

[< Back to results](#) | [< Previous](#) 7 of 32 [Next >](#)[Download](#) [Print](#) [Save to PDF](#) [Add to List](#) [Create bibliography](#)*Eastern-European Journal of Enterprise Technologies* • Open Access • Volume 6, Issue 12(114), Pages 6 - 12 • 2021**Document type**Article • [Gold Open Access](#) • [Green Open Access](#)**Source type**

Journal

ISSN

17293774

DOI

10.15587/1729-4061.2021.243993

[View more](#)

THE EFFECT OF LAMINA CONFIGURATION AND COMPACTION PRESSURE ON MECHANICAL PROPERTIES OF LAMINATED GIGANTOCHLOA APUS COMPOSITES

Manik, Parlindungan; [Suprihanto, Agus](#); [Nugroho, Sri](#); [Sulardjaka](#) [Save all to author list](#)^a Department of Mechanical Engineering Diponegoro University, Jl. Prof. Soedarto, SH, Tembalang, Semarang, 50275, Indonesia3 55th percentile
Citations in Scopus0.47
FWCI 17
Views count [View all metrics >](#)[View PDF](#) [Full text options](#) [Export](#) **Abstract**

Author keywords

SciVal Topics

Metrics

Funding details

Abstract

This study aims to investigate the mechanical properties of bamboo apus (*gigantochloa apus*) as a natural reinforced composite material. Bamboo's laminates of *gigantochloa apus* were used as reinforcement on the epoxy resin matrix. The parameters examined in this study are the configuration of lamina and compaction pressure. Laminate configuration varies in the number, thickness and direction of the lamina. Compaction pressures of 1.5 MPa, 2 MPa, and 2.5 MPa were used to fabricate the Laminated Bamboo Composites (LBCs). The stem of bamboo with a length of 400 mm was split to obtain bamboo lamina with a size of 400×20 mm. The thickness of bamboo lamina is varied between 1 mm, 1.5 mm, and 2 mm. The bamboo lamina is then preserved by watering it with a preservative solution in the form of 2.5 % sodium tetraborate solution and dried in an oven until the water content reaches 10 %. LBCs were made with a hand lay-up method. After the LBCs were molded, they were pressed with 3 variations of dies compaction 1.5 MPa, 2 MPa and 2.5 MPa. The tensile and bending tests were carried out on the LBCs. Tensile testing is performed in accordance with ASTM standard D3039 and the bending tests were conducted based on ASTM standard D7264. The results show that at each compaction pressure, the highest tensile and bending strength was achieved by LBCs with a thickness of 1 mm of bamboo lamina and 7 layers of bamboo laminates. The LBC with thinner bamboo lamina reinforcement and more layers has the highest tensile strength and bending strength, even it has a lower mass fraction. The LBCs with laminates oriented 0° exhibited greater tensile and bending strengths than the LBCs with laminates structured -45°/+45° and 0°/90°. The LBCs with the 0° laminates direction is matrix fracture followed by lamina fracture. In the 0°/90° direction, matrix fracture is followed by delamination in the 90° and 0° laminates direction. Delamination and lamina clefting were observed in LBCs with laminates oriented +45°/-45° © 2021. All Rights Reserved.

Author keywords

Bending Strength; Gigantoch-loa Apus; Laminated Bamboo Composites; Tensile Strength

SciVal Topics

Metrics

Funding details

Cited by 3 documents

Analysis of the tensile and bending strengths of the joints of "gigantochloa apus" bamboo composite laminated boards with epoxy resin matrix

Manik, P. , Firdhaus, A. , Tuswan, T. (2023) *Journal of the Mechanical Behavior of Materials*

Correlation between lamina directions and the mechanical characteristics of laminated bamboo composite for ship structure

Tuswan, T. , Manik, P. , Samuel, S. (2023) *Curved and Layered Structures*

Mechanical properties of laminated bamboo composite as a sustainable green material for fishing vessel: Correlation of layer configuration in various mechanical tests

