

References

- Abdelkader, R.; Amine, H.; Mohammed, B. H-NMR spectra of conductive, anticorrosive and soluble polyaniline exchanged by an eco-catalyst layered (Maghnite-H⁺), *World Journal of Chemistry*, **8** (2013) 20-26.
- Abdiryim T., Ubul A., Jamal R., Rahman A., Solid-state synthesis of polyaniline/single-walled carbon nanotubes: A comparative study with polyaniline/multi-walled carbon nanotubes, *Materials*, **5** (2012) 1219-1231.
- Abdulla H. S., Abbo A. I., Optical and Electrical Properties of Thin Films of Polyaniline and Polypyrrole, *International Journal of Electrochemical Science*, **7** (2012) 10666-10678.
- Adzhri R., Arshad M. K., Gopinath S. C., Ruslinda A. R., Fathil M. F., Ayub R. M., Nor M. N., Voon C. H., High-performance integrated field-effect transistor-based sensors, *Analytical Chimica Acta*, **917** (2016) 1-18.
- Ahammad A. J. S., Mamun A. A., Akter T., Mamun M. A., Faraezi S., Monira F. Z., Enzyme-free impedimetric glucose sensor based on gold nanoparticles/PANI composite film, *Journal of Solid State Electrochemistry*, **20** (2016) 1933–1939.
- Ahmed A. A., Bahaidarah H. M., Mazumder M. A. J., Biomedical perspectives of PANI Based Biosensors, *Advanced Materials Research*, **810** (2013) 173-216.
- Ahmed A. A., Mohammad F., Rahman M. Z. A., Composite of Polyaniline and Cellulose acetate: preparation, characterization, thermo oxidative degradation and stability in terms of DC electrical conductivity retention, *Synthetic Metals*, **144** (2004) 29-49.
- Ahmed S., Ikram S., Synthesis of gold nanoparticles using plant extract: an overview, *Nano Research & Applications*, **5** (2015) 1-6.
- Akbar S., Taimoor A. A., Functionalization of carbon nanotubes: manufacturing techniques and properties of customized nanocomponents for molecular-level technology, *Recent Patents on Nanotechnology*, **3** (2009) 154-61.
- Akbarinezhad E., Ebrahimi M., Sharif F., Preparation of PANI and self-doped PANI–clay nanocomposites in supercritical CO₂: Synthesis and conductivity study, *Synthetic Metals*, **162** (2012) 1879-1886.
- Akhtar M. S., Panwar J., Yun Y. S., Biogenic synthesis of metallic nanoparticles by plant extracts, *ACS Sustainable Chemistry Engineering*, **1** (2013) 591-602.
- Akiyama H., Toko K., Yamafuji K., Detection of taste substances using impedance change of phospholipid Langmuir-Blodgett membrane, *Japanese Journal of Applied Physics*, **135** (1996) 5516-5521.
- Ali S. M., Emran K. M., Lehaibi H. A. A., Enhancement of the Electrocatalytic Activity of Conducting Polymer/Pd Composites for Hydrazine Oxidation by Copolymerization, *International Journal of Electrochemical Science*, **12** (2017) 8733 – 8744.
- Ali S. R., Parajuli R. R., Balogun Y., Ma Y., He H., A Nonoxidative Electrochemical Sensor Based on a Self-Doped PANI/Carbon Nanotube Composite for Sensitive and Selective Detection of the Neurotransmitter Dopamine: A Review, *Sensors (Basel)*, **8** (2008) 8423-8452.
- Ali Y., Kumar V., Sonkawade R. G., Dhaliwal A. S., Fabrication of polyaniline nanofibers by chronopotentiometry, *Advanced Materials Letters*, **3** (2012) 388-392.

Alshahrani L. A., Li X., Luo H., Yang L., Wang M., Yan S., Liu P., Yang Y., Li Q., The simultaneous electrochemical detection of catechol and hydroquinone with [Cu(Sal-β-Ala)(3,5-DMPz)2]/SWCNTs/GCE, *Sensors*, **14** (2014) 22274-22284.

Alvi F., Ram M. K., Gomez H., Joshi R. K., Kumar A., Evaluating the chemio-physio properties of novel zinc oxide–PANI nanocomposite polymer films, *Polymer Journal*, **42** (2010) 935–940.

Ameena S., Akhtar M. S., Shin H. S., Hydrazine chemical sensing by modified electrode based on in situ electrochemically synthesized PANI/graphene composite thin film, *Sensors and Actuators B*, **173** (2012) 177-183.

Anbalagan A. C., Sawan S. N., Brine solution-driven synthesis of porous polyaniline for supercapacitor electrode application, *Polymer*, **87** (2016) 129-137.

Arasia A. Y., Jeyakumari J. J. L., Sundaresan B., Dhanalakshmi V., Anbarasan R., The structural properties of poly(aniline)-Analysis via FTIR spectroscopy, *Spectrochimica Acta Part A*, **74** (2009) 1229-1234.

