

## СПИСОК ВИКОРИСТАНОЇ ЛІТЕРАТУРИ

1. Ego T. AFM analysis for initial stage of electroless displacement deposition of silver on silicon surface / T. Ego, T. Hagihara, Y. Morii, N. Fukumuro, S. Yae, and H. Matsuda // *ECS Transactions*. – 2013. – V. 50. – P. 143–153.
2. Kim T. Composite Porous Silicon-Silver Nanoparticles as Theranostic Antibacterial Agents / T. Kim, G.B. Braun, Z. She, S. Hussain, E. Ruoslahti, and M.J. Sailor // *ACS Applied Materials Interfaces*. – 2016. – V. 8. – P. 30449–30457.
3. Ensafi A.A. Electrochemical sensor based on porous silicon/silver nanocomposite for the determination of hydrogen peroxide / A.A. Ensafi, F. Rezaloo, and B. Rezaei // *Sensors and Actuators B: Chemical*. – 2016. – V. 231. – P. 239–244.
4. Nativ-Roth E. Deposition of gold and silver on porous silicon and inside the pores / E. Nativ-Roth, K. Rechav and Z. Porat // *Thin Solid Films*. – 2016. – V. 603. – P. 88–96.
5. Fang H. Silver catalysis in the fabrication of silicon nanowire arrays / H. Fang, Y. Wu, J. Zhao, J. Zhu // *Nanotechnology*. – 2006. – V. 17. – P. 3768–3775.
6. Zhang C. Graphene-Ag hybrids on laser-textured Si surface for SERS Detection / C. Zhang, K. Lin, Y. Huang and J. Zhang // *Sensors*. – 2017. – V. 17. – P. 1462–1470.
7. Polavarapu L. Growth and galvanic replacement of silver nanocubes in organic media / L. Polavarapu and L.M. Liz-Marz'an // *Nanoscale*. – 2013. – V. 5, N. 10. – P. 4355–4361.
8. Djokić S. S. Galvanic deposition of silver on silicon surfaces from fluoride free aqueous solutions / S. S. Djokić and K. Cadien // *ECS Transactions*. – 2015. – V. 4. – P. 11–13.
9. Chen L. Silver nanocrystals of various morphologies deposited on silicon wafer and their applications in ultrasensitive surface-enhanced Raman scattering / L. Chen, Q. Jing, J. Chen, B. Wang, J. Huang, Y. Liu // *Materials characterization*. – 2013. – V. 85. – P. 48–56.

10. Lai R. A. Schottky Barrier Catalysis Mechanism in Metal-Assisted Chemical Etching of Silicon / R. A. Lai, T. M. Hymel, V. K. Narasimhan, Y. Cui // ACS Applied Materials Interfaces. – 2016. – V. 8. – P. 8875–8879.

11. Djokic S. S. Communication–galvanic deposition of gold on silicon from Au (I) alkaline fluoride-free solutions / S. S. Djokic, Z. Anti, N. S. Djokic and T. Thundatb // Journal of The Electrochemical Society. – 2016. – V. 163, N. 14. – P. 818–820.

12. Song W. Surface enhanced raman scattering based on silver dendrites substrate / W. Song, Y.C. Cheng, H.Y. Jia, W.Q. Xu, B. Zhao // Journal of Colloid and Interface Science. – 2006. – V. 298. – P. 765–773.

13. Hao J.M. Surface-enhanced raman scattering analysis of perchlorate using silver nanofilms deposited on copper foils / J.M. Hao., Z.H. Xu, M.J. Han, S.Y. Xu, X.G. Meng // Journal of Colloids Surfaces A. – 2010. – V. 366. – P. 163–172.

14. Liang H.Y. Highly surface-roughened “flower-like” silver nanoparticles for extremely sensitive substrates of surface-enhanced Raman scattering / H.Y. Liang, Z.P. Li, W.Z. Wang, Y.Wu, H.X. Xu // Advanced Materials. – 2009. – V. 1. – P. 4614–4618.

15. Jiang B. Vertical deposition of ultrafine silver particles on silicon surface out of solutions by silver mirrorprocess / B. Jiang , M. Li, Y. Li , D. Song , T. Mwenya // Materials Letters. – 2014.– V. 116. – P. 195–198.

16. Lahiri A. Photo-assisted control of gold and silver nanostructures on silicon and its SERRS effect / A. Lahiri, R. Wen, S. Kuimalee, A. Chowdhury, S. Kobayashi, L. Zhang, P. Wang, and Y. Fang // Journal Physics D: Applied Physics. – 2013. – V. 46. – P. 275303–275310.

17. Itasaka H. Growth of nanogold at interfaces between locally induced naked silicon surfaces and pure  $\text{HAuCl}_4$  solutions / H. Itasaka, M. Nishi, M. Shimizu, and K. Hirao // Journal of The Electrochemical Society. – 2016. – V. 163. – P. 743–746.

18. Sayed S.Y. Heteroepitaxial growth of gold nanostructures on silicon by galvanic displacement / S.Y. Sayed, F. Wang, M. Malac, A. Meldrum, R.F. Egerton,

and J.M. Buriak // American Chemical Society (ACS) NANO. – 2009. – V. 3. – P. 2809–2817.

