Peccularities of formation of microstructure in composites based on chemically synthesized zirconium nanopowders obtained by the method of decomposition from fluoride salts were considered. Hydrofluoric acid, concentrated nitric acid, aqueous ammonia solution, metallic zirconium, and polyvinyl alcohol were used. It was established that the reduction of porosity in nanopowders in the sintering process is the main problem in the formation of high-density materials.

Analysis of various initial nanopowders, their morphology, and features of sintering by the method of hot pressing with direct transmission of electric current was made. Peccularities of obtaining the composites based on them with the addition of Al2O3 nanopowders applying the electric sintering method were considered. It was shown that the increase in the content of alumina nano additives leads to an increase in strength and crack resistance of the samples due to simultaneous inhibition of abnormal grain growth and formation of a finer structure with a high content of tetragonal phase.

The influence of sintering modes on the formation of the microstructure of zirconium nanopowders has been studied for different contents of alumina additives. Electric current promotes the surface activity of nanopowders and its variable value promotes partial fragmentation of agglomerated grains thus affecting the composite structure.

Physical-mechanical properties of the obtained samples, optimal compositions of mixtures, and possibilities of improving some parameters were determined. It was found that nanopowders of zirconium dioxide obtained by the method of decomposition from fluoride salts are quite suitable for the production of composite materials with high physical and mechanical properties. They can compete with imported analogs and enable obtaining of crack resistance of 7.8 MPa m1/2 and strength of 820 MPa.

**Keywords**: zirconium dioxide, composite materials, consolidation, microstructure, alumina, sintering, crack resistance.

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Abstract and References. Materials science

Currently, the availability of polypropylene, elastomer and sugar palm fiber (Arenga pinnata) is very abundant, which has a good impact on the potential for the development of new composite materials that have good properties and characteristics. Composites are generally a new material composed of two or more different materials with the aim of producing a new material that has better properties than the constituent material. In this study, polypropylene (PP) plastic and elastomer were used as a composite matrix reinforced with sugar palm fiber (Arenga pinnata). The purpose of this study was to determine the value of tensile strength, impact strength, and bending strength of composites with a weight fraction of 20% (80:20), 30% (70:30), and 40% (60:40). Based on the results of the research on hybrid polypolypropylene and fiber-reinforced elastomers, composites with a weight fraction of 20% (80:20) got the lowest tensile strength value of 1.153 MPa, while composites with a weight fraction of 40% (60:40) obtained the highest tensile strength value of 2.613 MPa. Composites with a weight fraction of 20% (80:20) got the lowest tensile strain value of 0.0049 and the highest tensile strain value of 0.0067 was found in composites with a weight fraction of 40% (60:40). For the impact strength, the 40% (40:60) weight fraction composite got the lowest value of 45248.234 kJ/mm², while the 20% (80:20) weight fraction composite got the highest impact strength of 17649.97 kJ/mm². For the bending strength results, the composite with a weight fraction of 20% (80:20) obtained the lowest bending strength of 1.7778 MPa, while the composite with a weight fraction of 30% (70:30) obtained the highest bending strength of 4.8867 MPa. The highest bending strain was found in the composite with a weight fraction of 20% (80:20), which was 0.0207.

Keywords: hybrid composite, sugar palm fiber (Arenga pinnata), polypropylene, elastomer, mechanical properties.

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DEVELOPMENT AND VERIFICATION OF MECHANICAL CHARACTERISTICS OF A COMPOSITE MATERIAL MADE OF A THERMOPLASTIC MATRIX AND SHORT GLASS FIBERS (p. 30–38)

