



ABSTRACT BOOK

INESS

The 7th International Conference on Nanomaterials and
Advanced Energy Storage Systems
7-9 August, Almaty

www.iness.kz

Almaty, Kazakhstan
2019

ORGANIZING COMMITTEE

Position - Name	Organization
Chairman - Prof. Ilesanmi Adesida	Nazarbayev University, Kazakhstan
Co-Chairman - Prof. Zhumabay Bakenov	Institute of Batteries LLP, National Laboratory Astana, Nazarbayev University, Kazakhstan
Co-Chairman - Prof. Mukhambetkali Burkitbayev	Al-Farabi Kazakh National University, Kazakhstan
Co-Chairman - Prof. Tlek Kabul Ramazanov	Al-Farabi Kazakh National University, Kazakhstan
Co-Chairman - Prof. Charles Sury	Nazarbayev University, Kazakhstan
Member - Prof. Masataka Wakihara	Tokyo Metropolitan University, Japan
Member - Prof. Kiyoshi Kanamura	Tokyo Metropolitan University, Japan
Member - Prof. Hidehiro Sakurai	Osaka University, Suita, Japan
Member - Dr. Maksym Myronov	University of Warwick, England
Member - Prof. Payam Kaghadzchi	Freie Universität, Germany
Member - Prof. Youngguang Zhang	Hebei University of Technology, China
Member - Dr. Yingqiu Xie	Nazarbayev University, Kazakhstan
Member - Dr. Almagul Mentbayeva	Nazarbayev University, Kazakhstan
Member - Dr. Indira Kurmanbayeva	NLA, Nazarbayev University, Kazakhstan
Member - Dr. Aliya Mukanova	NLA, Nazarbayev University, Kazakhstan
Member - Dr. Kuralay Korzhynbayeva	NLA, Nazarbayev University, Kazakhstan
Member - Mrs. Sandugash Kalybekkyzy	NLA, Nazarbayev University, Kazakhstan
Member - Mr. Dauran Batyrbekuly	NLA, Nazarbayev University, Kazakhstan
Member - Mr. Nurbol Tolganbek	Nazarbayev University, Kazakhstan
Member - Mr. Nurzhan Bakalov	NLA, Nazarbayev University, Kazakhstan
Member - Mr. Orynbay Zhanadilov	NLA, Nazarbayev University, Kazakhstan
Member - Mrs. Nazym Kassenova	NLA, Nazarbayev University, Kazakhstan
Member - Ms. Assel Serikzakyyeva	NLA, Nazarbayev University, Kazakhstan
Member - Mr. Al-Farabi Kopzhassar	NLA, Nazarbayev University, Kazakhstan
Member - Ms. Raihan Zakarina	NLA, Nazarbayev University, Kazakhstan
Member - Mr. Miras Naizakarayev	NLA, Nazarbayev University, Kazakhstan
Member - Mr. Orynbasar Mukhan	NLA, Nazarbayev University, Kazakhstan

SCIENTIFIC ADVISORY COMMITTEE

- Chairman** - Prof. Sung-Soo Kim, Chungnam National University, Korea
- Co-Chairman** - Dr. Indira Kurmanbayeva, National Laboratory Astana, Kazakhstan
- Prof. Woojin Lee, Nazarbayev University, Kazakhstan
- Prof. Desmond Adair, Nazarbayev University, Kazakhstan
- Prof. Zulkhair Mansurov, Al-Farabi Kazakh National University, Kazakhstan
- Prof. Seung-Taeek Myung, Sejong University, Korea
- Prof. Jean-Pierre Pereira-Ramos, CNRS et Université Paris Est Créteil, France
- Prof. Hirokazu Munakata, Tokyo Metropolitan University, Japan
- Dr. Annie Ng, Nazarbayev University, Kazakhstan

SECRETARIAT OF INESS-2019

Conference Scientific Secretary - Dr. Berik Uzakbaituly, NLA, Nazarbayev University, Kazakhstan
Technical Secretary - Dr. Atralyim Nurpeissova, National Laboratory Astana, Kazakhstan

CONTENT

PLENARY INVITED SPEAKERS	
1. Masataka Wakihara, Taisuke Koseki, Shun Murayama, Taku Murata, Hiroto Shimamura Improvement of Oxidation Potential in Superconcentrated Electrolytes	11
2. Rachid Yazami Lithium Ion Batteries: Technology and Application	12
3. Kiyoshi Kanamura All Solid State Battery Prepared by Composite Type Solid Electrolyte Promoting Na-pillar effect on the structural stability and cyclability of α-NaV_2O_5 as cathode material for Li-ion battery	13
4. Jean-Pierre Pereira-Ramos, Rita Baddour-Hadjjean, Thanh Nguyen Le Huynh, Nicolas Emery Carbonate Solutions Containing Sodium or Potassium Hexafluorophosphate Salts	14
5. Seung-Taeek Myung Passivation of Aluminum Current Collectors in Non-aqueous Electrolyte	15
6. Maksym Myronov Unlocking new devices applications with novel wafer scale Silicon Carbide heteroepitaxy	16
7. Hidehiro Sakurai Morphology Effect on Metal Nanoparticle/Organic Polymer Composite	17
8. Nurzhan Umirov, Byoung-Min Lee, Jae-Hak Choi, Sung-Soo Kim Cellulose Non-woven Fabric-derived Free-standing Electrode for Next Generation Flexible Secondary Batteries	18
9. Toru Wakihara, Zhendong Liu, Kotatsu Okabe, Chokalingam Anand, Yasuo Yonezawa, Jie Zhu, Hiroki Yamada, Akira Endo, Yutaka Yanaba, Takeshi Yoshikawa, Koji Ohara, Tatsuya Okubo Continuous Flow Synthesis of ZSM-5 Zeolite on the Order of Seconds	19
10. Payam Kaghadzchi Theory and Simulation of Energy Materials	20
11. Fu-Ming Wang Investigation and characterization of in-situ polymer brush effects on Si anode material and its battery performance	21
12. Duygu Kaus, Max Weeber, Kai Peter Birke Digitalization in Battery Cell Manufacturing	22
13. Barbara Laik, Lucie Leveau, Aurelien Gobier, Costel-Sorin Cojocaru, Jean-Pierre Pereira-Ramo Different ways for electrochemical performance improvement of silicon nanowires as anode for lithium-ion batteries	23
14. Leming Sun, Aipeng Li, Lianbing Zhang Functional Peptide Self-assembled Nanomaterials for Biomedical Applications	24
15. Yao Chen, Qingxiao Yuchia, Jiaojiao Miao, Cheryang Huang, Jingyi Liu, Aipeng Liu, Tao Lia, Yong Qin band Lianbing Zhang Precise Engineering of Ultra-thin Fe_2O_3 Decorated Pt-based Nanozymesia Atomic Layer Deposition to Switch off Undesired Activity for mesenchymal stem cells homing and gene therapy	25
16. Shu-Qi Wu, Yang Li, Lianbing Zhang Dual-functional persistent luminescent nanocomposite for mesenchymal stem cells homing and gene therapy	26
17. Liang-Yin Kuo, Payam Kaghadzchi Modeling of LiNi_{0.5}Mn_{0.5}O₂ Cathode Materials	27
18. Yingqiu Xie, Adilet Dautov, Medina Khamijian, Haiyan Fan Carbon nanodots induced drug resistance and how to overcome it	28
19. Nae-Lih Wu Synthesis and Operation of High-Sulfur-Content Cathodes for Li-Sulfur Batteries	29
20. Thierry Djennizian A new concept of microstructured electrodes for high performance stretchable microbatteries	30
21. Stanislav Fedotov, Artem Abakumov, Evgeny Antipov Identifying OH-defects in LiFePO₄ cathode materials for Li-ion batteries	31
22. Xing-Jie Liang Which Size of Nanoparticle is Beneficial to Pharmaceutical Development?	32
23. Damiir Aidarkhanov, Zhiwei Ren, Zhuldyz Yelzhanova, Gaukhar Nigmatova, Gaukhar Tallanova, Askar Maxim, Bakhyzhan Baptyayev, Mannix Balanay, Aleksandra B. Djurisić, Charles Surya, Annie Ng Strategies for High Performance Hysteresis-free Perovskite Solar Cells	33
24. Jiang Chang Regulation of stem cell fate using bioactive ions for tissue engineering	34
25. Desmond Adair, Gulnur Kalimuldina & Martin Jaeg Battery Powered System Development for Solar-Powered UAVs	35

26.	Fabian Jeschull, Yuri Surace, Flora Scott, Sigitra Trabesinger, Silicon as Electrode and as Electrode's Capacity-Enhancing Additive	36
27.	Huaidong Jiang, Jiadong Fan, Jianhua Zhang, Zhibin Sun High-resolution coherent diffraction imaging with synchrotron radiation and XFELs	37
28.	Jinlan Jiang Treatment of rheumatoid arthritis with Fe ₃ O ₄ @PDA magnetic targeting stem cells	38
29.	Zulkhair Mansurov Development of nanoscience and nanotechnologies	39
30.	Andrey Kurbatov, Feodor Malchik, Saule Kokhmetova, Alina Galeyeva The problem of the determining of kinetic parameters of the deintercalation-intercalation process	40
31.	Jongsoon Kim Development of new cathode with high electrochemical performances for Na-ion batteries using first-principles calculation and structural analyses	41
32.	Donghyuk Kim Systems Approaches to Engineer Microorganism to Produce Value-Added Materials	42
33.	Sergey V. Levchenko Global Effects of Doping on Surface and Interface Properties: An Ab Initio Study	43
ORAL PRESENTATIONS		
34.	A.K.Rakhimova, A.K.Galeyeva, A.P.Kurbatov Effects of absorbers on the synthesis of lithium iron phosphate for lithium-ion batteries	44
35.	Saule Kokhmetova, Andrey Kurbatov, Alina Galeyeva Efficient way to create conductive coatings based on various carbon materials	45
36.	Guzal Ismailova, Leonid Mikhailov, SvetlanaMikhailova, RaiymbekYersayin, NursultanKenes, OlegLavritshev, Valery Nikulin Using solar energy by a smart window for the needs of urban residents	46
37.	Dauren Batyrbekuly, Barbara Laik, Nicolas Emery, Zhumabay Bakonov, Jean-Pierre Pereira-Ramos, Rita Baddour-Hadjea Nanosized puckered V2O5 γ -polymorph as cathode material for Li-ion batteries with enhanced electrochemical properties	47
38.	Kanat Amirtayev A Numerical Algorithm for the Analysis of the Thermal Stress-Stain State of a Rod	48
39.	Nurislom Abduganiyev, Obid Tursunov A Comprehensive Study on Household Solid Waste Characteristics for Green Energy Recovery in Urta-Chirchik District of the Tashkent Region	49
40.	Anastassiya A. Mashentseva, Aida R. Krekesheva, Vadim V. Krasnov, Tomiris G. Khassen Copper nanostructures loaded PET ion track membranes as a flexible composite material	50
41.	Algul Shongalova, Madi Aitizhanov, SultanZhanuarov, Kazhmutkhan Urazov, Paulo Fernandes, NurlanTokmoldin, Maria Correia Comparison of antimony selenide thin films obtained by electrochemical deposition and selenization of a metal precursor	51
42.	Zhibek Akasheva, Bakhytzhah Assilbekov, Aziz Kudalikulov Numerical calculation of relative permeability for two immiscible fluids flow in the channel	52
43.	Nazgul Kassenova, Sandugash Kalybekkyzy, Memet Vezir Kalhraman, Zhumabay Bakonov, Almagul Mentbayeva Fabrication and characterization of poly(vinyl alcohol)/maleic anhydride (PVA/MA) based polymer membranes for gel polymer electrolyte by electrospinning for lithium-ion batteries	53
44.	Nazgul Tompakova, Elena Dmitriyeva, Igor Lebedev, Abai Serikkanov, Ekaterina Grushevskaya, Konstantin Mit Influence of Hydrogen Plasma on SnO ₂ Thin Films	54
45.	Bakhytzhah Baptaevy, Mannix P. Balamay Binary Transition Metal Sulfide for Pt-free Counter Electrode in Dye-sensitized Solar Cell	55
46.	Nurbek Nurlan, Mannix Balamay, Woojin Lee Enhanced Reduction of Aqueous Bromate by Catalytic Hydrogenation Using Ni-based Metal-organic Framework with NaBH ₄	56
47.	Ainash Akmanova, Dina Kondratyuk, Moulay-Rachid Babaa, Woojin Lee Significant Factors on Reductive Degradation of Aqueous Doxycycline by nZVI	57
48.	Segizbayeva R. U., Seidildaeva A. K. Separability of the generalized Cauchy–Riemann system in space L(E ₂)	58

49.	Aishuak Konarov, Zhumabay Bakonov, Seung-Taek Myung Activation of Oxygen Redox in P2-type Na _{2/3} MnO ₂ Compound by Incorporation of Zn ion into the Crystal Structure	59
50.	S. Savilov, E. Suslova, N. Osipov, E. Arkhipova, A. Ivanov, V. Lunin Determination of the Thermal Properties of Carbon Nanostructures: Experimental Approaches	60
51.	D.V. Pelegov, A.A. Ryabin, B.N. Slautin, A.R. Makhmutov, D.K. Kuznetsov Towards industrial quality control of LiFePO ₄ ; Raman spectroscopy study of laser-induced decomposition	61
52.	Murat Alibek, Tulay Yildirim Single channel potentiostat for electroanalytical applications	62
53.	Azamat Amanzholov, Aidama Iltuzirova, Salimgerey Adilov Synthesis and Photophysical Properties of 5,10,15,20-tetrakis(3-cyanophenyl)porphyrin and Its Metal Derivatives	63
POSTER SESSION		
54.	Berik Uzakbaituly, Azat Abdullaev, Almagul Mentbayeva, Aliya Mukanova, Zhandos Utegulov, Zhumabay Bakonov Thermal conductivity of Si thin films through time-domain thermoreflectance measurements	64
55.	Yongguang Zhang Construction of Oxygen-deficient La(OH) ₃ Nanorods Wrapped by Reduced Graphene Oxide for Polysulfide Trapping toward High-Performance Lithium/Sulfur Batteries	65
56.	Ulantai Doseke, Yerzhan Mukhamekharimov, Kuanysh Dautkhan, Oleg Prikhodko, Svetlana Mikhailova, Suyumbika Maksimova, Guzal Ismailova Features of the structure and optical properties of thin TiO ₂ <Ag> nanocomposite coatings	66
57.	Aliya Assembayeva, Aleksandr Ryaguzov, Renata Nemkayeva, Nazim Guseinov, Markizat Myrzabekova Research of the structure of a-C<Pd> films by the Raman spectroscopy method	67
58.	Maxim Yu. Maximov, Yury Koshlyal, Ilya Mitrofanov, Ilya Ezhov, Aleksander Rymyantsev, Anatoly Popovich Features of the synthesis of lithium-based ternary oxide nanofilms by atomic layer deposition with LHMDS for thin-film LIBs	68
59.	Evgeniya Il'ina, Efim Lyalin, Boris Antonov Modified sol-gel synthesis of the solid electrolytes based on Li _{1.5} La ₂ Zr ₂ O ₇ doped by Nb and Al	69
60.	A.P. Ryaguzov, E. Bekmurat, R.R. Nemkayeva Structure and properties of a-C<Ir> <Ir>	70
61.	Nazgul Tompakova, Elena Dmitriyeva, Igor Lebedev, Abai Serikkanov, Ekaterina Grushevskaya, Bagila Baitimbetova Influence of Acid Filming Solution on SnO ₂ Thin Films	71
62.	Almar Zhumabekov, Niyazbek Ibrayev, Evgeniya Seliverstova Preparation and photoelectric characteristics of nanocomposite based on reduced graphene oxide and TiO ₂	72
63.	Elmira Alkhaidarova, Dmitriy Alanasyev, Niyazbek Ibrayev Nanocomposite materials based on Pedot:PSS polymer mixture doped with Ag-TiO ₂ and Ag-SiO ₂ nanostructures	73
64.	Svetlana Pershina, Evgeniya Il'ina, Konstantin Druzhinin Reducing interfacial resistance between Li _{1.5} Al _{0.5} Ge _{1.5} (PO ₄) ₃ glass-ceramics and Li-metal anode by Al-coated Alibek Zhakypov, Suyumbika Maksimova, Oleg Prikhodko, Guzal Ismailova, Kundyž Turmanova, Zhandos Tolepov Nanoscaled GeSb ₂ Te ₅ films structure transformation influenced by laser irradiation	74
65.	Turmanova, Zhandos Tolepov Nanoscaled GeSb ₂ Te ₅ films structure transformation influenced by laser irradiation	75
66.	Indira Kurmanbayeva, S. Kalybekkyzy, A. Mentbayeva, Z. Bakonov SiOx anodes for LIB	76
67.	Nurbol Tolganbek, Berik Uzakbaituly, Almagul Mentbayeva, Kiyoshi Kanamura, Zhumabay Bakonov NASICON-type electrolyte with transition metal dopants	77
68.	Yerkezhan Yerkinbekova, Sandugash Kalybekkyzy, Orynbay Zhamadilov, Almagul Mentbayeva, Zhumabay Bakonov Sulfur-containing composite cathode materials for Li-Ion batteries obtained by vacuum infiltration method	78
69.	Madina Kudabayeva, Renata Nemkayeva, Nazim Guseinov, Alexander Ryaguzov Research of the structure and electronic properties of silicon containing amorphous diamond-like carbon films	79
70.	M.F. Kadir, B.E. Alysbayeva, M.T. Yskak, M.S. Batalova Porous structures for supercapacitors	80

Features of the structure and optical properties of thin TiO₂-Ag nanocomposite coatings

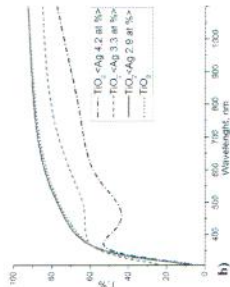
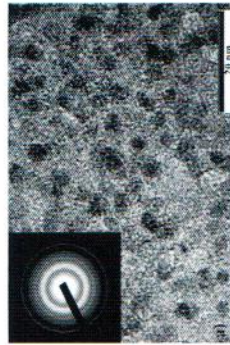
Ulantai Doseke^{1*}, Yerzhan Mukhamekarimov¹, Kuanysh Dautkhan¹, Oleg Prikhodko¹, Svetlana Mikhailova^{2**}, Suyumbika Maksimova¹, Guzal Ismailova¹

¹NNLOT, al-Farabi Kazakh National University, 71 al-Farabi avn. 050040 Almaty, Kazakhstan
*E-mail: udoseke@mail.ru

**E-mail: svetik.mikhailova@gmail.com

The structure and optical properties of nanocomposite coatings based on titanium dioxide and silver nanoparticles (TiO₂-Ag) were studied. Nanocomposite films were obtained by ion-plasma high-frequency sputtering of a combined target TiO₂(rutile)-Ag. The structure of TiO₂-4.2 at.% Ag coatings (figure a) is an amorphous TiO₂ matrix with embedded isolated spherical silver nanoparticles 3-4 nm sized.

In the TiO₂-Ag nanocomposite coatings silver impurity changes the position of the transmission edge in the optical spectra and reduces the transparency of the coatings. At the same time, in the visible region of the spectrum in the range from 400 to 500 nm there is a minimum transmittance (figure b) that is due to the resonance absorption of electromagnetic radiation by the surface electrons of silver nanoparticles (plasmon absorption).



Morphology and electron diffraction pattern (a) and transmission spectra (b) of TiO₂-Ag nanocomposite coatings

Thus, the structure of nanocomposite TiO₂-Ag coatings represents an amorphous matrix TiO₂ with inclusions of isolated silver nanoparticles. In these coatings resonance absorption in the visible region of spectra is manifested, and the intensity of the resonance absorption increases with silver content rise.

Acknowledgement

This research was supported by the grant AP05132897 of the Ministry of Education and Science of Kazakhstan Republic.

Research of the structure of a-C<Pd> films by the Raman spectroscopy method

Aliya Assembayeva^{1*}, Aleksandr Ryaguzov², Renata Nembkayeva², Nazim Guseinov², Markizat Myrzabekova²

¹K.Y. Saipayev KazVNTU, Almaty, Republic of Kazakhstan
²NNLOT al-Farabi KazNU, Almaty, Republic of Kazakhstan
*E-mail: Aliya.assembayeva@mail.ru

One of the important tasks is the possibility of modifying the structure of amorphous carbon films and their properties. Inert materials have a considerable interest to form chemical bonds with carbon. Such materials can in a certain way influence both the formation of the structure of the amorphous carbon matrix and its electronic properties. Therefore, identifying the possibility of influencing the formation of the structure of carbon films is an important task.

The possibility of the influence of a chemically inert element palladium on the structure of amorphous carbon films was considered in this paper. Palladium in the carbon matrix forms nanoparticles with a defined distribution of surface potential, which affects the structuring of carbon bonds.

The paper presents the results of studying the local structure of a-C films modified by Pd nanoparticles by Raman spectroscopy method using two lasers at excitation frequencies of 474 THz and 634 THz. Synthesis of a-C films was carried out by the method of magnetron ion-plasma co-sputtering of a combined target in an argon atmosphere on quartz and silicon substrates.

As studies of the structure showed, Raman spectra of a-C <Pd> films are characterized by a main G peak, a shoulder in the low-frequency region and a second order. It was shown that the position of the G peak substantially depends on both the excitation energy of the phonon density of the states of the carbon matrix and the structure of the films synthesized on different substrates. In addition, the dispersion of the G peak was calculated [1], which showed that the films synthesized on the amorphous quartz substrate mainly form diamond-like structures and there is no effect of palladium nanoparticles on the structure. However, the reverse picture is observed in films grown on a silicon (100) substrate, which contributes to the formation of the graphite-like carbon matrix phase with increasing palladium concentration.

Thus, the conducted studies show the possibility of influencing the structure of a-C films with nanoparticles of palladium.