

Opravný list

K diplomové práci: Použití jílem modifikovaných uhlíkových filmových elektrod ke stanovení nitrofenolů

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5. Literatura:

1. B. Yosypchuk, J. Barek, M. Fojta: Carbon Powder Based Films on Traditional Solid Electrodes as an Alternative to Disposable Electrodes. *Electroanalysis* **18**, 1126-1130, (2006).
2. I. Jiránek, J. Barek: *Book of Proceedings – 4th International Student Conference: Modern Analytical Chemistry 2008*. Prague, Czech republic, Jiří G. K. Ševčík – Consultancy 2008, s. 153-157
3. V. Vyskočil, J. Barek: Voltammetric DNA Biosensor Based on a Microcrystalline Natural Graphite-Polystyrene Composite Transducer. *Procedia Chemistry* **6**, 52-59, (2012)
4. Y. Peng, C. Lu, B. Hu, Z. Wang, S. Hu: Development of an acetylspiramycin sensor based on a single-walled carbon nanotubes film electrode. *Microchimica Acta* **158**, 79-84, (2007).
5. J. Wang: *Analytical Electrochemistry*. John Wiley (2006).
6. K. Kalcher, I. Svancara, M. Buzuk, K. Vytras, A. Walcarus: Electrochemical sensors and biosensors based on heterogeneous carbon materials. *Monatshefte für Chemie - Chemical Monthly* **140**, 861-889, (2009).
7. J.-M. Zen, A. Senthil Kumar, D.-M. Tsai: Recent Updates of Chemically Modified Electrodes in Analytical Chemistry. *Electroanalysis* **15**, 1073-1087, (2003).
8. A. L. Beilby, A. Carlsson: A pyrolytic carbon film electrode for voltammetry: Part V. characterization and comparison with the glassy carbon electrode by electrochemical pretreatment in basic solution. *Journal of Electroanalytical Chemistry and Interfacial Electrochemistry* **248**, 283-304, (1988).

9. M. Hadi, A. Rouhollahi, M. Yousefi: Pyrolytic carbon film deposit as an electrochemical interface. *Carbon Science and Technology* **2**, 93-97, (2009).
10. M. Hadi, A. Rouhollahi, M. Yousefi, F. Taidy, R. Malekfar: Electrochemical characterization of a pyrolytic carbon film electrode and the effect of anodization. *Electroanalysis* **18**, 787-792, (2006).
11. M. Hadi, A. Rouhollahi: Application of nanocrystalline graphite-like pyrolytic carbon film electrode for determination of thiols. *Electrochimica Acta* **58**, 647-653, (2011).
12. M. Hadi, A. Rouhollahi, M. Yousefi: Nanocrystalline graphite-like pyrolytic carbon film electrode for electrochemical sensing of hydrazine. *Sensors and Actuators B* **160**, 121-128, (2011).
13. M. Hadi, A. Rouhollahi, M. Yousefi: Direct Electrooxidation of Ascorbic Acid at the Nanocrystalline Graphite-like Pyrolytic Carbon Film Electrode. *Electroanalysis* **23**, 1497-1505, (2011).
14. M. Hadi, A. Rouhollahi: Simultaneous electrochemical sensing of ascorbic acid, dopamine and uric acid at anodized nanocrystalline graphite-like pyrolytic carbon film electrode. *Analytica Chimica Acta* **721**, 55-60, (2012).
15. M. Hadi, A. Rouhollahi: Filamentous pyrolytic carbon film and its electroanalytical properties. *Journal of Electroanalytical Chemistry* **727**, 13-20, (2014).
16. H. Jiang, L. Huang, Z. Zhang, T. Xu, W. Liu: Facile deposition of copper-doped diamond-like carbon nanocomposite films by a liquid-phase electrochemical route. *Chemical Communications* **19**, 2196-2197, (2004)
17. J.-M. Ting, H. Lee: DLC composite thin films by sputter deposition. *Diamond and Related Materials* **11**, 1119-1123, (2002).
18. X. Ling, P. Zhang, R. Li, D. Fan, X. Yao: Electron field emission of iron and cobalt-doped DLC films fabricated by electrochemical deposition. *Surface and Interface Analysis* **45**, 943-948, (2013).
19. R. S. Nicholson, I. Shain: Theory of Stationary Electrode Polarography. Single Scan and Cyclic Methods Applied to Reversible, Irreversible, and Kinetic Systems. *Analytical Chemistry* **36**, 706-723, (1964).
20. C. M. A. Brett, A. M. O. Brett: *Electrochemistry: Principles, Methods, and Applications*. Oxford University Press, Incorporated 1993
21. K. E. Creasy, B. R. Shaw: Polishable modified carbon fiber composite electrodes containing copolymers of (vinylferrocene) or (vinylpyridine) in a cross-linked polystyrene matrix. *Analytical Chemistry* **61**, 1460-1465, (1989).
22. S. Fletcher, M. D. Horne: Random assemblies of microelectrodes for electrochemical studies. *Electrochemical Communications* **1**, 502-512, (1999).
23. M. Vnouček: *Kompozitní materiály*. Dostupné z:
http://web.archive.org/web/20131208150703/http://stefanmichna.com/download/technicke-materialy_II/kompozitni_materialy.pdf [cit. 15. 6. 2014]
24. Z. Kořínek: *Technologie výroby kompozitů*. Dostupné z:
<http://mujweb.cz/zkorinek/technologie.pdf> [cit. 14. 6. 2014]
25. X. Xu, S. G. Weber: Carbon fiber/epoxy composite ring-disk electrode: Fabrication, characterization and application to electrochemical detection in capillary high performance liquid chromatography. *Journal of Electroanalytical Chemistry* **630**, 75-80, (2009).
26. D. Bavol: Prozkoumání možnosti využití uhlíkové kompozitní elektrody jako disposabilního senzoru při stanovení pesticidu. *Diplomová práce*, Univerzita Karlova v Praze, 2013.