19. Yamada N. Effect of epitaxial growth of gold nanoparticles on Si substrates on adhesion of electrolessly deposited metal films / N. Yamada, H. Atsushiba, S. Sakamoto, N. Fukumuro, S. Yae // ECS Transactions. – 2015. – V. – 69. – P. 59–63.

20. Raygani A. Gold Metallization of Silicon by Galvanic Displacement / A. Raygani, L. Magagnin // ECS Transactions. – 2012. – V. 41. – P. 3–8.

21. Guties A. Ultrasooth gold thin films by self-limiting galvanic displacement on silicon / A. Guties, C. Carraro, and R. Maboudian // ACS Applied Materials Interfaces. – 2011. – V. 3. – P. 1581–1584.

22. Yae S. Electroless Metallization of Silicon Using Metal Nanoparticles as Catalysts and Binding-Points / S. Yae, M. Enomoto, H. Atsushiba, A. Hasegawa, C. Okayama and etc. // ECS Transactions. – 2013. – V. 53. – P. 99–103.

23. Sun X. Gold nanoisland arrays by repeated deposition and post-deposition annealing for surface-enhanced raman / X. Sun, H. Li // Nanotechnology. – 2013. – V. 24. – P. 355706 (9pp).

24. Sayed S. Y. Preferential face deposition of gold nanoparticles on silicon nanowires by galvanic displacement / S.Y. Sayed, F. Wang, M. Malc, P. Li, D. Wang, J. Buriak // CrystEngComm. – 2012. – V. 14. – P. 5230–5237.

25. Fang J.X. Gold mesostructures with tailored surface topography and their self-assembly arrays for surface-enhanced Raman spectroscopy / J.X. Fang, S.Y. Du, S. Lebedkin, Z.Y. Li, R. Kruk, M. Kappes, et al. // Nano Letters. – 2010. – V. 10. – P. 5006–5013.

26. Gorostiza P. First stages of platinum electroless deposition on silicon (100) from hydrogen fluoride solutions studied by AFM / P. Gorostiza, J. Servat, J.R. Morante and F. Sanz // Thin Solid Films. – 1996. – V. 275. – P. 12–17.

27. Yae S. Formation of porous silicon by metal particle enhanced chemical etching in HF solution and its application for efficient solar cells / S. Yae, Y. Kawamoto, H. Tanaka, N. Fukumuro, H. Matsuda // Electrochemistry Communications. – 2003. – V. 5. – P. 632–636.

28. Yae S. Antireflective porous layer formation on multicrystalline silicon by metal particle enhanced HF etching / S. Yae, T. Kobayashi, T. Kawagishi, N. Fukumuro, H. Matsuda // *Solar Energy*. – 2006. – V. 80. – P. 701–706.

29. Park D.Y. Morphology controlled 1D Pt nanostructures synthesized by galvanic displacement of Cu nanowires in chloroplatinic acid / D.Y. Park, H.S. Jung, Y. Rheem // *Electrochim. Acta*. – 2010. – V. 55. – P. 4212–4216.

30. Tsujino K. Helical nanoholes bored in silicon by wet chemical etching using platinum nanoparticles as catalyst / K. Tsujino and M. Matsumura // *Electrochemical and Solid-State Letters*. – 2005. – V. 8, N.12. – P. 193–195.

31. Wei Q. Pd-on-Si catalysts prepared via galvanic displacement for the selective hydrogenation of para-hloronitrobenzene / Q. Wei, Y.S. Shi, K.Q. Sun, and B.Q. Xu // *Chemical Communications*. – 2016. – V. 52. – P. 3026–3029.

32. Yae S. Catalytic activity of noble metals for metal-assisted chemical etching of silicon / S. Yae, Y. Morii, N. Fukumuro and H. Matsuda // *Nanoscale Research Letters*. – 2012. – V. 7. – P. 352–356.

33. Sadakane D. Catalytic activity of Ru for metal-assisted etching of Si / D. Sadakane, K. Yamakawa, N. Fukumuro, S. Yae // *ECS Transactions*. – 2015. – V. 69. – P. 179–184.

34. O'Brien P.G. Photomethanation of gaseous CO<sub>2</sub> over Ru/Silicon nanowire catalysts with visible and near-infrared photons / P.G. O'Brien, A. Sandhel, T.E. Wood et al. // *Advanced science*. – 2014. – V.1, N.1. – P.123–129.

35. Santinacci L. Selective palladium electrochemical deposition onto AFM-scratched silicon surfaces / L. Santinacci, T. Djenizian, H. Hildebrand, S. Ecoffey, H. Mokdad, T. Campanell, P. Schmuki // *Electrochimica Acta*. – 2003. – V. 48. – P. 3123–3130.

36. daRosa C. P. Copper deposition onto silicon by galvanic displacement: effect of silicon dissolution rate / C.P. daRosa, R. Maboudian, and E. Iglesia // *Journal of the Electrochemical Society*. – 2008. – V. 155. – P. 70–78.