Arsov L. D., Plieth W., Koumehl G., Electrochemical and Raman spectroscopic study of polyaniline; influence of the potential on the degradation of polyaniline, *Journal of Solid State Electrochemistry*, **2** (1998) 355-361.

Ates M., A review study of (bio)sensor systems based on conducting polymers, *Materials Science and Engineering: C*, **33** (2013) 1853-1859.

Attia N. F., Geckeler K. E., PANI as a material for hydrogen storage applications, *Macromol Rapid Communication*, **34** (2013) 1043-1055.

Awuzie C. I., Conducting Polymers, *Materials Today: Proceedings*, **4** (2017) 5721–5726

Aydemir N., Malmstrom J., Travas S. J. Conducting polymer based electrochemical biosensors, *Physical Chemistry Chemical Physics*, **18** (2016) 8264-77.

Aydemir N., Malmstrom J., Travas S. J., Conducting polymer based electrochemical biosensors, *Physical Chemistry Chemical Physics*, **18** (2016) 8264-77.

Azevedo W. M. D., Schwartz M. O. E., Nascimento G. C. D., Jr E. F. D. S., Synthesis and characterization of PANI/clay nanocomposite, *Physica Status Solidi (C)*, **1** (2004) 249–255.

Bai H., Shi G., Gas Sensors Based on Conducting Polymers, *Sensors*, **7** (2007) 267-307.

Bairi V. G., Bourdo S. E., Sacre N., Nair D., Berry B. C., Biris A. S., Viswanathan T., Ammonia Gas Sensing Behavior of Tanninsulfonic Acid Doped PANI-TiO₂ Composite, *Sensors*, **15** (2015) 26415-26429.

Baker C. O., Huang X., Nelson W., Kaner R. B., PANI nanofibers: broadening applications for conducting polymers, *Chemical Society Review*, **46** (2017) 1510-1525.

Bandgar D. K., Navale S. T., Naushad M., Mane R. S., Stadler F. J., Patil V. B., Ultra-sensitive PANI–iron oxide nanocomposite room temperature flexible ammonia sensor, *Royal Society of Chemistry Advances*, **5** (2015) 68964-68971.

Barik A., Solanki P. R., Kaushik A., Ali A., Pandey M. K., Kim C. G., Malhotra B. D., Polyaniline–carboxymethyl cellulose nanocomposite for cholesterol detection, *Journal of nanoscience and nanotechnology*, **10** (2010) 6479-6488.

Barik A., Solanki P. R., Kaushik A., Ali A., Pandey M. K., Kim C. G., Malhotra B. D., PANI-Carboxymethyl Cellulose Nanocomposite for Cholesterol detection, *Journal of Nanoscience and Nanotechnology*, **10** (2010) 1-10.

Barras R., Cunha I., Gaspar D., Fortunato E., Martins R., Pereira L., Printable cellulose-based electroconductive composites for sensing elements in paper electronics, *Flexible and Printed Electronics*, **2** (2017) 014006.

Barros A. D., Ferreira M., Constantino C. J., Bortoleto J. R., Ferreira M., Synergy between PANI and OMT clay mineral in Langmuir-Blodgett films for the simultaneous detection of traces of metal ions, *ACS Applied Material Interfaces*, **7** (2015) 6828-34.

Barsan M. M., Ghica M. E., Brett C.M.A., Electrochemical sensors and biosensors based on redox polymer/carbon nanotube modified electrodes: A review, *Analytical Chimica Acta*, **88** (2015) 1-23.

Basavaraja C., Kim J. K., Thinh P.X., Huh D. S., Characterization and DC electrical conductivity of the composite films containing polyaniline-carboxymethyl cellulose, *Polymer Composite*, **33** (2012) 1541-1548.

Batra B., Kumari S., Pundir C.S., Construction of glutamate biosensor based on covalent immobilization of glutamate oxidase on polypyrrole nanoparticles/PANI modified gold electrode, *Enzyme Microbial Technology*, **57** (2014) 69-77.

Batra B., Lata S., Sharma M., Pundir C. S., An acrylamide biosensor based on immobilization of hemoglobin onto MWCNTs/copper nanoparticles/PANI hybrid film, *Analytical Biochemistry*, **433** (2013) 210-217.

Bayramoglu G., Altintas B., Arica M. Y., Immobilization of glucoamylase onto PANI-grafted magnetic hydrogel via adsorption and adsorption/cross-linking, *Applied Microbiology and Biotechnology*, **97** (2013) 1149-1159.

Bernard M. C., Gof A. H. L., Quantitative characterization of Polyaniline films using Raman spectroscopy. I. Polaron lattice and bipolaron, *Electrochimica Acta*, **52** (2006) 595-603.

Boujakhrouf A., Diez P., Sanchez A., Ruiz P. M., Pingarron J. M., Villalonga R., Gold nanoparticles-decorated silver-bipyridine nanobelts for the construction of mediatorless hydrogen peroxide, *Journal of Colloid and Interface Science*, **482** (2016) 105-111.

Bredas J. L., Street G. B., Polarons, bipolarons, and solitons in conducting polymers. *Accounts of Chemical Research*, **18** (1985) 309-315.

