correlations between these two important parameters would allow ferroalloys companies to buy cokes with suitable quality and characteristics to be used in the electric furnace without impairing the operation of the furnace and deteriorating the quality of the final product. In our research work, we propose the utilization of the thermogravimetric analysis using a thermal balance to determine the CRI and then, knowing the relation that exists between CRI and CSR calculate this second parameter. The value of the CRI is obtained from a quadratic equation where the variable is the mass loss slope, which is the slope (mass loss/time) of the reaction of the coke with the flow of CO2 (Boudouard mechanism). The utilization of this method might represent an instrument for the ferroalloys industry (or other metallurgical industries) to know the quality of the coke using a simple thermogravimetric analysis.

Company name: Nanomaterials and Nanotechnology Research Center CINNCSIC
Universidad de Oviedo UO Principado de Asturias PA

City: El Entrego

Country: Spain

Topic: design and processing of iron and steel materials

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INFLUENCE OF CONSOLIDATION METHOD ON SELECTED PROPERTIES OF MIXTURES OF ZIRCONIUM AND COPPER POWDERS

Adam Zwoliński[1*], Lucyna Jaworska[1], Tomasz Skrzekut[1], Piotr Noga[1], Grzegorz Boczkal[1], Paweł Pałka[1], Marcin Podsiadło[2]

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Most of the zirconium produced is used in the nuclear industry. It is characterized by excellent corrosion resistance to most organic and inorganic acids, salt solutions, strong alkalis. It is one of the most biocompatible elements available. Zirconium alloys are considered a substitute for titanium in implantological applications. Research has shown that the produced zirconium and copper alloys have the lowest magnetic susceptibility of all known metals, even lower than pure zirconium. Zirconium powders can be made by various methods. Relatively pure powders allow the wider use of modern sintering methods such as SPS (Spark Plasma Sintering), SLS (Selective Laser Sintering), EBM (Electron Beam Melting) and other zirconium powder consolidation processes, as well as powder extrusion processes.The Zr-2.5Cu and Zr-10Cu powder mixtures were consolidated in the extrusion process and using the Spark Plasma Sintering technique. The paper presents material tests in terms of density, phase composition, microstructure, hardness and tensile strength of Zr-Cu materials at room temperature and 400˚C. Fractographic analysis of the materials was performed at room temperature and 400°C. The research took into account the anisotropy of the materials obtained in the extrusion process.

Company name: AGH University of Science and Technology, Łukasiewicz Research Network – Krakow Institute of Technology

Country: Poland

City: Krakow

Topic: non – ferrous materials

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DUST MEASUREMENT IN SELECTED AREAS OF THE FACULTY OF NATURAL SCIENCES, MATEJ BEL UNIVERSITY

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The aim of the paper was to measure the number of particles of different sizes in selected areas of the Faculty of Natural Sciences and dust in the entrance areas and the woodworking workshop at the Department of Technology. A mobile laser particle meter TROTEC PC200 was used for the measurement, which is commonly used for measuring indoor air quality. The results of the measurements showed that the largest number of particles was 0.3 μm in all selected areas. The highest values of the number of these particles were recorded with the vacuum cleaner switched on, but it should be noted that an older filter was used in the vacuum cleaner. High values of particles were also measured in the woodworking workshop for various types of machines, in the gym, where it should be noted that these values do not pose a greater risk to the occasional visitor, but rather for people who spend a lot of time in the gym, e.g. coach. Increased values, less than in the gym, were measured in the warehouse where we worked, which caused the agitation of dust particles and a longer stay in this environment without protective equipment is unsatisfactory. The measurement of dust particles is performed mainly in the working environment, where a person is exposed to these particles regularly and for a longer period of time (8-hour working hours, etc.). If dust limits in the environment are exceeded, protective equipment such as respirators, protective masks, suction or air filtration must be provided to prevent harmful effects on the body.

Company name: Matej Bel University/ Technical University in Zvolen

Country: Slovakia

City: Banská Bystrica,

Topic: fire toxicity and pollutants

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BEHAVIORAL PSYCHOLOGY AND ITS POSSIBLE CONTRIBUTION TO GREEN MANUFACTURING

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How B. F. Skinner once said, “The real problem is not whether machines think but whether men do.” This article’s aim is to show how behaviorism can contribute to changes in people’s way of acting and thinking. Using Skinner’s theory, the author speaks of behavioral methods of conditioning of thought and behaviour conversion. Firstly, the author explains what does „conditioning” mean and what kind of conditioning exists in orthodox behaviorism. Secondly, the autor explains what factors can influence people’s lifestyle, way they thing and behave. Last but not least, the author will present methods of using behaviorism in real life and how can it contribute to green manufacturing.

Company name: Adam Mickiewicz University Poznań, Faculty Of Psychology And Cognitive Sciences

Country: Poland

City: Poznań

Topic: green manufacturing