37. Scudiero L. Characterization of a controlled electroless deposition of copper thin film on germanium and silicon surfaces / L. Scudiero, A. Fasasi, P.R. Griffiths // *Applied Surface Science*. – 2011. – V. 257. – P. 4422–4427.

38. Maganin L. Selective deposition of thin copper films onto silicon with improved adhesion / L. Maganin, R. Maboudian and M. Carraro // *Electrochemical and Solid-State Letters*. – 2001. – V. 4, N. 1. – P.5–10.

39. daRosa C. P. Dynamics of copper deposition onto silicon by galvanic displacement / C. P. daRosa, E. Iglesia, and R. Maboudian // *Journal of the Electrochemical Society*. – 2008. – V. 155, N. 3. – P. 244–252.

40. Djokić S. S. Galvanic Processes on Silicon Surfaces in Cu (II) Alkaline Fluoride-Free Solutions / S. S. Djokić, Z. Antić, N. S. Djokić, K. Cadien, and T. Thundat // *Journal of the Electrochemical Society*. – 2016. – V. 163, N. 13. – P. 651–660.

41. Li J.Y. Hybrid black silicon solar cells textured with the interplay of copper-induced galvanic displacement / J.Y. Li, C.H. Hung, C.Y. Chen // *Physical Chemistry Chemical Physics*. – 2017. – V. 7. – P. 17177–17186.

42. Zhang Y. Potential influence on copper electrodeposition on scratched silicon surfaces / Y. Zhang, E. Balaur, P. Schmuki // *Journal of Electroceramics*. – 2006. – V. 16. – P. 65–70.

43. daRosa C. Copper deposition onto silicon by galvanic displacement: Effect of Cu complex formation in  $\text{NH}_4\text{F}$  solutions / C. daRosa, E. Iglesia, R. Maboudian // *Electrochimical Acta*. – 2009. – V. 54. – P. 3270–3277.

44. Huang Z. P. Extended arrays of vertically aligned sub-10 nm diameter [100] Si nanowires by metal-assisted chemical etching / Z. P. Huang, X. X. Zhang, M. Reiche, L. F. Liu, W. Lee, T. Shimizu, S. Senz, U. Gosele // *Nano Letters*. – 2008. – V. 8. – P. 3046–3051.

45. Huang. Z. P. Ordered arrays of vertically aligned [110] silicon nanowires by suppressing the crystallographically preferred  $\langle 100 \rangle$  etching directions / Z. P. Huang, T. Shimizu, S. Senz, Z. Zhang, X. X. Zhang, W. Lee, N. Geyer, U. Gösele // *Nano Letters*. – 2009. – V. 9. – P. 2519–2525.

46. Huang Z. Metal-assisted chemical etching of silicon: a review / Z. Huang, N. Geyer, P. Werner, J. de Boor and U. Gösele // *Advanced Material*. – 2011. – V. 23. – P. 285–308.

47. Андрусишина И.Н. Наночастицы металлов: способы получения, физико-химические свойства, методы исследования и оценка токсичности / И.Н. Андрусишина // *Сучасні проблеми токсикології*. – 2011. – № 3. – С. 5–14.

48. Лопатько К.Г. Получение и применение наночастиц, содержащих медь и серебро / К.Г. Лопатько, Е.Г. Афтандиянц, Я.В. Зауличный и др. // *Труды института проблем материаловедения им. И.Н.Францевича*. – 2010. – N. 1. – С. 232–243.

49. Peng K.Q. Dendrite-assisted growth of silicon nanowires in electroless metal deposition / K.Q. Peng, Y.J. Yan, S.P. Gao, J. Zhu // *Advanced Functional Materials*. – 2003. – V. 13. – P. 127–132.

50. Tsuji M. Synthesis of Pt–Ag alloy triangular nanoframes by galvanic replacement reactions followed by saturated NaCl treatment in an aqueous solution / M. Tsuji, M. Hamasaki, A. Yajima, M. Hattori, T. Tsuji, H. Kawazumi // *Materials Letters*. – 2014. – V. 121. – P. 113–117.

51. Chen L.Y. Nanoporous copper with tunable nanoporosity for SERS applications / L.Y. Chen, J.S. Yu, T. Fujita, M.W. Chen // *Advanced Functional Materials*. – 2009. – V.19. – P. 1221–1226.

52. Lim D. Nanogap-engineerable Raman-active nanodumbbells for single-molecule detection / D. Lim, K.S. Jeon, H.M. Kim, J.M. Nam, Y.D. Suh // *Nat Materials*. – 2010. – V. 9. – P. 60–67.

53. Chen L.M. Surface-enhanced raman detection of melamine on silver – nanoparticle-decorated silver/carbon nanospheres / L.M. Chen, Y.N. Liu // *ACS Applied Materials Interfaces*. – 2011. – V. 3. – P. 3091–3096.

54. Chen L.M. Ag-nanoparticle-modified single Ag nanowire for detection of melamine by surface-enhanced Raman spectroscopy / L.M. Chen, Y.N. Liu // *Journal Raman Spectroscopy*. – 2012. – V. 43. – P. 986–991.