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The paper presents the results of computer modeling and prediction of the mechanical properties of composite materials with a polycarbonate matrix filled with short glass inclusions. At the micro-level, the influence of the volume of inclusions on the mechanical properties of the designed composite based on polycarbonate matrix is studied in the DIGIMAT (France) program. It was found that with a ratio of the sizes of inclusions in the range of 468–60, the par-
Abstract and References. Materials science

ticles have a needle shape, and the material with such inclusions has a higher stress limit and elastic modulus than with a shape coefficient less than 50. The components of the fiber orientation tensor were also determined, at which the values of computer modeling are in good agreement with experimental data. The influence of the size of the finite element grid on the characteristics of the composite at the macro level was studied, and recommendations were given for choosing the size of the face of the finite element. The adequacy of computer models was confirmed by the results of field tests. The paper presents the results of testing flat samples made by injection molding technology. Mechanical tests were carried out for three variants of samples made of composite material based on a polycarbonate matrix with 10%, 20% and 30% inclusions. The discrepancy between the experimental and computer results for samples with 10%, 20% content of short chopped fibers is explained by the influence of technological factors on the properties of the material at the macro-level.

The conducted research allowed us to develop a computer modeling technique used at the stage of development of polymer composites based on thermoplastic matrices with short glass inclusions.

Keywords: composite material, polycarbonate, short glass fibers, DIGIMAT, elastic modulus.

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A STUDY OF PHYSICO-CHEMICAL CHARACTERISTICS OF ELECTROCHROMIC Ni(OH)2-PVA FILMS ON FTO GLASS WITH DIFFERENT DEPOSITION DURATION (p. 39–46)

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The use of electrochromic elements in “smart” windows leads to significant savings in electricity required for cooling premises. However, the high cost of these devices does not allow the technology to be widely used. Since the cost is determined by costly vacuum deposition methods, the development of other cheaper methods of deposition of electrochromic element layers is urgent.

Aspects of alternative to vacuum formation methods – cathode template electrochemical deposition of composite electrochromic Ni(OH)\(_2\)-PVA films were investigated.

The study is devoted to determining the effect of the duration of deposition of the electrochromic layer on their physicochemical characteristics, in particular, on the optical and electrochemical properties. The deposition was carried out on fluorine-doped tin oxide glasses (FTO glasses). The time of deposition was chosen equal to 5, 10, 20, 40, 60, and 80 minutes.

As a result of the experiments, it was shown that the optimal duration of deposition under the selected conditions of the electrochromic layer formation was the interval from 5 to 20 minutes, inclusive. The deposition time of 40 minutes did not improve the optical characteristics of the film. At the same time, with the deposition duration of 60 and 80 minutes, the electrochemical and optical parameters sharply decreased, the coloration depth and irreversibility during bleaching, as well as the specific capacitances of the processes decreased.

In the course of data processing, the film thickness was calculated depending on the duration of deposition in several ways. Comparison of the graphs obtained made it possible to determine the approximate amount of polyvinyl alcohol in the electrochromic composite coating, as well as to estimate the current efficiency of the electrodeposition and oxidation-reduction process of the electrochromic material. In this case, the volume of polyvinyl alcohol in the composite was approximately equal to the volume of nickel hydroxide, and the efficiency of Ni(OH)\(_2\) deposition and coloration-bleaching processes was approximately 100%.

Keywords: electrochromism, electrodeposition, nickel hydroxide, polyvinyl alcohol, deposition duration, coating thickness, adhesion.

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IDENTIFICATION OF WHITE JEWELRY ALLOY BASED ON SILVER AND PLATINUM FOR TESTING PURPOSES (p. 47–59)

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The procedure for the identification of white jewelry alloys based on precious metals is a significant and complex task, often requiring precise analysis techniques. In the presented study, the authors have developed a method for the identification of white jewelry alloys based on silver and platinum. The method involves the analysis of various physical characteristics such as weight, purity, and metal composition, as well as the evaluation of specific color changes that can indicate the presence of certain metals. The procedure is designed to identify the alloy composition of white jewelry alloys and to determine the qualitative and quantitative content of silver and platinum in these alloys.

In this study, the authors have employed several analytical techniques, including spectroscopy and microscopy, to identify the alloy composition of the white jewelry alloys. The results show that the method is effective in identifying the specific alloys and determining their metal content. The authors emphasize the importance of accurate identification, as the correct classification of white jewelry alloys is crucial for determining their value and authenticity.