Manik, P. , Samuel, S. , Tuswan, T. (2022) *Journal of the Mechanical Behavior of Materials*[View all 3 citing documents](#)

Inform me when this document is cited in Scopus:

[Set citation alert >](#)**Related documents**

Mechanical Properties of Layered Laminated Woven Bamboo Gigantochloa Scortechinii/Epoxy Composites

Rassiah, K. , Megat Ahmad, M.M.H. , Ali, A. (2018) *Journal of Polymers and the Environment*

Mechanical properties of laminated bamboo composite as a sustainable green material for fishing vessel: Correlation of layer configuration in various mechanical tests

Manik, P. , Samuel, S. , Tuswan, T. (2022) *Journal of the Mechanical Behavior of Materials*

Fatigue and fracture properties of laminated bamboo strips from Gigantochloa scortechinii polyester composites

Ali, A. , Rassiah, K. , Othman, F. (2016) *BioResources*[View all related documents based on references](#)[Find more related documents in Scopus based on:](#)[Authors >](#) [Keywords >](#)

References (24)

[View in search results format >](#)[All](#) [Export](#) [Print](#) [E-mail](#) [Save to PDF](#) [Create bibliography](#)

[Home](#) / [About the Journal](#)

About the Journal

Focus and Scope

Terminology used in the title of the "Eastern-European Journal of Enterprise Technologies" should be read as "industrial technologies". "**Eastern-European Journal of Enterprise Technologies**" publishes all those best ideas from the science, which can be introduced in the industry. Since, obtaining the high-quality, competitive industrial products is based on introducing high technologies from various independent spheres of scientific researches, but united by a common end result - a finished high-technology product. Among these scientific spheres, there are engineering, power engineering and energy saving, technologies of inorganic and organic substances and materials science, information technologies and control systems. Publishing scientific papers in these directions are the main development "vectors" of the "Eastern-European Journal of Enterprise Technologies". Since, these are those directions of scientific researches, the results of which can be directly used in modern industrial production: space and aircraft industry, instrument-making industry, mechanical engineering, power engineering, chemical industry and metallurgy.

Therefore, the scientists, associated with modern production, have the opportunity to participate in **technology transfer to industry**, publishing the results of their applied scientific researches. Industrialists, in turn, can draw scientific and practical information from the journal - each in their direction:

- specialists in management and computer science - from volumes "Applied Information Technologies and Control Systems", "Mathematics and Cybernetics - Applied Aspects";
- mechanical and design engineers - from the volume "Applied Mechanics";
- production engineers - from volumes "Mechanical Engineering Technology", "Applied Physics", "Materials Science", "Technology of organic and inorganic substances and the Ecology";
- production and power engineers - from the volume "Energy-saving technology and equipment".

The goal of the journal is to eliminate the gap, which occurs between the rapidly emerging new scientific knowledge and their introduction in the industry, which requires much more time. Industrial enterprises are active subscribers to the "Eastern-European Journal of Enterprise Technologies", and production engineers check the practical value of those scientific and technological ideas, which are recommended for implementation by scientists-authors of the "Eastern-European Journal of Enterprise Technologies".

The objective of the journal in achieving the goal is **forming a "scientific component" of modern technologies** transfer from science to industry. Therefore, in the papers, published in the journal, the emphasis is placed on both scientific novelty, and practical value.

Materials of scientific research works of scientific and pedagogical employees, scientists, specialists who are associated with modern production and have the opportunity to participate in the transfer of technologies to industry are accepted for publication in the "Eastern-European Journal of Enterprise Technologies", publishing the results of their applied scientific research in the **following specialties**:

Technical sciences:

- 101 – Ecology
- 104 – Physics and astronomy
- 105 – Applied Physics and Nanomaterials
- 113 – Applied Mathematics
- 121 – Software Engineering
- 122 – Computer Science
- 123 – Computer Engineering
- 124 – System Analysis
- 125 – Cybersecurity
- 126 – Information Systems and Technologies
- 131 – Applied Mechanics
- 132 – Materials Science
- 133 – Sectoral Mechanical Engineering
- 134 – Aviation and rocket-space technology
- 135 – Shipbuilding
- 136 – Metallurgy
- 141 – Electrical Power Engineering, Electrical Engineering and Electromechanics
- 142 – Power Engineering
- 143 – Nuclear Power
- 144 – Heat Power Engineering
- 145 – Hydropower
- 151 – Automation and Computer-integrated Technologies
- 152 – Metrology and Information-measuring Technologies
- 161 – Chemical Technology and Engineering
- 163 – Biomedical Engineering
- 171 – Electronics
- 172 – Telecommunications and Radio Engineering
- 181 – Food Technology

[Information site](#)

Language

[English](#)[Українська](#)

Information

[For Readers](#)[For Authors](#)[For Librarians](#)[Make a Submission](#)[Open Journal Systems](#)

[Collective monographs with Scopus indexing from PC TECHNOLOGY CENTER](#)

[Package offer for universities from our partner Scientific Route](#)



[How to correctly link to an article in the Eastern European Journal of Enterprise Technologies](#)



Current Issue

[RTM 3.0](#)[REP 3.0](#)[REP 3.0](#)**Visitors**

[Home](#) / [Editorial Team](#)

Editorial Team

EDITOR-IN-CHIEF

[Dmitriy Demin](#), PC TECHNOLOGY CENTER, National Technical University «Kharkiv Polytechnic Institute», [Ukraine](#)

[Vagan Terziyan](#), University of Jyvaskyla, [Finland](#)

ENGINEERING TECHNOLOGICAL SYSTEMS

[Mykhaylo Zagirnyk](#), Kremenchuk Mykhailo Ostrohradskiy National University, Ukraine

[Viliam Zaloga](#), Sumy State University, Ukraine

[Myroslav Kindrachuk](#), National Aviation University, Ukraine

[Volodymyr Korzhyk](#), E.O. Paton Electric Welding Institute of the National Academy of Sciences of Ukraine, Ukraine

[Houfa Shen](#), Tsinghua University, China

[Jan Awrejcewicz](#), Lodz University of Technology, Poland

[Marcin Kamiński](#), Lodz University of Technology, Poland

[Uğur Ulusoy](#), Cumhuriyet University, Turkey

INFORMATION TECHNOLOGY. INDUSTRY CONTROL SYSTEMS

[Grygoriy Zholtkevych](#), V. N. Karazin Kharkiv National University, Ukraine

[Valeriy Lakhno](#), National University of Life and Environmental Sciences of Ukraine, Ukraine

[Vasyl Lytvyn](#), Lviv Polytechnic National University, Ukraine

[Serhii Ostapov](#), Yuriy Fedkovych Chernvtsi National University, Ukraine

[Vasyl Teslyuk](#), Lviv Polytechnic National University, Ukraine

[Vagan Terziyan](#), University of Jyvaskyla, Finland

[Frantisek Jakab](#), Technical University of Kosice, Slovakia

[Sitharama Iyengar](#), Florida International University, USA; National Forensics Sciences University, India

CONTROL PROCESSES

[Tetiana Butko](#), Ukrainian State University of Railway Transport, Ukraine

[Dmitriy Demin](#), National Technical University «Kharkiv Polytechnic Institute», PC TECHNOLOGY CENTER, Ukraine

[Sergey Myamlin](#), JSC "Ukrainian Railway", Ukraine

[Sergii Panchenko](#), Ukrainian State University of Railway Transport, Ukraine

[Andrii Prokhorchenko](#), Ukrainian State University of Railway Transport, Ukraine

[Oksana Sira](#), National Technical University «Kharkiv Polytechnic Institute», Ukraine

[Rab Nawaz Lodhi](#), Hailey College of Commerce, University of the Punjab, Lahore, Pakistan