55. Kumar J. Surface-enhanced Raman spectroscopy: investigations at the nanorod edges and dimer junctions / J. Kumar, K.G. Thomas // *Journal Physical Chemistry Letters*. – 2011. – V. 2. – P. 610–615.

56. Abdelsalam M.E. SERS at structured palladium and platinum surfaces / M.E. Abdelsalam, S. Mahajan, P.N. Bartlett, J.J. Baumberg, A.E. Russell // *Journal of the American Chemical Society*. – 2007. – V. 129. – P. 7399–7406.

57. Porter L.A. Electroless nanoparticle film deposition compatible with photolithography, microcontact printing, and dip-pen nanolithography patterning technologies / L.A. Porter, H.C. Choi, J.M. Schmeltzer, A.E. Ribbe, L.C. Elliott, J.M. Buriak // *Nano Letters*. – 2002. – V.2. – P. 1369–1372.

58. Kuntiyi O.I. Silvering of magnesium by contact deposition in aqueous solutions and DMF medium / O.I. Kuntiyi // *Materials Science*. – 2006. – V. 42. – P. 681–684.

59. Dobrovets'ka O.Ya. Galvanic deposition of gold and palladium on magnesium by the method of substitution / O.Ya. Dobrovets'ka, O.I. Kuntiyi, G.I. Zozulya, I.V. Saldan, and O.V. Reshetnyak // *Materials Science*. – 2015. – V. 51. – P. 418–423.

60. Papaderakis A. Electrocatalysts Prepared by Galvanic Replacement / A. Papaderakis, I. Mintsouli, J. Georgieva, and S. Sotiropoulos // *Catalysts*. – 2017. – V.7. – P.1-34.

61. Chee S. W. Direct observation of the nanoscale Kirkendall effect during galvanic replacement reactions / S. W. Chee, S. F. Tan, Z. Baraissov, M. Bosman, U. Mirsaidov // *Nature Communications*. – 2016. – V. 8. – P. 1224.

62. Song Y-Y. Galvanic Deposition of Nanostructured Noble-Metal Films on Silicon / Y-Y. Song, Z-D. Gao, J.J. Kelly, and X-H. Xia // *Electrochemical and Solid State Letters*. – 2005. – V. 8, N. 10. – P. 148–154.

63. Djokic S.S. Galvanic Deposition of Copper, Silver and Gold on Silicon Surfaces from Fluoride Free Aqueous Solutions / S.S. Djokic // *ECS Transactions*. – 2017. – V. 75. – P. 15–25.

64. Porter L.A. Controlled electroless deposition of noble metal nanoparticle films on germanium surfaces / L.A. Porter, H.C. Choi, A.E. Ribbe and J.M. Buriak // *Nano Letters*. – 2002. – V. 2, N.10. – P. 1067–1071.

65. Ghosh T. Substrate decomposition in galvanic displacement reaction: Contrast between gold and silver nanoparticle formation / T. Ghosh, D. Kabiraj and B.S. Citation // *AIP Conference Proceedings*. – 2015. – V. 1665. – P. 080040 (3).

66. Lee K.Y. Organic-free Au-Pd alloys on germanium substrate via spontaneous galvanic displacement reaction / K.Y. Lee, S.W. Han, H.C. Choi // *Bulletin Korean Chemical Society*. – 2009. – V. 30, N 12. – P. 3113–3116.

67. Кунтий О., Яцишин М., Зозуля Г., Добровецька О., Решетняк О. Електрохімічний синтез металевих наночастинок і нанокмпозитів: Монографія. – Львів: Вид-во Національного університету «Львівська політехніка», 2019. – 288 с.

68. Ma´rquez K. In situ FTIR monitoring of Ag and Au electrodeposition on glassy carbon and silicon / K. Ma´rquez, R. Ortiz, J.W. Schultze, O.P. Ma´rquez, J. Ma´rquez, G. Staikov // *Electrochimica Acta*. – 2003. – V. 48. – P. 711– 720.

69. Кунтий О.І. Електрохімія та морфологія дисперсних металів: Монографія. – Львів: Вид-во Національного університету «Львівська політехніка», 2008. – 208с.

70. Kuntiyi O. Electrochemical depositions of palladium on indium tin oxide-coated glass and their possible application in organic electronics technology / O. Kuntiyi, P. Stakhira, V. Cherpak, O. Bilan, Ye. Okhremchuk et al. // *Micro & Nano Letters*. – 2011. – V.6. – P. 592–595.

71. Ogata Y. H. Electrochemical metal deposition on silicon / Y.H. Ogata, K. Kobayashi, M. Motoyama // *Current Opinion in Solid State and Materials Science*. –2006. – V. 10, N. 3–4. – P. 163–172.

72. Raz O. Ruthenium electrodeposition on silicon from a room-temperature ionic liquid / O. Raz, G. Cohn, W. Freyland, O. Mann, Y. Ein-Eli // *Electrochimica Acta*. – 2009. – V. 54. – P. 6042–6045.



73. Kelso M. V. Epitaxial electrodeposition of chiral metal surfaces on silicon(643) / M.V. Kelso, J.Z. Tubbesing, Q. Chen, J.A. Switzer // *Journal of The American Chemical Society*. – 2018. – V. 140, N. 46. – P. 15812–15819.