The method described in the paper provides a reliable and efficient way to identify white jewelry alloys based on silver and platinum. This is significant for both the jewelry industry and collectors, as it allows for accurate identification and valuation of these valuable materials. The procedure outlined in the paper can be adapted to various settings, from small-scale workshops to large-scale jewelry manufacturers, making it a versatile tool for the industry.

In conclusion, the study contributes to the field of white jewelry analysis by offering a practical and effective method for identifying the composition of these alloys. This method not only enhances the accuracy of identification but also provides a basis for more efficient and reliable customer service. The authors encourage further research into the development of similar techniques for other types of precious metal jewelry, thereby expanding the utility of the method.
of 5 %. The presence in silver alloys of such impurities as zinc, cadmium, nickel, gold, palladium and others increases the error in determining the fineness of silver and forms a different color and shade.

It has been proven that testing of silver alloys on an assay stone with silver nitrate is effective only for the CuPm system. The presence of zinc in 925 sterling silver alloys visually increases the color intensity of the sediment, which indicates a higher overestimated fineness.

It has been found that the identification of the content of precious alloys based on platinum for the presence of ligature components is carried out with a potassium iodide reagent at \( r = 120 \degree C \) by the color and shade of the sediment.

The procedure for using potassium iodide during testing of precious platinum-based alloys has been optimized.

Keywords: assay control, precious metals based on silver and platinum, assay stone.

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DEVELOPMENT OF Fe-11Al-xMN ALLOY STEEL ON CRYOGENIC TEMPERATURES (p. 60–68)

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This research is focused on increasing the reliability of Fe-11Al-Mn by combining the properties of Mn and the superiorility of Fe-Al-C under cryogenic temperature. Three Fe-11Al-Mn alloys with compositions of 15 wt % Mn (F15), 20 wt % Mn (F20), and 25 wt % Mn (F25) were investigated. The cryogenic process uses liquid nitrogen in a temperature range of 0–196 °C. Hardness testing using the Vickers method and SEM was used to analyze the microstructure. X-ray diffraction (XRD) testing was conducted to ensure the Fe-11Al-Mn alloy phase and corrosion testing was carried out using the three-electrode cell polarization method. With the addition of Mn, the Vickers hardness of the Fe-11Al-Mn alloy decreased from 331.50 VHN at 15 wt % to 297.91 VHN at 25 wt %. The value of tensile strength and fracture elongation values were 742.21 MPa, 35.3 % EI; 789.03 MPa, 36.1 % EI; and 894.42 MPa, 50.2 % EI, for F15, F20, and F25, respectively. An important factor for improving the performance of cryogenic materials is the impact mechanism. The resulting impact toughness increased by 2.85 J/mm² to 3.30 J/mm² for F15 and F25, respectively. The addition of the element Mn increases
the corrosion resistance of the Fe-11Al-Mn alloy. The lowest corrosion rate occurs at 25 % wt Mn to 0.016 mm/year. Based on the results, the F25 alloy has the highest mechanical and corrosion resistance of the three types of alloys equivalent to SS 304 stainless steel. The microstructure of Fe-11Al-Mn alloy was similar between before and after cryogenic temperature treatment, this condition showed that the microstructure did not change during the process. From the overall results, the Fa-11Al-Mn alloy is a promising candidate for material applications working at cryogenic temperatures by optimizing the Mn content.

**Keywords:** Fe-11Al-Mn, Microstructure, Mechanical characteristics, Impact, Corrosion resistance, Cryogenic temperature.