MATHEMATICS AND CYBERNETICS - APPLIED ASPECTS

[Igor Atamanyuk](#), Warsaw University of Life Sciences, Poland; Mykolaiv National Agrarian University, Ukraine

[Yuriy Kondratenko](#), Petro Mohyla Black Sea National University, Ukraine

[Tetyana Romanova](#), Anatolii Pidhornyi Institute of Mechanical Engineering Problems of the National Academy of Sciences of Ukraine, Ukraine

[Vadym Savanewych](#), Kharkiv National University of Radioelectronics, Ukraine

[Hari Mohan Srivastava](#), University of Victoria, Canada; Azerbaijan University, Azerbaijan

[Dimitris Kanellopoulos](#), University of Patras, Greece

[Izhar Ahmad](#), King Fahd University of Petroleum and Minerals, Saudi Arabia

[Juan J. Trujillo](#), Universidad de la Laguna, Spain



[Information site](#)



Language

[English](#)

[Українська](#)

Information

[For Readers](#)

[For Authors](#)

[For Librarians](#)

[Make a Submission](#)

[Open Journal Systems](#)



[Collective monographs with Scopus indexing from PC TECHNOLOGY CENTER](#)



[Package offer for universities from our partner Scientific Route](#)



[How to correctly link to an article in the Eastern European Journal of Enterprise Technologies](#)



Current Issue

[EJETT 1.0](#)

[EJETT 2.0](#)

[EJETT 3.0](#)

[Gennadiy Filimonikhin](#), Central Ukrainian National Technical University, Ukraine

[Petro Fomychov](#), National Aerospace University - Kharkiv Aviation Institute, Ukraine

[Nikolai Yaroshevich](#), Lutsk National Technical University, Ukraine

[Igor Andrianov](#), RWTH Aachen University, Germany

[Elias Aifatis](#), Aristotle University, Thessaloniki, Greece; Michigan Technological University, United States

[Evangelos Giakoumis](#), National Technical University of Athens, Greece

[Evangelos Sapountzakis](#), National Technical University of Athens, Greece

[Francesco Tornabene](#), Universita del Salento, Lecce, Italy

[Frank Visser](#), Flowserve, Netherlands

[Kenji Uchino](#), The Pennsylvania State University, United States

[Roland W. Lewis](#), Swansea University, United Kingdom

ENERGY-SAVING TECHNOLOGIES AND EQUIPMENT

[Andriy Avramenko](#), Institute of Engineering Thermophysics of NAS of Ukraine, Ukraine

[Borys Liubarskyi](#), National Technical University «Kharkiv Polytechnic Institute», Ukraine

[Andrii Rusanov](#), A. Podgorny Institute of Mechanical Engineering Problems of the National Academy of Sciences of Ukraine, Ukraine

[Nataliia Fialko](#), Institute of Engineering Thermophysics of NAS of Ukraine, Ukraine

[Matheos Santamouris](#), University of New South Wales, Australia

[Zhenjun Ma](#), University of Wollongong, Australia

[Josep M. Guerrero](#), Aalborg University, Denmark

[Tatiana Morosuk](#), Technical University Berlin, Germany

[Tole Sutikno](#), Universitas Ahmad Dahlan, Embedded System and Power Electronics Research Group, Indonesia

[Francesco Calise](#), Università degli Studi di Napoli Federico II, Naples, Italy

[Giorgio Besagni](#), Politecnico di Milano, Milan, Italy

[Hai-Wen Li](#), Kyushu University, Japan; Hefei General Machinery Research Institute (HGMR), China

[Mihaela Popescu](#), University of Craiova, Romania

[Mustafa Acaroglu](#), Selçuk University, Turkey

INFORMATION AND CONTROLLING SYSTEM

[Valeriy Bezruk](#), Kharkiv National University of Radio Electronics, Ukraine

[Oleh Velychko](#), State Enterprise "Ukrmetrteststandard", Ukraine

[Leonid Uryvsky](#), National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine

[Galyna Shcherbakova](#), Odessa National Polytechnic University, Ukraine

[Vasyl Yatskiy](#), West Ukrainian National University, Ukraine

[Ulkar Sattarova](#), Azerbaijan University of Architecture and Construction, Azerbaijan

ECOLOGY

[Sergii Boichenko](#), National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine

[Mykola Gomelya](#), National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine

[Natalya Remez](#), National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine

[Iryna Shvedchykova](#), Kyiv National University of Technologies and Design, Ukraine

[Oleg Makarynskyi](#), MetOcean Dynamic Solutions Pty Ltd, Australia; Odessa State Environmental University, Ukraine

[Ozgur Kisi](#), University of Applied Sciences, Germany; Ilia State University, Georgia

[Miklas Scholz](#), University of Salford, Salford, United Kingdom; Oldenburgisch-Ostfriesischer Wasserverband, Germany

TECHNOLOGY AND EQUIPMENT OF FOOD PRODUCTION

[Oleg Burdo](#), Odessa National University of Technology, Ukraine

[Effat Baher](#), National Research Centre, Egypt

[Vinod Modi](#), Amity University, India

[Davide Barreca](#), University of Messina, Italy

[Gabriel Olaniran Adegoke](#), University of Ibadan, Nigeria

[Osman Erkmen](#), İstanbul Arel University, Turkey

[Hafiz Ansar Rasul Suleria](#), University of Melbourne, Deakin University, Australia

MATERIALS SCIENCE

[Andriy Buketov](#), Kherson State Maritime Academy, [Ukraine](#)

[Edvin Gevorkyan](#), Ukrainian State University of Railway Transport, Ukraine; Kazimierz Pułaski University of Technology and Humanities in Radom, [Poland](#)

[Vitalii Dubok](#), Institute for Problems of Materials Sciences National Academy of Sciences of Ukraine, [Ukraine](#)

[Zoia Duriagina](#), Lviv Polytechnic National University, [Ukraine](#)

[Vasily Efremenko](#), State Higher Educational Institution "Priazovivskiy State Technical University", [Ukraine](#)

[Ivan Yaremiy](#), Vasyl Stefanyk Precarpathian National University, [Ukraine](#)

[Charis Apostolopoulos](#), University of Patras, Rio, [Greece](#)

[Jenő Gubicza](#), Eötvös Loránd University, [Hungary](#)

[Manoj Gupta](#), National University of Singapore, [Singapore](#)

[Patrizia Bocchetta](#), University of Salento, [Italy](#)

TRANSFER OF TECHNOLOGIES: INDUSTRY, ENERGY, NANOTECHNOLOGY

[Vitalina Babenko](#), V. N. Karazin Kharkiv National University, Ukraine

[Viacheslav Dzhezdzhula](#), Vinnytsia National Technical University, Ukraine

[Iryna Gontareva](#), V. N. Karazin Kharkiv National University, Ukraine

[Oleksandr Prystemskiy](#), Kherson State Agrarian and Economic University, Ukraine

[Yuri Romanenkov](#), National Aerospace University – Kharkiv Aviation Institute, Ukraine

[H. Kent Baker](#), American University, Kogod School of Business, Washington, USA

[Luísa Carvalho](#), Institute Polytechnic of Setúbal, Portugal

[Gabriel Fedorko](#), Technical university of Kosice, Slovakia

[Simon Grima](#), University of Malta, Malta; University of Latvia, Latvia

[Ryszard Pukala](#), Bronislaw Markiewicz State University of Technology and Economics, Poland

ISSN (print) 1729-3774, ISSN (on-line) 1729-4061

Platform &
workflow by
OJS / PKP

[Home](#) / [Archives](#) / Vol. 6 No. 12 (114) (2021): Materials Science

Vol. 6 No. 12 (114) (2021): Materials Science

Published: 2021-12-22

[Full Issue](#)
[ABSTRACT AND REFERENCES](#)
[Materials Science](#)

Devising criteria for the authenticity of historical cold weapons based on X-ray fluorescence analysis of their surface

Nina Merezhko, Yuliia Vovk, Volodymyr Indutnyi, Kateryna Pirkovich, Valentyna Davydiuk, Oleksii Andreiev 6-11

[PDF](#)

Effect of pack carburizing with chicken egg shell powder agent and vibrator quenching on the mechanical properties of AISI 9310 steel

Sinarep Sinarep, Sujita Darmo 12-19

[PDF](#)

Energy power parameter effect of hot rolling on the formation of the structure and properties of low-alloy steels

Sergey Sheyko, Anton Matiukhin, Volodymyr Tsyganov, Andrey Andreev, Anna Ben, Elena Kulabneva 20-26

[PDF](#)

Efficiency definition of the deposition process of electrochromic Ni(OH)₂-PVA films formed on a metal substrate from concentrated solutions

Valerii Kotok, Vadym Kovalenko, Rovil Nafeev, Volodymyr Verbitskiy, Olena Melnyk, Iryna Plaksienko, Igor Kovalenko, Viktoriia Stoliarenko, Valerii Plaksienko, Iryna Zamrii 27-33

[PDF](#)

Establishment of regularities of influence on the specific heat capacity and thermal diffusivity of polymer nanocomposites of a complex of defining parameters

Nataliia Fialko, Roman Dinzhos, Julii Sherenkovskii, Nataliia Meranova, Sergii Aloschko, Diana Izvorska, Volodymyr Korzhyk, Maxim Lazarenko, Irina Mankus, Liudmyla Nedbaievskia 34-39

[PDF](#)

Determining the influence of ultra-dispersed aluminum nitride impurities on the structure and physical-mechanical properties of tool ceramics

Edwin Gevorkyan, Volodymyr Nerubatskyi, Volodymyr Chyshkala, Yuriy Gutsalenko, Oksana Morozova 40-52

[PDF](#)

Determining the influence of the microstructure and phase composition of glass-metal-ceramic coatings on their basic physical-technical properties

Elena Karasik, Yurii Hordieiev 53-61

[PDF](#)

The effect of lamina configuration and compaction pressure on mechanical properties of laminated gigantochloa apus composites

Parlunganan Manik, Agus Suprihanto, Sri Nugroho, Sulardjaka Sulardjaka 62-73

[PDF](#)

[Information site](#)

Language
[English](#)
[Українська](#)
Information
[For Readers](#)
[For Authors](#)
[For Librarians](#)
[Make a Submission](#)
[Open Journal Systems](#)

[Collective monographs with Scopus indexing from PC TECHNOLOGY CENTER](#)

[Package offer for universities from our partner Scientific Route](#)


How to correctly link to an article in the Eastern European Journal of Enterprise Technologies


Current Issue
[HTML 1.0](#)
[PDF 1.0](#)
[RSS 1.0](#)

- **Bukti penulis terdiri dari 2 negara dalam 1 nomor terbitan**

UDC 355.48:623.444]:167.2

DOI: 10.15587/1729-4061.2021.247624

DEVISING CRITERIA FOR THE AUTHENTICITY OF HISTORICAL COLD WEAPONS BASED ON X-RAY FLUORESCENCE ANALYSIS OF THEIR SURFACE

Nina Merezhko

Doctor of Technical Sciences, Professor, Head of Department*

Yuliia Vovk

Corresponding author

Postgraduate Student*

E-mail: y.vovk@knu.edu.ua

Volodymyr Indutnyi

Doctor of Geological and Mineralogical Sciences,

Associate Professor*

Kateryna Pirkovich

PhD, Associate Professor*

Valentyna Davydiuk

Chief Curator

National Military History Museum of **Ukraine**

Hrushevskoho str., 30/1, Kyiv, Ukraine, 01021

Oleksii Andreiev

PhD, Leading Researcher

Department of Physical and Chemical Research

National Research Restoration Center of **Ukraine**

Tereshchenkivska str., 9b, Kyiv, Ukraine, 01024

*Department of Commodity Science and Customs Affairs

Kyiv National University of Trade and Economics

Kyoto str., 19, Kyiv, **Ukraine**, 02156

This paper reports the results of studying the chemical composition of the surface of 4 objects of cold weapons of the 19th and early 20th centuries, made of iron – bayonet knives and sabers. This makes it possible to establish the signs of authenticity of cold weapon samples made of iron in that chronological period.

An authentic procedure has been proposed for examining the chemical composition of the surface of historical objects of cold weapons by rubbing the samples with cotton wool swabs and their subsequent investigation. This makes it possible to explore objects of cold weapons, whose size is large, as well as simplify the very procedure for studying objects of historical and cultural value.

Using the X-ray fluorescent chemical analyzer Expert Mobile, chemical elements were found at the surface of samples of cold weapons made of iron. The presence of such elements is the result of the process of re-crystallization and self-purification of metal during a long history of its life. Elements found in almost every rubbing sample were identified: calcium, ferrum, zinc, cuprum, and chlorine.

The studies of cold weapons samples testify to the heterogeneity of the composition of patina formations on their surface, which confirms the authenticity of ancient objects. In addition, the studies have shown a difference in the chemical composition of surface layers of different parts of individual samples of antique cold weapons, which may indicate different times or different technology for their manufacture.

The fluorescence spectra of the obtained rubbing of individual samples of cold weapons were compared with “pure” material, which made it possible to identify elements removed from the surface of objects. The study results are important indicators to confirm the authenticity of cultural monuments and the technology of their manufacture in the past

Keywords: cold weapons, metal affinity, metal crystallization, impurity chemical elements, X-ray fluorescence analysis

Received date 27.10.2021

Accepted date 10.12.2021

Published date 22.12.2021

How to Cite: Merezhko, N., Vovk, Y., Indutnyi, V., Pirkovich, K., Davydiuk, V., Andreiev, O. (2021). Devising criteria for the authenticity of historical cold weapons based on X-ray fluorescence analysis of their surface. *Eastern-European Journal of Enterprise Technologies*, 6 (12 (114)), 6–11. doi: <https://doi.org/10.15587/1729-4061.2021.247624>

1. Introduction

Fundamental research in the field of materials science, carried out during the last century, allows us to assert that the physicochemical properties of metals and their alloys have been fully studied. Relevant knowledge contributes to the active development of modern technologies and is now widely used to solve numerous practical tasks [1]. It should be noted that at that time special attention was paid to devising the technologies for metal refining – methods for obtaining pure and ultra-pure metals, which are devoid of the content of chemical and mechanical impurities. At the same time, the leading role in the development of such tech-

nologies belonged to the results of experimental studies on the recrystallization of metals. The energy of the metal crystalline lattice during the growth time of crystals contributes to pushing out (into thermal solutions or melts) of impurity chemical elements, causing deep purification of the crystalline phase of the metal. These technologies involve melting with the gradual cooling of the melt at temperatures close to eutectics. This makes it possible to indirectly control the growth rate of pure metal crystals, as well as the transition of impurity elements to a melt or solution with their subsequent elimination.

It is worth noting that such processes of metal refining also occur in a solid state at low temperatures close to ambi-

Bukti penulis terdiri dari 2 negara dalam 1 nomor terbitan

This paper reports a series of experimental studies to establish regularities of the integrated effect exerted on the specific heat capacity of polymer nanocomposites by such factors as the temperature regime of their production, the value of the mass fraction of the filler, and the temperature of the composite material. The studies were conducted for nanocomposites based on polypropylene filled with carbon nanotubes. When obtaining composites, the method of mixing the components in the melt of the polymer was used. During the studies, the temperature of nanocomposites varied from 295 to 455 K, the mass fraction of the filler – from 0.3 to 10 %. The basic parameter of the technological mode for obtaining composite materials, the value of overheating the polymer melt relative to its melting point, varied in the range of 10...75 K.

It is shown that the temperature dependence of the specific heat capacity of the considered composites is sensitive to changes in the overheating of the polymer melt only in the region maximum values of the specific heat capacity. Concentration dependences of the specific heat capacity of the considered nanocomposites at different values of their temperature and the level of overheating of the polymer melt have been built.

The studies have been carried out to identify the effects of the influence of the above parameters on the coefficient of thermal diffusivity of nanocomposites. It has been established, in particular, that an increase in the level of overheating the polymer could lead to a very significant increase in the coefficient of thermal diffusivity, which is all the more significant the higher the proportion of filler and the lower the temperature of the composite material. It is shown that the level of overheating the polymer melt relative to its melting point is a parameter that can be used as the basis for the creation of polymer composite materials with specified thermophysical properties

Keywords: *polymer nanocomposites, heat capacity of nanocomposites, thermal diffusivity of nanocomposites, carbon nanotubes, temperature regimes*

UDC 538.9:536.6

DOI: 10.15587/1729-4061.2021.245274

ESTABLISHMENT OF REGULARITIES OF INFLUENCE ON THE SPECIFIC HEAT CAPACITY AND THERMAL DIFFUSIVITY OF POLYMER NANOCOMPOSITES OF A COMPLEX OF DEFINING PARAMETERS

Nataliia Fialko

Corresponding author

Doctor of Technical Sciences, Professor,

Corresponding Member of the National Academy of Sciences of Ukraine*

E-mail: nmfialko@ukr.net

Roman Dinzhos

Doctor of Technical Sciences, Professor**

Julii Sherenkovskii

PhD, Senior Scientific Researcher, Leading Researcher*

Nataliia Meranova

PhD, Senior Scientific Researcher, Leading Researcher*

Sergii Alosko

PhD, Leading Researcher*

Diana Izvorska

PhD, Associate Professor

Department of Language and Specialized Training

Technical University of Gabrovo

Hadzhi Dimitar str., 4, Gabrovo, Bulgaria, 5300

Volodymyr Korzhyk

Doctor of Technical Sciences, Head of Department

Department of Electrothermal Processing Material

E. O. Paton Electric Welding Institute of the National Academy of Sciences of Ukraine

Kazymyra Malevycha str., 11, Kyiv, Ukraine, 03150

Maxim Lazarenko

Doctor of Physical and Mathematical Sciences

Department of Molecular Physics

Taras Shevchenko National University of Kyiv

Volodymyrska str., 60, Kyiv, **Ukraine**, 01601

Irina Mankus

PhD, Associate Professor**

Liudmyla Nedbaievska

PhD, Associate Professor**

*Department of Thermophysics of Energy-Efficient Heat Technologies

Institute of Engineering Thermophysics of the National Academy of Sciences of Ukraine

Mariyi Kapnist (Zhelyabova) str., 2A, Kyiv, Ukraine, 03057

**Department of Physics and Mathematics

V. O. Sukhomlynskyi National University of Mykolaiv

Nikolska str., 24, Mykolaiv, **Ukraine**, 54030

Received date 05.10.2021

How to Cite: Fialko, N., Dinzhos, R., Sherenkovskii, J., Meranova, N., Alosko, S., Izvorska, D., Korzhyk, V., Lazarenko, M., Mankus, I., Nedbaievska, L.

Accepted date 22.11.2021

(2021). Establishment of regularities of influence on the specific heat capacity and thermal diffusivity of polymer nanocomposites of a complex of defining parameters. Eastern-European Journal of Enterprise Technologies, 6 (6 (114)), 34–39. doi: <https://doi.org/10.15587/1729-4061.2021.245274>

Published date 22.12.2021

1. Introduction

Polymer materials are increasingly used in engineering practice owing to their various compositions. The latter are

characterized by a more wider set of physical and technological properties. At the same time, polymer nanocomposites with a range of unique properties and record performance in terms of their characteristics are of particular importance.