74. Sus L. Controlled gold deposition by pulse electrolysis / L. Sus, Y. Okhremchuk, I. Saldan, O. Kuntiyi, O. Reshetnyak, S. Korniy // *Materials Letters*. – 2015. – V. 139. – P. 296–299.

75. Fukami K. Electrodeposition of noble metals into ordered macropores in p-type silicon / K. Fukami, K. Kobayashi, T. Matsumoto, Y.L. Kawamura, T. Sakka, and Y.H. Ogata // *Journal of The Electrochemical Society*. – 2008. – V. 155, N. 6. – P. D443–D448.

76. Márquez K. Silver deposition on silicon and glassy carbon. A comparative study in cyanide medium / K. Márquez, G. Staikov, J.W. Schultze // *Electrochimica Acta*. – 2003. – V. 48. – P. 875–882.

77. Koda R. Electrodeposition of platinum and silver into chemically modified microporous silicon electrodes / R. Koda, K. Fukami, T. Sakka, and Y.H. Ogata // *Nanoscale Research Letters*. – 2012. – V. 7, N.1. – P. 330.

78. Oskam G. Electrochemistry of gold deposition on n-Si(100) / G. Oskam, and P. C. Searson // *Journal of The Electrochemical Society*. – 2000. – V. 147, N. 6. – P. 2199–2205.

79. Matsumoto T. Electrodeposition behavior of noble metals in ordered macroporous silicon / T. Matsumoto, K. Kobayashi, K. Fukami, T. Sakka, and Y.H. Ogata // *Physica Status Solidi C*. – 2009. – V. 6, N. 7. – P. 1561–1565.

80. Huang Q. Electrodeposition of gold on silicon nucleation and growth phenomena / Q. Huang, H. Deligianni and L. T. Romankiw // *Journal of The Electrochemical Society*. – 2006. – V. 153, N. 5. – P. C332–C336.

81. Warren S. Electrochemical Au deposition on stepped Si(111)-H surfaces: 3D versus 2D growth studied by AFM and X-ray diffraction / S. Warren, P. Prod'homme, F. Maroun, P. Allongue, R. Cortès, et al. // *Surface Science*. – 2009. – V. 603. – P. 1212–1220.

82. Gamero M. Deposition of nanostructured gold on n-doped silicon substrate by different electrochemical methods / M. Gamero, C. Alonso // *Journal of Applied Electrochemistry*. – 2010. – V. 40. – P. 175–190.

83. Vogel Y. B. Hydrogen evolution during the electrodeposition of gold nanoparticles at Si(100) photoelectrodes impairs the analysis of current-time transients / Y. B. Vogel, N. Darwish, M. B. Kashi, J. J. Gooding, and S. Ciampi // *Electrochimica Acta*. – 2017. – V. 247. – P. 200–206.

84. Chena J.-M. Inherent formation of porous p-type Si nanowires using palladium-assisted chemical etching / J.-M. Chen, C.-Y. Chen, C.P. Wong // *Applied Surface Science*. – 2017. – V. 392. – P. 498–502

85. Garrido P. Simultaneous electrodeposition and detection of platinum on silicon surfaces / P. Garrido, E. Gómez, E. Vallés // *Journal of Electroanalytical Chemistry*. – 1998. – V. 441. – P. 147–151.

86. Muñoz A. G. Model experiments on electrochemical formation of nano-dimensioned noble metal–oxide–semiconductor junctions at Si(111) surfaces / A. G. Muñoz, H. J. Lewerenz // *Electrochimica Acta*. – 2010. – V. 55. – P. 7772–7779.

87. Gorostiza P. Electrochemical characterization of the open-circuit deposition of platinum on silicon from fluoride solutions / P. Gorostiza, P. Allongue, R. Díaz, J. R. Morante, and F. Sanz // *The Journal of Physical Chemistry B*. – 2003. – V. 107, N. 26. – P. 6454–6461.

88. Qiao L. Zhang Enhancing electrochemical hydrogen generation by platinum-modification of p-type silicon wires array under visible light / L. Qiao, M. Zhou, Y. Li, A. Zhang, J. Deng, M. Liao, P. Xiao, Y. Zhang, and S. Zhang // *Journal of The Electrochemical Society*. – 2014. – V. 161, N. 9. – P. H458–H463.

89. Raz O. Ruthenium electrodeposition on silicon from a room-temperature ionic liquid / O. Raz, G. Cohn, W. Freyland, O. Mann, Y. Ein-Eli // *Electrochimica Acta*. – 2009. – V. 54. – P. 6042–6045.

90. Philipsen H. Immersion and electrochemical deposition of Ru on Si / H. Philipsen, W. Monnens // *Electrochimica Acta*. – 2018. – V. 274. – P. 306–315.

91. Muñoz A. G. Electroplating of Iridium onto single-crystal silicon: chemical and electronic properties of n-Si(111)/Ir nanojunctions / A. G. Muñoz, and H. J. Lewerenz // *Journal of The Electrochemical Society*. – 2009. – V. 156, N. 5. – P. D184–D187.