27. B. Ogorevc, X. H. Cai, I. Grabec: Determination of traces of copper by anodic-stripping voltammetry after its preconcentration via an ion-exchange route at carbon-paste electrodes modified with vermiculite. *Analytica Chimica Acta* **305**, 176-182, (1995).
28. Z. Navratilová, P. Wojtowicz, L. Vaculíková, V. Šugárová: Sorption of alkylammonium cations on montmorillonite. *Acta Geodynamica Et Geomaterialia* **4**, 59-65, (2007); W. F. Jaynes, G. F. Vance: Sorption of benzene, toluene, ethylbenzene, and xylene (BTEX) compounds by hectorite clays exchanged with aromatic organic cations. *Clays Clay Miner.* **47**, 358-365, (1999).
29. W. S. Huang, D. Z. Zhou, X. P. Liu, X. J. Zheng: Electrochemical determination of phenol using CTAB-functionalized montmorillonite electrode. *Environmental Technology* **30**, 701-706, (2009).
30. C. T. Chiou, D. W. Rutherford: Effects of exchanged cation and layer charge on the sorption of water and EGME vapors on montmorillonite clays. *Clays and Clay Minerals* **45**, 867-880, (1997).
31. M. A. M. Lawrence, R. K. Kukkadapu, S. A. Boyd: Adsorption of phenol and chlorinated phenols from aqueous solution by tetramethylammonium- and tetramethylphosphonium-exchanged montmorillonite. *Applied Clay Science* **13**, 13-20, (1998).
32. Y.-p. Luo, S.-f. Zhao, G.-x. Pan, L.-f. Huang, D.-f. Huang, C.-n. Chen, L.-j. Gu: Preparation of clay based slow-release fertilizers containing nitrogen, phosphorus and potassium and its release characteristics. *Anhui Nongye Kexue* **40**, 813-816, (2012). CA 2013:1485220.
- AU Pat 2012065214, A. J. Saunders: *A fertilizer composition containing a plant nutrient and method for producing it as granules with improved strength*, 24. 5. 2012.
33. MX Pat 2008014315, J. L. Miranda Valencia: *Clay-supported fertilizer containing secondary nutrients and micronutrients*, 6. 10. 2009.
34. DE Pat 2920854, H. G. Franke: *Agent and methods for cultivation and recultivation of nutrient-poor, dry soils*, 27. 11. 1980.
35. CN Pat 101099441, S. Wang, L. Shi, Q. Xie, C. Zhang: *Method for planting grape in droughty desert*, 9. 2. 2008.
36. M. J. Sanchez-Martin, M. S. Rodriguez-Cruz, M. S. Andrades, M. Sanchez-Camazano: Efficiency of different clay minerals modified with a cationic surfactant in the adsorption of pesticides: Influence of clay type and pesticide hydrophobicity. *Applied Clay Science* **31**, 216-228, (2006).
37. L. P. Meier, R. Nueesch, F. T. Madsen: Organic Pillared Clays. *Journal of Colloid and Interface Science* **238**, 24-32, (2001).
38. C.-H. Zhou, Z.-F. Shen, L.-H. Liu, S.-M. Liu: Preparation and functionality of clay-containing films. *Journal of Materials Chemistry* **21**, 15132-15153, (2011).
39. C. J. Song, G. Villemure: Effect of decreasing film thickness on the electrochemical responses of cations adsorbed in clay-modified electrodes. *Electrochimica Acta* **52**, 6509-6516, (2007).
40. E. Fuguet, C. Rafols, E. Bosch, M. Roses: A Fast Method for pKa Determination by Capillary Electrophoresis. *Chemical Biodiversity* **6**, 1822-1827, (2009).
41. ATSDR: *Toxicological profile for nitrophenols: 2-nitrophenol, 4-nitrophenol*, U.S. Public Health Service 1992
42. C. A. de Lima, P. S. da Silva, A. Spinelli: Chitosan-stabilized silver nanoparticles for voltammetric detection of nitrocompounds. *Sensors and Actuators B* **196**, 39-45, (2014).
43. J. Fischer, L. Vaňourková, A. Daňhel, V. Vyskočil, K. Čížek, J. Barek, K. Pecková, B. Yosypchuk, T. Navrátil: Voltammetric determination of nitrophenols at a silver solid amalgam

- electrode. *International Journal of Electrochemical Science* **2**, 226-234, (2007).
44. V. A. Pedrosa, H. B. Suffredini, L. Codognoto, S. T. Tanimoto, S. A. S. Machado, L. A. Avaca: Carbon surfaces for electroanalytical applications: A comparative study. *Analytical Letters* **38**, 1115-1125, (2005).
45. K. Asadpour-Zeynali, P. Najafi-Marandi: Bismuth modified disposable pencil-lead electrode for simultaneous determination of 2-nitrophenol and 4-nitrophenol by net analyte signal standard addition method. *Electroanalysis* **23**, 2241-2247, (2011).
46. P. Deng, Z. Xu, J. Li: Simultaneous voltammetric determination of 2-nitrophenol and 4-nitrophenol based on an acetylene black paste electrode modified with a graphene-chitosan composite. *Microchimica Acta* **181**, 1077-1084, (2014).
47. Y. Lei, G. Zhao, M. Liu, X. Xiao, Y. Tang, D. Li: Simple and feasible simultaneous determination of three phenolic pollutants on boron-doped diamond film electrode. *Electroanalysis* **19**, 1933-1938, (2007).
48. A. Daňhel, K. K. Shiu, B. Yosypchuk, J. Barek, K. Pecková, V. Vyskočil: The use of silver solid amalgam working electrode for determination of nitrophenols by HPLC with electrochemical detection. *Electroanalysis* **21**, 303-308, (2009).
49. M. Teich, D. Pinxteren, H. Herrmann: Determination of nitrophenolic compounds from atmospheric particles using hollow-fiber liquid-phase microextraction and capillary electrophoresis/mass spectrometry analysis. *Electrophoresis* **35**, 1353-1361, (2014).
50. F. Zhu, M.-z. Tu, L.-l. Wang, D.-w. Shi, M.-k. Wang: Simultaneous determination of ten phenols in textiles by high performance liquid chromatography. *Fenxi Ceshi Xuebao* **32**: 336-340, (2013). *CA* 2014:344919.
51. E. S. Oliveira, P. A. Fiorito, H. B. Suffredini: Single oil drop electrochemistry on a screen-printed electrode surface. *Electroanalysis* **26**, 1660-1663, (2014).
52. C. Karuppiah, S. Palanisamy, S.-M. Chen, R. Emmanuel, M. A. Ali, P. Muthukrishnan, P. Prakash, F. M. A. Al-Hemaid: Green biosynthesis of silver nanoparticles and nanomolar detection of p-nitrophenol. *Journal of Solid State Electrochemistry* **18**, 1847-1854, (2014).
53. M. M. Rahman, S. B. Khan, A. M. Asiri, A. G. Al-Sehemi: Chemical sensor development based on polycrystalline gold electrode embedded low-dimensional Ag₂O nanoparticles. *Electrochimica Acta* **112**, 422-430, (2013).
54. M. J. Zunic, A. D. Milutinovic-Nikolic, D. M. Stankovic, D. D. Manojlovic, N. P. Jovic-Jovicic, P. T. Bankovic, Z. D. Mojovic, D. M. Jovanovic: Electrooxidation of p-nitrophenol using a composite organo-smectite clay glassy carbon electrode. *Applied Surface Science* **313**, 440-448, (2014).
55. B. Liu, T. Wang, C. Yin, Z. Wei: Electrochemical analysis of p-nitrophenol in acidic or alkaline medium using silver nanoparticle decorated multi-walled carbon nanotubes. *Journal of Material Science* **49**, 5398-5405, (2014).
56. B. Devadas, M. Rajkumar, S.-M. Chen, P.-C. Yeh: A novel voltammetric p-nitrophenol sensor based on ZrO₂ nanoparticles incorporated into a multiwalled carbon nanotube modified glassy carbon electrode. *Analytical Methods* **6**, 4686-4691, (2014).
57. K. Nejati, K. Asadpour-Zeynali, Z. Rezvani, R. Peyghami: Determination of 2-nitrophenol by electrochemical synthesized Mg/Fe layered double hydroxide sensor. *International Journal of Electrochemical Science* **9**, 5222-5234, (2014).

58. N. Lezi, A. Economou, J. Barek, M. Prodromidis: Screen-Printed Disposable Sensors Modified with Bismuth Precursors for Rapid Voltammetric Determination of 3 Ecotoxic Nitrophenols. *Electroanalysis* **26**, 766-775, (2014).
59. J. A. Harper, K. Dickinson, M. D. Brand: Mitochondrial uncoupling as a target for drug development for the treatment of obesity. *Obesity Reviews* **2**, 255-265, (2001).
60. NJDH: *Hazardous Substance Fact Sheet: 2,4,6-trinitrophenol*. New Jersey, New Jersey Department of Health, 2010
61. NJDH: *Hazardous Substance Fact Sheet: 2,4-dinitrophenol*. New Jersey, New Jersey Department of Health, 1999
62. J. Musilová, J. Barek, K. Pecková: Použití diamantových filmových elektrod dopovaných borem pro stanovení organických látek. *Chemické listy* **103**, 469-478, (2009).
63. S. Angioi, S. Polati, M. Roz, C. Rinaudo, V. Gianotti, M. C. Gennaro: Sorption studies of chloroanilines on kaolinite and montmorillonite. *Environmental Pollution* **134**, 35-43, (2005).
64. Z. Hranická: Stanovení vybraných nitrofenolů na modifikovaných uhlíkových pastových elektrodách. *Diplomová práce*, Univerzita Karlova v Praze, 2010.
65. M. H. Abraham, C. M. Du, J. A. Platts: Lipophilicity of the Nitrophenols. *The Journal of Organic Chemistry* **65**, 7114-7118, (2000).
66. D. Mackay, W. Y. Shiu, K. C. Ma, S. C. Lee: *Handbook of Physical-Chemical Properties and Environmental Fate for Organic Chemicals, Second Edition*. Taylor & Francis 2006