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This paper considers a possibility to obtain high-quality butt junctions of bimetallic sheets from steel clad with a layer of titanium, with the use of barrier layers. The task that was tackled related to preventing the formation of Ti-Fe intermetallic phases (IMPs) between the steel and titanium layer. The barrier layers (height ~0.5 mm) of vanadium and copper alloys were surfaced by arc techniques while minimizing the level of thermal influence on the base metal. To this end, plasma surfacing with a current-driving wire and pulsed MAG surfacing were used. The obtained samples were examined by methods of metallography, X-ray spectral microanalysis, durometric analysis. It has been established that when a layer of vanadium is plated on the surface of titanium, a defect-free structure of variable composition (33.87–65.67) wt % Ti with (33.93–45.54) wt % V is formed without IMPs. The subsequent surfacing of steel on a layer of vanadium leads to the formation of eutectics (hardness up to 5,523 MPa) in the fusion zone, as well as to the evolution of cracks. To prevent the formation of IMPs, a layer of bronze CuBe2 was deposited on the surface of vanadium. The formed layer contributed to the formation of a grid of hot cracks. In the titanium-vanadium-copper transition zones (0.1–0.2 mm wide), a fragile phase was observed. To eliminate this drawback, the bronze CuBe2 was replaced with bronze CuSi3Mn1; a defect-free junction was obtained. When using a barrier layer with CuSi3Mn1, a defect-free junction was obtained (10–30 % Ti; 18–50 % Fe; 5–25 % Cu). The study reported here makes it possible to recommend CuSi3Mn1 as a barrier layer for welding bimetallic sheets “steel–titanium”. One of the applications of the research results could be welding of longitudinally welded pipes of main oil and gas pipelines formed from bimetallic sheets of steel clad with titanium. 

Keywords: steel–titanium bimetal, barrier layer, structure, intermetallic phases, interface boundary.

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Abstract and References. Materials science

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DOI: 10.15587/1729-4061.2021.243374 REGULARITIES IN THE FORMATION OF WEAR-RESISTANT COATINGS ON STEEL SAMPLES WHEN MACHINING THEM WITH ELECTRICAL DISCHARGE (p. 83–90)

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This paper considers the technology of electrical discharge machining of steel friction pairs and reports the results of experimental studies. Analysis of the experimental studies has shown that increasing the “anode-cathode” voltage leads to a sharp decrease in the micro-hardness of the surface layer. The study has also made it possible to determine the characteristic dimensions of the structural elements, the height parameters of surface roughness. The elemental composition of the resulting surface of a steel 15KHGN2TA sample differs from the composition of coatings and the surface layers of samples modified by electrical discharge machining involving various electrodes. Under the “anode-cathode” system operation mode, a thin layer of coating with a stable modified structure forms on the surface of the cathode due to dissipative processes. It is shown that the height of surface irregularities on sections after friction is higher than on the surface sections outside the friction flow, which is associated with the formation of a friction transfer film on the samples’ surface. It was established that the interaction of friction of steel samples treated by electrical discharge machining forms a thin film on the surface of friction of steel samples, which leads to a change in the relief of surfaces with an increase in the height of the micro-protrusions, as well as the structure of the transfer film in the direction of sliding. The effect of machining steel surfaces by electrical discharge on the wear resistance of metal-polymer tribosystem was established. The implementation of the devised technology could provide a significant increase in the wear resistance of metal-polymer tribojunctions.

Keywords: alloying electrode, wear resistance of metal polymers, tribobuinetion, electrical discharge machining, steel modification.

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Анотацiї. Materials science

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ВИЯВЛЕННЯ ОСОБЛИВОСТЕЙ ФОРМУВАННЯ СТРУКТУРИ КОМПОЗИТІВ НА ОСНОВІ СИНТЕЗОВАНИХ НАНОПОРОШКІВ ДЮКСИДУ ЦИРКОНІЮ (с. 6–19)
Е. С. Геворкян, В. П. Нерубацький, В. О. Чишкала, О. М. Морозова

Розглянуто особливості формування мікроструктури композитів на основі синтезованих хімічним способом методом розкладу з фторидних солей нанопорошків діоксиду цирконію. При цьому було використано фтороводневу кислоту, концентровану азотну кислоту, водний розчин аміаку, металевий цирконій, полівініловий спирт. Встановлено, що зменшення пористості нанопорошків в процесі спікання є головним завданням на шляху формування високощільних матеріалів.

Проведено аналіз різних вихідних нанопорошків, їх морфології та особливостей спікання методом гарячого пресування з прямим пропусканням електричного струму. Розглянуто особливості отримання композитів на їх основі з добавками нанопорошків Аl₂O₃ при використанні методу електроспікання. Показано, що збільшення вмісту нанодобавок оксиду алюмінію призводить до підвищення міцності і тріщиності зразків за рахунок одночасного стискання аномально росту зерен та формування більш дрібної структури з високим вмістом тетрагональної фази.

Досліджено вплив режимів спікання на формування мікроструктури нанопорошків діоксиду цирконію з різним вмістом добавок олії алюмінію. Електричний струм сприяє поверхневій активності нанопорошків, а його змінне значення – частковому дробленню агломерованих зерен, таким чином впливаючи на структуроутворення композитів.

Визначено фізико-механічні властивості отриманих зразків, оптимальні склади сумішей та можливості поліпшення деяких параметрів. Встановлено, що для отримання композиційних матеріалів з високими фізико-механічними властивостями нанопорошки дюксиду цирконію, отримани методом розкладання з фторидних солей, ацетоном підходять. Вони конкурентоспроможні з імпортними аналогами та дозволяють отримати тріщиностість 7,8 МПа·m⁰/₂ та міцність 820 МПа.

Ключові слова: діоксид цирконію, композиційні матеріали, консолідація, мікроструктура, оксид алюмінію, спікання, тріщиностість.

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АНАЛІЗ МЕХАНІЧНОЇ МІЦНОСТІ ВОЛОКНА ЦУКРОВОЇ ПАЛЬМИ РІЗНОЇ МАСОВОЇ ЧАСТКИ В ЯКОСТІ АРМУЮЧОГО МАТЕРІАЛУ ПОЛІПРОПІЛЕН-ЕЛАСТОМЕРНОЇ МАТРИЦІ ГІБРИДНОГО КОМПОЗИТУ (с. 20–29)
I Gusti Ngurah Nitya Santhiarsa, I Gusti Ayu Agung Praharsini, I Gusti Agung Alit Suryawati, Pratikto

В даний час доступність поліпропілену, еластомеру і волокна цукрової Пальми (Arenga pinnata) дуже велика, що підвищує потенціал розробки нових композиційних матеріалів, що володіють хорошими властивостями і характеристиками. Композити, як правило, являють собою новий матеріал, що складається з двох або більше різних матеріалів з метою отримання нового матеріалу, що володіє кращими властивостями, ніж складові матеріали. У цьому дослідженні пластик поліпропілен (ПП) і еластомер використовували в якості матриці композиту, армованої волокном цукрової пальми (Arenga pinnata). Метою даного дослідження було визначити значення міцності на розрив, ударну в’язкість і міцність на вигин композитів з масовою часткою 20% (80:20), 30% (70:30) і 40% (60:40). За результатами досліджень гібридних композитів з поліпропілену і армованих волокнами еластомерів, найменше значення міцності на розрив 1,153 МПа отримали композити з масовою часткою 20% (80:20), в той час як найбільше значення 2,613 МПа отримали композити з масовою часткою 40% (60:40). Найменше значення деформації при розтяганні 0,0049 отримали композити з масовою часткою 20% (80:20), найбільше значення 0,0067 було виявлено в композитах з масовою часткою 40% (60:40). За результатами досліджень найменше значення 1,7778 МПа отримали композити з масовою часткою 20% (80:20), в той час як найбільше значення 4,8867 МПа отримали композити з масовою часткою 40% (60:40). Найменша ударна в’язкість склала 17649,97 кДж/мм², найбільша – 4528.234 кДж/мм².

Ключові слова: гібридний композит, волокно цукрової Пальми (Arenga pinnata), поліпропілен, еластомер, механічні властивості.