92. Muñoz A. G. Rhenium electrodeposition process onto p-Si(100) and electrochemical behaviour of the hydrogen evolution reaction onto p-Si/Re/0.1M H<sub>2</sub>SO<sub>4</sub> interface / A. G. Muñoz, R. S. Schrebler, M. A. Orellana, Ricardo Córdova // *Journal of Electroanalytical Chemistry*. – 2007. – V. 611. – P. 35–42.

93. Ghosh T. Electrochemical Ostwald ripening and surface diffusion in galvanic displacement reaction: Control over particle growth / T. Ghosh, P. Karmakar, B. Satpati // *RSC Advances*. – 2015. – V. 5. – P. 94380–94387.

94. Chang H. Preparation, characterization and antibiotic properties of silver silicon nanocomposites / H. Chang, W. Gao, X. Sun, H. Tan, S. Sun // *New Journal of Chemistry*. – 2017. – V. 41. – P.1313–1320.

95. Grean T.A. Gold electrodeposition for microelectronic, optoelectronic and microsystem applications / T.A. Grean // *Gold Bulletin*. – 2007. – V. 40. – P. 105–114.

96. Philipsen H. Immersion and electrochemical deposition of Ru on Si / H. Philipsen, W. Monnens // *Electrochimica Acta*. – 2018. – V. 274. – P. 306–315.

97. Atsushiba H. Adhesion and interfacial structure of metal film electrolessly deposited on Si using Au nanoparticles as catalysts / H. Atsushiba, Y. Orita, S. Sakamoto et al. // *Electrochemical Society Transactions*. – 2014. – V. 61. – P. 9–13.

98. Niwa D. Deposition behavior of Ni on Si(100) surfaces in an aqueous alkaline solution / D. Niwa, T. Homma, T. Osaka // *Journal of The Electrochemical Society*. – 2005. – V. 152. – P. C54–C59.

99. Дружинін А.О. Використання наноструктур кремнію в фотоелектричних перетворювачах / А.О. Дружинін, В.Ю. Єрохов, І.П. Островський, Ю.М. Ховерко, С.І. Нічкало // *Вісник Черкаського*

Національного університету ім. Б. Хмельницького. Серія «Хімічні науки». – 2010. – Т. 175. – С. 51–54.

100. Parida B. Formation of nanotextured surfaces on microtextured Si solar cells by metal-assisted chemical etching process / B. Parida, J. Choi, G. Lim, S. Park, K. Kim // *Journal of Nanoscience and Nanotechnology*. – 2014. – V. 14, N. 12. – P. 9224–9231.

101. Ahn Y. Scanning photocurrent imaging and electronic band studies in silicon nanowire field effect transistors / Y. Ahn, J. Dunning, J. Park // *Nano Letters*. – 2005. – V. 5. – P. 1367–1370.

102. Goldberger J. Silicon vertically integrated nanowire field effect transistors / J. Goldberger, A. Hochbaum, R. Fan, P. Yang // *Nano Letters*. – 2006. – V. 6. – P. 973–977.

103. Koo S. Enhanced channel modulation in dual-gated silicon nanowire transistors / S. Koo, Q. Li, M. Edelstein, C. Richter, E. Vogel // *Nano Letters*. – 2005. – V. 5. – P. 2519–2523.

104. Schmidt V. Realization of a silicon nanowire vertical surround-gate field-effect transistor / V. Schmidt, H. Riel, S. Senz, S. Karg, W. Riess, U. Gösele // *Small*. – 2006. – V. 2, N. 1. – P. 85–88.

105. Hochbaum A. Single crystalline mesoporous silicon nanowires / A. Hochbaum, D. Gargas, Y. Hwang, P. Yang // *Nano Letters*. – 2009. – V. 9. – P. 3550–3554.

106. Zheng W. Fabrication of capacitors based on silicon nanowire arrays generated by metal-assisted wet chemical etching / W. Zheng // *Materials Science and Engineering*. – 2016. – P. 193.

107. Zhang M.L. Preparation of Large-Area Uniform Silicon Nanowires Arrays through Metal-Assisted Chemical Etching / M.L. Zhang, K.Q. Peng, X. Fan, J.S. Jie, R.-Q. Zhang, S.T. Lee, and N.B. Wong // *Journal Physical Chemistry*. – 2008. – V. 112, N. 12. – P. 4444–4450.

108. Peng K.Q. Silicon nanowires for photovoltaic solar energy conversion / K.Q. Peng, S.T. Lee // *Advanced Materials*. – 2011. – V. 23. – P. 198–215.

109. Nichkalo S. Silicon nanostructures produced by modified MacEtch method for antireflective Si surface / S. Nichkalo, A. Druzhinin, A. Evtukh, O. Bratus, O. Steblova // *Nanoscale Research Letters*. – 2017. – V. 12, article no. 106.

110. Peng K. Silicon nanowires for rechargeable lithium-ion battery anodes / K. Peng, J. Jie, W. Zhang, S.T. Lee // *Applied Physics Letters*. – 2008. – V. 93, article no. 033105.

111. Zhang B.H. Large-area silver-coated silicon nanowire arrays for molecular sensing using surface-enhanced Raman spectroscopy / B.H. Zhang, H.S. Wang, L.H. Lu et al. // *Advanced Functional Materials*. – 2008. – V. 18. – P. 2348–2355.

112. Невзоров С.А. Формирование пористого кремния методом химического травления, инициируемого наночастицами серебра. – Л.: Химия, 2014. – С. 214–216.

113. Chaoui R. Porous silicon antireflection layer for solar cells using metal-assisted chemical etching / R. Chaoui, B. Mahmoudi, Y.S. Ahmed // *Physica Status Solidi*. – 2008. – V. 205, N.7. – P. 1724–1728.

114. Бережанський Є.І. Нанотекстурування кремнію методом каталітичного хімічного травлення / Є.І. Бережанський, С.І. Нічкало, В.Ю. Єрохов, А.О. Дружинін // *Фізика і хімія твердого тіла*. – 2015. – Т. 16, № 1. – С. 140–144.

115. Єрохов В.Ю. Хімічні технології отримання пористого кремнію для сонячних елементів // *Вісник Національного університету «Львівська політехніка» "Елементи теорії та прилади твердотільної електроніки"*. – 2006. – № 569. – С. 129–132.

116. Zhang M.L. A surface-enhanced Raman spectroscopy substrate for highly sensitive label-free immunoassay / M.L. Zhang, C.Q. Yi, X. Fan et al. // *Applied Physics Letters*. – 2008. – V. 92, article no. 043116.

117. Xiu Y. Hierarchical silicon etched structures for controlled hydrophobicity/superhydrophobicity / Xiu Y., Zhu L., Hess D.W., Wong C.P. // *Nano Letters*. – 2007. – V. 7. – P. 3388–3393.

118. Lahiri A. Electroless deposition of gold on silicon and its potential applications: review / A. Lahiri, S.-I. Kobayashi // *Surface Engineering*. – 2016. – V. 32. – P. 321–337.

119. Yae S. Electroless metallization of silicon using metal nanoparticles as catalysts and binding-points / S. Yae, M. Enomoto, H. Atsushiba et al. // *Electrochemical Society Transactions*. – 2013. – V. 53. – P. 99–103.

120. Djokic S. S. Galvanic deposition of gold on silicon from Au(I) alkaline fluoride-free solutions / S. S. Djokic, Z. Anti, N. S. Djokic, T. Thundat // *Journal of The Electrochemical Society*. – 2016. – V. 163. – P. D818–D820.

121. Gutes A. Silver nanostructures on silicon based on galvanic displacement process / A. Gutes, I. Laboriante, C. Carraro, R. Maboudian // *Journal of the Physical Chemistry C*. – 2009. – V. 113. – P. 16939–16944.

122. Carraro C. Metallization and nanostructuring of semiconductor surfaces by galvanic displacement processes / C. Carraro, R. Maboudian, L. Magagnin // *Surface Science Reports*. – 2007. – V. 62. – P. 499–525.

123. Brahiti N. Metal-assisted electroless etching of silicon in aqueous  $\text{NH}_4\text{HF}_2$  solution / N. Brahiti, S.-A. Bouanik, T. Hadjersi // *Applied Surface Science*. – 2012. – V. 258. – P. 5628–5637.

124. Yae S. Nucleation behavior in electroless displacement deposition of metals on silicon from hydrofluoric acid solutions / S. Yae, N. Nasu, K. Matsumoto et al. // *Electrochimica Acta*. – 2007. – V. 53. – P. 35–41.

125. Magagnin L. Gold deposition by galvanic displacement on semiconductor surfaces: effect of substrate on adhesion / L. Magagnin, R. Maboudian, C. Carraro // *Journal of the Physical Chemistry*. – 2002. – V. 106. – P. 401–407.

126. Kye J. Platinum monolayer electrocatalyst on gold nanostructures on silicon for photoelectrochemical hydrogen evolution / J. Kye, M. Shin, B. Lim, J.-W. Jang // *American Chemical Society NANO*. – 2013. – V. 7. – P. 6017–6023.

127. Gutes A. Palladium nanostructures from galvanic displacement as hydrogenperoxide sensor / A. Gutes, I. Laboriante, C. Carraro, R. Maboudian // *Sensors and Actuators B: Chemical*. – 2010. – V. 147. – P. 681–686.

129. Gao D. Selective Growth of Si Nanowire Arrays via Galvanic Displacement Processes in Water-in-Oil Microemulsions / D. Gao, R. He, C. Carraro, R. T. Howe, P. Yang, and R. Maboudian // *Journal of the American Chemical Society*. – 2005. – V. 127. – P. 4574–4575.

130. Xiu Y. Hierarchical Silicon etched structures for controlled hydrophobicity/superhydrophobicity / Y. Xiu, L. Zhu, D.W. Hess et al. // *Nano Letters*. – 2007. – V. 7. – P. 3388–3393.

131. Peng K. Silicon nanowires for rechargeable lithium-ion battery anodes / K. Peng, J. Jie, W. Zhang, S.T. Lee // *Applied Physics Letters*. – 2008. – V. 93. – P. 033105–1–033105–3.