Burridge K. A., Johnston J. H., Borrmann T., Hybrid materials of kaolinite clay with polypyrrole and PANI, *Journal of Nanoscience and Nanotechnology*, **9** (2009) 6813-22.

Camargo P. H. C., Satyanarayana K. G., Wypych F., Nanocomposites: synthesis, structure, properties and new application opportunities, *Materials research*, **12** (2009) 1-39.

Casella I. G., Guascito M. R., Electrocatalysis of Ascorbic Acid on the Glassy Carbon Electrode Chemically Modified with PANI Films, *Electroanalysis*, **9** (1997) 1381-1387.

Chairam S., Sriraksa W., Amatongchai M., Somsook E., Electrocatalytic Oxidation of Ascorbic Acid Using a Poly(aniline-co-m-ferrocenylaniline) Modified Glassy Carbon Electrode, *Sensors*, **11** (2011) 10166-10179.

Chandra S., Lang H., Bahadur D., PANI-iron oxide nanohybrid film as multi-functional label-free electrochemical and biomagnetic sensor for catechol, *Analytical Chimica Acta*, **795** (2013) 8-14.

Chauhan N., Narang J., Pundir C. S., Fabrication of multiwalled carbon nanotubes/PANI modified Au electrode for ascorbic acid determination, *Analyst*, **136** (2011) 1938-1945.

Chauhan N., Narang J., Rawal R., Pundir C.S., A highly sensitive non-enzymatic ascorbate sensor based on copper nanoparticles bound to multi walled carbon nanotubes and PANI composite, *Synthetic Metals*, **161** (2011) 2427-2433.

Chawla S., Rawal R., Pundir C. S., Fabrication of polyphenol biosensor based on laccase immobilized on copper nanoparticles/chitosan/multiwalled carbon nanotubes/PANI-modified gold electrode, *Journal of Biotechnology*, **156** (2011) 39–45.

Chen D., Chen C., Du D., Detection of organophosphate pesticide using polyaniline and carbon nanotubes composite based on acetylcholinesterase inhibition, *Journal of nanoscience and nanotechnology*, **10** (2010) 5662-5666.

Chen W., Cai S., Ren Q. Q., Wen W., Zhao Y. D., Recent advances in electrochemical sensing for hydrogen peroxide: a review, *Analyst*, **137** (2012) 49-58.

Chen X., Chen Z., Tian R., Yan W., Yao C., Glucose biosensor based on three dimensional ordered macroporous self-doped PANI/Prussian blue bicomponent film, *Analytical Chimica Acta*, **723** (2012) 94-100.

Chena C., Suna C., Gaob Y., Application of electrosynthesized poly(aniline-co-p-aminophenol) as a catechol sensor, *Electrochimica Acta*, **54** (2009) 2575-2580.

Chiem C. L. T., Huynh L., Ralston J., Beattie D. A., In situ particle film ATR FTIR spectroscopy of carboxymethyl cellulose adsorption on talc: binding mechanism, pH effects, and adsorption kinetics, *Langmuir*, **24** (2008) 8036-8044.

Chiou N. R., Lu C., Guan J., Lee L. J., Epstein A. J., Growth and alignment of Polyaniline nanofibres with super hydrophobic, superhydrophilic and other properties, *Nature Nanotechnology*, **2007**, 2, 354-357.

Chiou N. R., Lee L. J., Epstein A. J., Porous membrane controlled polymerization of nanofibers of polyaniline and its derivatives, *Journal of Material Chemistry*, **18** (2008) 2085-2089.

Chowdhury A. D., Gangopadhyay R., De A., Highly sensitive electrochemical biosensor for glucose, DNA and protein using gold-PANI nanocomposites as a common matrix, *Sensors and Actuators B*, **190** (2014) 348-356.

Chowdhury A., Saleh F. S., Rahman M. R., Rahim A., Influence of pH on the Specific Surface Area of Polyaniline Matrices, *Journal of Applied Polymer Science*, **109** (2008) 1764-1771.

Corbierre M. K., Cameron N. S., Sutton M., Laaziri K., Lennox R. B., Gold nanoparticle/polymer nanocomposites: Dispersion of nanoparticles as a function of capping agent molecular weight and grafting density, *Langmuir*, **21** (2005) 6063–6072.

Cosnier S., Biomolecule immobilization on electrode surfaces by entrapment or attachment to electrochemically polymerized films. A review, *Biosensors and Bioelectronics*, **14** (1999) 443-56.

Crespilho F. N., Iost R. M., Travain S. M., Jr. O. N.O., Zucolotto V. V., Enzyme immobilization on Ag nanoparticles/PANI nanocomposites, *Biosensors and Bioelectronics*, **24** (2009) 3073-3077.

Dallas P., Georgakilas V., Interfacial polymerization of conductive polymers: Generation of polymeric nanostructures in a 2-D space, *Advance Colloid Interface Science*, **224** (2015) 46-61.

Danesh E., Lopez F. M., Camara M., Bontempi A., Quintero A. V., Teyssieux D., Thierry L., