

Ф
Х
Т
Т

— Фізика і
— хімія
— твердого
— тіла

№ 4
2025
Том
Vol. 26



P
C
S
S

— Physics and
— Chemistry of
— Solid
— State

Міністерство освіти і науки України
Карпатський національний університет імені Василя Стефаника
Навчально-дослідний центр напівпровідникового матеріалознавства

Ministry of Education and Science of Ukraine
Vasyl Stefanyk Carpathian National University
Research & Education Center of Semiconductor Material Science

ISSN 1729-4428

ФІЗИКА І ХІМІЯ ТВЕРДОГО ТІЛА

PHYSICS AND CHEMISTRY OF SOLID STATE

№ 4
2025
Том
Vol. 26

Журнал включено у категорію А Реєстру фахових видань України:
Галузі науки: хімічні (02.07.2020), технічні (02.07.2020), фізико-математичні (24.09.2020)
Спеціальності: 102 (02.07.2020) 132 (02.07.2020) 104 (24.09.2020) 105 (24.09.2020)

Ідентифікатор медіа: R30-02046
zareєстровано Національною Радою України
з питань телебачення і радіомовлення
від 23.11.2023, №1534
Періодичність: щоквартально

Media identifier (National): R30-02046
registered by National Council of Television
and Radio Broadcasting of Ukraine
from 11/23/2023; #1534
Periodical: Quarterly

© Карпатський національний університет імені Василя Стефаника, 2025
Vasyl Stefanyk Carpathian National University, 2025

Адреса редакції:
Карпатський національний університет
імені Василя Стефаника,
вул. Шевченка, 57,
Івано-Франківськ,
76018, Україна
Тел.: +380 (342) 596082
Факс.: +380 (342) 531574
E-mail: pcss@pnu.edu.ua
<https://journals.pnu.edu.ua/index.php/pcss>

Editorial address:
Vasyl Stefanyk Carpathian National University,
57, Shevchenko Str.,
Ivano-Frankivsk,
76018, Ukraine
Tel.: +380 (342) 596082
Fax.: +380 (342) 531574
E-mail: pcss@pnu.edu.ua
<https://journals.pnu.edu.ua/index.php/pcss>

Scientific Journal
Physics and Chemistry of Solid State

EDITORIAL BOARD

EDITOR-IN-CHIEF

Lyubomyr NYKYRUY (Ivano-Frankivsk, Ukraine)

DEPUTY EDITORS-IN-CHIEF

Ruslan ZAPUKHLYAK (Ivano-Frankivsk, Ukraine)

Grzegorz WISZ (Rzeszów, Poland)

MANAGING EDITOR

Roman DZUMEDZEY (Ivano-Frankivsk, Ukraine)

EDITORIAL BOARD MEMBERS

Physics&Mathematical Sciences

Belyaev O. (Kyiv, Ukraine), **Bester M.** (Rzeszów, Poland), **Budzulyak I.** (Ivano-Frankivsk, Ukraine), **Fedosov S.** (Lutsk, Ukraine), **Fodchuk I.** (Chernivtsi, Ukraine), **Friedman K.** (Worcester, USA), **Ilchuk H.** (Lviv, Ukraine), **Galuschak M.** (Ivano-Frankivsk, Ukraine), **Gasyuk I.** (Ivano-Frankivsk, Ukraine), **Gnatenko Kh.** (Lviv, Ukraine), **Gurevich Yu.** (Mexico, Mexico), **Korbutyak D.** (Kyiv, Ukraine), **Kovalenko O.** (Dnipro, Ukraine), **Labuz M.** (Rzeszów, Poland), **Lishchynskyy I.** (Ivano-Frankivsk, Ukraine), **Mazur T.** (Ivano-Frankivsk, Ukraine), **Mantashyan P.** (Yerevan, Armenia), **Moklyak V.** (Kyiv, Ukraine), **Ploch D.** (Rzeszów, Poland), **Protsenko I.** (Sumy, Ukraine), **Saliy Ya.** (Ivano-Frankivsk, Ukraine), **Stolyarchuk I.** (Drohobych, Ukraine), **Strikha M.** (Kyiv, Ukraine), **Titova L.** (Worcester, USA), **Wal A.** (Rzeszów, Poland), **Yavorskyi R.** (Ivano-Frankivsk, Ukraine)

Chemical Sciences

Babanly M. (Baku, Azerbaijani), **Fochuk P.** (Chernivtsi, Ukraine), **Gladyshevskii R.** (Lviv, Ukraine), **Horichok I.** (Ivano-Frankivsk, Ukraine), **Lobanov V.** (Kyiv, Ukraine), **Myronyuk I.** (Ivano-Frankivsk, Ukraine), **Nedilko S.** (Kyiv, Ukraine), **Parashchuk T.** (Krakow, Poland), **Shyichuk O.** (Bydgoszcz, Poland; Ivano-Frankivsk, Ukraine), **Tatarchuk T.** (Ivano-Frankivsk, Ukraine), **Tomashyk V.** (Kyiv, Ukraine), **Turovska L.** (Ivano-Frankivsk, Ukraine), **Zinchenko V.** (Odessa, Ukraine)

Technical Sciences

Ascheulov A. (Chernivtsi, Ukraine), **Dashevsky Z.** (Beer-Sheva, Israel), **Dzundza B.** (Ivano-Frankivsk, Ukraine), **Holovko M.** (Lviv, Ukraine), **Kharchenko M.** (Kharkiv, Ukraine), **Kogut I.** (Ivano-Frankivsk, Ukraine), **Kryuchyn A.** (Kyiv, Ukraine), **Romaka V.** (Lviv, Ukraine), **Sabat K.** (Bhopal, India), **Swiatek Z.** (Krakow, Poland), **Uhrin R.** (NJ, USA)

TECHNICAL EDITOR

Yurchyshyn L. (Ivano-Frankivsk, Ukraine)

Influence of Cu²⁺ ions on the optical properties of CdS/L-Cys colloid solutions <i>O. Krupko, L.P. Shcherbak, Yu.B. Khalavka, V.H. Pulupko, Kh. Holovata, S. Udod</i>	713
Photopolymerization and photodegradation of polymers after long-term UV light exposure <i>T.S. Kavetsky, O.V. Zubrytska, O.I. Matskiv, M. Stievenard, O. Šauša, H. Švajdlénková, V.M. Soloviev, A.O. Bielinskyi, J. Ostrauskaite, A.E. Kiv</i>	718
Theoretical models of chemical bonding in melts of Bi-Sb-Se-Te based thermoelectric materials <i>O.M. Manyk, D.E. Rybchakov, V.V. Lysko, V.V. Razinkov</i>	733
Catalyst-Assisted H₂O₂ Systems for Bacterial Disinfection of Wastewater: From UV/Visible Synergy to Electro-/Photo-Fenton Pathways <i>V. Husak, V. Shvadchak, L. Soltys</i>	738
Synthesis and crystal structure of selenides R₃Ag_{4k}Ge_{1.25-k}Se₇ (R – La, Ce; k = 0.05; 0.10; 0.15) <i>N.M. Blashko, O.V. Marchuk</i>	752
Compensation effect in the kinetics of chemical treatment of GaAs, InAs, GaSb, and InSb using bromine-releasing etching compositions based on H₂O₂–HBr solutions for the development of effective chemical polishing techniques <i>I.O. Sheliuk, R.O. Denysiuk, G.P. Malanych, V.M. Tomashyk, I.D. Boichuk, M.V. Chaika, O.F. Melnyk</i>	760
GEANT4 Study of Secondary Electron Emission in ZnO Nanorod Arrays under 10-100 MeV Oxygen Ion Irradiation <i>V. Kotsyubynsky, M. Cholewa, V. Kindrat, V. Boychuk, N. Mentynskyi, R. Abaszade, Y. Sukhorebskyi</i>	766
Phase Transitions in Ag₈SnSe₆ and Ag₈SnS₆: Mössbauer and X-ray Study <i>M. V. Chekaylo, S. I. Yushchuk, S. O. Yuryev, L. G. Akselrud, V. V. Mokliak</i>	774
Study of the interaction of Zinc sulfide with Europium (III) fluoride by spectroscopic methods <i>V.F. Zinchenko, O.V. Mozkova, A.V. Babenko, P.G. Doga, I.R. Magunov, R.E. Khoma</i>	781
Research on a new thermoelectric material obtained by doping of n-HfNiSn with Nb atoms <i>L. Romaka, Yu. Stadnyk, V.A. Romaka, A. Horyn, V.V. Romaka, P. Demchenko, P. Haranyuk</i>	787
Resistance against mechanical and corrosion-mechanical failure of welded joint of in X70 steel with advanced viscous properties <i>L.I. Nyrkova, L.V. Goncharenko, Yu.I. Lisovskiy, L.I. Faynberg</i>	794
Effect of Surface Treatment of Single-Crystalline Ge on Its Photoconductivity and Photomodulation of Radiation with frequency of 0.13 THz <i>O. Balaban, R. Bukliv, A. Danylov, B. Venhryn, D. Vynnyk, V. Haiduchok, A. Andrushchak</i>	802
Adsorption of proteins on carbon-based materials. Review <i>Iryna Prokipchuk, Ivan Myroniuk, Ihor Mykytyn, Hanna Vasylyeva</i>	808
Phonon thermal conductivity of nanograined zirconium diboride: molecular dynamics study <i>O.O. Grygorenko, K.V. Popiuk, V.V. Kuryliuk</i>	828
Nano-based Materials for Environmental Soil Remediation due to Noxious Transition Metals Removal: Structural, Electromagnetic and Thermodynamic Analysis by DFT Outlook <i>Fatemeh Mollaamin</i>	833
Influence of annealing temperature on the Charpy fracture characteristics of selective laser melted 316L steel at ambient and cryogenic temperatures <i>B.V. Efremenko, Yu.G. Chabak, E.V. Tsvetkova, I.M. Olejnik, V.G. Efremenko, A.V. Dzherenova</i>	844
Theoretical Simulation of mechanical, phonon dispersion and related electronic crystal properties of Niobium: A DFT study <i>Omamoke O. E. Enaroseha, Obed Oyibo, Aziakpono Blessing Umukoro, Uyiosa O. Aigbe, and Amaju Ojobor</i>	852
Investigation the Effect of Micro and Nano Size (SiO₂) on the Corrosion Resistance of Aluminum <i>N. A. Abd, Jawdat. Ali. Yagoob</i>	858
Thermoelectric thin film energy generators based on lead telluride compounds <i>B.S. Dzundza, O.B. Holovata, Ya.S. Yavorskyi, S.V. Dombrovskyi, A.V. Morgun, M.V. Shtun, V.V. Martyniuk</i>	867

Numerical determination of thermoelectric parameters for two-stage sintering of cBN–Al system samples in a high-pressure cubic cell	875
<i>O.P. Liudvichenko, O.O. Lyeshchuk, O.M. Anisin, M.P. Bezhenar</i>	
A study of acousto-electron effects in semiconductor quantum dots and bionanocomplexes based on them using deep machine learning	882
<i>O.O. Dan'kiv, A.I. Stolyarchuk, O.T. Viychuk, I.D. Stolyarchuk, O.V. Kuzyk</i>	
Effect of deposition time on the optical properties of CdSe nanostructured films	888
<i>H.A. Ilchuk, V.A. Pavlysh, I.V. Semkiv, V.M. Kordan, M.Y. Rudysh, A.I. Kashuba</i>	
Magnesium-Doped Cobalt-Zinc Ferrite: A Study on Enhanced Magnetic and Electrical Properties	895
<i>Y. Ravikumar Kolekar, S.B. Kapatkar, S.N. Mathad, Shreedatta Hegde</i>	
Electrochemical properties of TiS₂ and TiS₂/C composite, irradiated by laser and ultrasound	905
<i>I.M. Budzulyak, L.S. Yablon, I.I. Budzulyak, V.O. Kotsyubynsky, R.V. Ilnytskyi</i>	
Impact of Thermal Reduction in an H₂ Stream on the Composition of Ferrocene Degradation Products	912
<i>A.I. Rustamova, L.V. Huseynova, S.N. Osmanova, V.M. Ahmadov, E.H. Ismailov</i>	
Manufacturing Polyurethane Slag from Composite using Polyol from Polyethylene Plastic Waste	923
<i>Satrio Herbirowo, Muhamad Diko Mahendra, Muhammad Ilham Maulana, Adhitya Trenggono, Uma Maheshwera Reddy Paturi</i>	
A structural and mechanical study of the maintenance of archaeological Al-brass alloy by simulation method	935
<i>Omar F. Abdullah, Orass A. Hussein, Marwan Al-Lattouf, Salih Y. Darweesh</i>	
Computer modeling of mobile devices exposed to radio-electronic interference	941
<i>T.G. Benko, I.T. Kohut, V.I. Holota, V.M. Hryha</i>	
Investigation of the Nanoporous Structure of Thermally Modified Carbon Materials by Small-Angle X-ray Scattering	946
<i>S.A. Lisovska, N.Ya. Ivanichok, B. I. Rachiy, O.V. Shutak, N.R. Ilnytskyi, O.I. Bulbuk, R.P. Lisovskiy</i>	
Design and Optimization of Hybrid Thin-Film PV-TE Energy Conversion Systems	953
<i>L.O. Yavorska, Y.S. Yavorskyi, L.I. Nykryuy, R.S. Yavorskyi</i>	
Influence of Element Concentration on Kinetic and Dynamic Properties of High-Entropy Solid Solutions	964
<i>N.I. Shumakova, S.I. Protsenko, V.I. Shevchenko, I.Yu. Protsenko</i>	
First-Principles Investigation of Phase Stability, Mechanical Properties, and Electronic Structure of Ti_xV_{1-x}N Solid Solutions	971
<i>P.M. Prysyazhnyuk, I.P. Yaremiy, V.G. Panchuk, A.V. Korzhov, M.P. Makohin, I.M. Umantsiv</i>	
Information for authors	980

Науковий журнал
ФІЗИКА І ХІМІЯ ТВЕРДОГО ТІЛА

Scientific Journal
PHYSICS AND CHEMISTRY OF SOLID STATE

Том 26, № 4
Volume 26, No. 4

Комп'ютерна верстка

Юрчишин Л.Д.

Підписано до друку 29.12.2025 р. Формат 60×84/8.
Гарн. Times New Roman. Умовн. друк. аркушів 15,95
Тираж 100 екземплярів.

Друк: підприємець Голіней О.М.
вул. Галицька, 128, м. Івано-Франківськ, 76008
Тел. +38(0342) 58-04-32