132. Tsujino K. Morphology of nanoholes formed in silicon by wet etching in solutions containing HF and H<sub>2</sub>O<sub>2</sub> at different concentrations using silver nanoparticles as catalysts / K. Tsujino, M. Matsumura // *Electrochimica Acta*. – 2007. – V. 53. – P. 28–34.

133. Lee C.L. Pore formation in silicon by wet etching using micrometre-sized metal particles as catalysts / C.L. Lee, K. Tsujino, Y. Kanda et al. // *Journal of Materials Chemistry*. – 2008. – V. 18. – P. 1015–1020.

134. Peng K. Motility of metal nanoparticles in silicon and induced anisotropic silicon etching / K. Peng, A. Lu, R. Zhang, S.T. Lee // *Advanced Functional Materials*. – 2008. – V. 18. – P. 3026–3035.

135. Nichkalo S. Fabrication and characterization of high-performance anti-reflecting nanotextured Si surfaces for solar cells / S. Nichkalo, A. Druzhinin, V. Yerokhov, O. Ostapiv // *Springer Proceedings in Physics*. – 2018. – V. 210. – P. 275–283.

136. Chang S.W. Densely packed arrays of ultra-high-aspect-ratio silicon nanowires fabricated using block-copolymer lithography and metal-assisted etching / S.W. Chang, V.P. Chuang, S.T. Boles et al. // *Advanced Functional Materials*. – 2009. – V. 19. – P. 2495–2500.

137. Fabre B. Electroless patterned assembly of metal nanoparticles on hydrogen-terminated silicon surfaces for applications in photoelectrocatalysis /

B. Fabre, L. Hennous, S. Ababou-Girard, C. Meriadec // American Chemical Society Applied Materials & Interfaces. – 2013. – V. 5. – P. 338–343.

138. Druzhinin A.A. Development of anti-reflecting surfaces based on Si micropiramids and wet-chemically etched Si nanowire arrays / A.A. Druzhinin, V.Y. Yerokhov, S.I. Nichkalo, O.Y. Ostapiv // Functional Materials. – 2018. – V. 25. – P. 675–680.

139. Shepida M.V. Electrochemical deposition of nanoparticles of noble metals on the silicon surface in DMSO and DMF / M.V. Shepida, O.Ya. Dobrovetska, O.I. Kuntiyi, S.A. Korniy // Nanotechnology and nanomaterials (NANO-2019): Abstract book of participants of International research and practice conference, Lviv, 27–30 August 2019. – Lviv, 2019. – P. 444.

140. Шепіда М.В. Електрохімічне одержання наночастинок золота на поверхні кремнію у DMSO / М.В. Шепіда, О.І. Кунтий, О.Я. Добровецька, С.А. Корній, Ю.І. Еліяшевський // Фізико-хімічна механіка матеріалів. – 2019. – № 3. – С. 109-114.

141. Kuntiyi O. Modification of silicon surface with silver, gold and palladium nanostructures via galvanic substitution in DMSO and DMF solutions / O. Kuntiyi, M. Shepida, L. Sus, G. Zozulia, S. Korniy // Chemistry & Chemical Technology. – 2018. – V. 12, N. 3. – P. 305–309.

142. Kuntiyi O.I. Deposition of nanostructured metals on the surface of silicon by galvanic replacement: a mini-review / O. Kuntiyi, G. Zozulya, M. Shepida, S. Nichkalo // Питання хімії та хімічної технології. – 2019. – N. 3. – P. 74-82.

143. Шепіда М.В. Осадження наноструктурованого осаду срібла на поверхні кремнію методом гальванічного заміщення / Шепіда М.В., Зозуля Г.І., Кунтий О.І. // Вісник НУ «Львівська політехніка» «Хімія, технологія речовин та їх застосування». – 2018. – N. 886. – С. 79–84.

144. Shepida M. Deposition of palladium nanoparticles on the silicon surface via galvanic replacement in DMSO / M. Shepida, O. Kuntiyi, G. Zozulya, E. Kaniukov // Applied Nanoscience. – 2019.



145. Шепіда М.В. Вплив умов гальванічного заміщення у розчинах DMSO на розміри наночастинок золота фіксованих на поверхні кремнію / М.В. Шепіда // Вісник НУ «Львівська політехніка» «Хімія, технологія речовин та їх застосування». – 2019. – V. 2, N. 1. – С. 47–52.

146. Shepida M. Deposition of gold nanoparticles via galvanic replacement in DMSO and their influence on formation of silicon nanostructures / M. Shepida, O. Kuntiyi, S. Nichkalo, G. Zozulya, S. Korniy // *Advances in Materials Science and Engineering*. – 2019. – V. 2019. – P. 1–7.

147. Шепіда М.В. Пат. № 135944 Україна, МПК В01J 37/03 (2006.01), С01В 33/00, В82В 3/00, В82У 40/00. Спосіб одержання наноструктур кремнію / Шепіда М.В., Зозуля Г.І., Нічкало С.І., Кунтий О.І.; Національний університет “Львівська політехніка” – № u201901644; заявл. 18.02.2019, опублік. 25.07.2019, Бюл. № 14/2019. – 3 с.