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РОЗРОБКА І ВЕРИФІКАЦІЯ МЕХАНІЧНИХ ХАРАКТЕРИСТИК КОМПОЗИЦІЙНОГО МАТЕРІАЛУ, ВИГОТОВЛЕНОГО З ТЕРМОПЛАСТИЧНОЇ МАТРИЦІ І КОРОТКОГО СКЛОВОЛОКНА (с. 30–38)
Madina Isametova, Gazel Abilezova, Nikolay Dishovsky, Petar Velev

У роботі представлені результати комп’ютерного моделювання та прогнозування механічних властивостей композиційних матеріалів з поликарбонатною матрицею, заповнено короткими склівними включеннями. На мікрорівні в програми
DIGIMAT (Франція) вивчено вплив обсягу включення на механічні властивості створюваного композиту на основі полікарбонатної матриці. Було встановлено, що при співвідношенні розмірів включення в діапазоні 468÷60 частинки мають гольчасту форму, матеріал з такими включеннями має більшу висоту між міцності і модуль пружності, ніж при коефіцієнті форми меншо 50. Також були визначені компоненти тензору орієнтації волокон, за яких значення комп’ютерного моделювання добре узгоджуються з даними експериментів. Вивчені вплив розміру сітки кінцевих елементів на характеристики композиту на макрорівні, надано рекомендації щодо вибору розміру зовні шару кінцевого елемента. Відповідність комп’ютерних моделей було підтверджено результатами натурних випробувань. У роботі представлені результати випробувань плоских зразків, виготовлених за технологією литья під тиском. Механічні випробування проводилися на трьох варіантах зразків, виготовлених з композіційного матеріалу на основі полікарбонатної матриці з включеннями 10 %, 20 % і 30 %. Розбіжність між експериментальними і комп’ютерними результатами для зразків з вмістом коротких рубаних відрізків волокон 10 %, 20 % пояснюється впливом технологічних факторів на властивості матеріалу на макрорівні.

Проведені дослідження дозволили розробити методику комп’ютерного моделювання, що застосовується на етапі створення полімерних композитів на основі термопластичних матриць з короткими скляними включеннями.

Ключові слова: композиційний матеріал, полікарбонат, коротке скловолокно, DIGIMAT, модуль пружності.

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ДОСЛІДЖЕННЯ ФІЗІКО-ХІМІЧНИХ ХАРАКТЕРИСТИК ЕЛЕКТРОХРОМНИХ ПІЛЮК Ni(OH)2-ПВС НА FTO КІПЛІ ПРИ РІЗНИЙ ТРИВАЛОСТІ ОСАДЖЕННЯ (с. 39‒46)  

В. А. Коток, В. Л. Коваленко, Р. К. Нафєєв, В. В. Вербицький, О. С. Мельник, І. Л. Плаксієнко, А. А. Кочерга, Н. П. Макарченко

Використання electroхромних елементів в «розумних» вікнах веде до значної економії електроенергії необхідної для охолодження приміщень. Проте, висока вартість цих пристроїв не дозволяє широко використовувати технологію. Оскільки вартість визначається витратами вакуумними методами нанесення, розробка інших більш дешевих методів нанесення ковзань електрохромного елементу актуальна.

Було досліджено аспекти альтернативного вакуумним методами формування – катодного темплатного електроосадження на електрохромному шару на їх фізико-хімічні характеристики зокрема на оптичні і електрохімічні властивості. Осадження проводили на схему з нанесеним оксидом олова доповненим щелочевим розчином. Тривалість осадження була обрана рівною 5, 10, 20, 40, 60 і 80 хвилин.

В результаті проведення експериментів було показано, що оптимальною тривалістю осадження при вибраних умовах формування electroхромного шару є інтервал від 5 до 20 хвилин включно. Тривалість осадження в 40 хвилин не давала вигріву в оптичних характеристиках, а тривалість від 60 і 80 хвилин відрізнялася більш високою електрохімічною та оптичною ефективністю, яка змінювалася залежно від тривалості осадження.

Ключові слова: electroхроомізм, електроосадження, гідроксид нікелю, полівініловий спирт, тривалість осадження, товщина плівки.

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РОЗРОБКА ПРОЦЕДУРІ ІДЕНТИФІКАЦІЇ ІЮВЕЛІРНИХ СПЛАВІВ БІЛОГО КОЛЬОРУ НА ОСНОВІ СРІБЛА ТА ПЛАТИНИ ЩЕДРІЙ КОРОБКОВІ З РОЗУМІНІ СПІЛЬНОСТІ ІЩЕДРЯ КОРОБКОВІ ПОДАРУНКИ (с. 47‒59)  

Т. М. Артюх, І. В. Григоренко, А. С. Тернова, С. В. Ягелюк, О. М. Верінікін, М. І. Чернавка

Розглянуто процедуру ідентифікації білих ювелірних сплавів на основі дорогоцінних металів, визначення срібла, платини та металів платинової групи із різним вмістом легувачів компонентів шляхом випробування на пробірному камені та методом рентгенфлуоренцентного аналізу. Існує вміст компоненту відповідно до проби срібла та платини в ювелірних сплавах більше кольору різного компонентного складу вимогам нормативної документації та процедурі їх ідентифікації.

Встановлено, що величина проби срібла у дорогоцінних сплавах системи СрМ, СрЦМ, визначена за допомогою реактиву «Біхромат калію» на пробірному камені, залежить від прояву контрастності якісної реакції від стандартного зразка (пробірного кольора). Присутність у срібних сплавах таких домішок, як цинк, кадмій, нікель, золото, платини та інші, збільшує похибку визначення проби срібла та утворює інший колір відтінок.
Доведено, що випробування срібних сплавів на пробірному камені азоткислим сріблом ефективне лише для систем СрМ. Наявність цинку в срібних сплавах 925 проби візуально збільшує інтенсивність кольору осаду, що свідчить про більш високу завищену пробу.

Встановлено, що ідентифікація вмісту дорогоцінних сплавів на основі платини на наявність лігатурних компонентів здіїснюється реактивом «Йодистий калій» при

Розглянуто технологію електроерозійної обробки сталевих пар тертя та представлено результати експериментальних досліджень. Аналіз експериментальних досліджень показав, що збільшення напруги «анод-катод» призводить до різкого зниження електроерозійної обробки сталевих пар тертя.

**Ключові слова:** біметал сталь-титан, бар’єрний прошарок, структура, інтерметалідні фази, границя розділу.

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**ЗАКОНОМІРНОСТІ ФОРМУВАННЯ ЗНОСОСТІЙКИХ ПОКРИТТІВ СТАЛЕВИХ ЗРАЗКІВ ЗА ДОПОМОГОЮ ІХ ЕЛЕКТРОЕРОЗІЙНОЇ ОБРОБКИ (c. 83–90)

Д. Д. Марченко, В. М. Курепін

Розглянута технологія електроерозійної обробки сталевих пар тертя та представлено результати експериментальних досліджень. Аналіз експериментальних досліджень показав, що збільшення напруги «анод-катод» призводить до різкого зниження електроерозійної обробки сталевих пар тертя.
ження мікротвердості поверхневого шару. Дослідження також дозволило визначити характерні розміри елементів конструкції, параметри висоти шорсткості поверхні. Елементний склад вихідної поверхні зразка зі сталі 15ХГН2ТА відрізняється від складу покриттів та поверхневих шарів зразків, модифікованих електроерозійною обробкою різними електродами. У режимі роботи системи «анод-катод» на поверхні катода внаслідок дисипативних процесів утворюється тонкий шар покриття стійкої модифікованої структури. Показано, що висота поверхневих нерівностей на ділянках після тертя вища, ніж на ділянках поверхні поза їх тертя, що пов’язано з утворенням на поверхні зразків плівки перенесення тертя. Встановлено, що взаємодія тертя зразків сталі, оброблених електроерозійним методом, утворює тонку плівку на поверхні тертя зразків сталі, що призводить до зміни рельєфу поверхні збільшенням висоти мікровиступів та структурування переносної плівки в напрямку ковзання. Встановлено вплив електроерозійної обробки сталевих поверхонь на зносостійкість металополімерної трибосистеми. Впровадження розробленої технології забезпечить істотне підвищення зносостійкості металополімерних трибоспріжижень.

Ключові слова: легуючий електрод, зносостійкість металополімерів, трибоспряження, електроерозійна обработка, модифікація сталі.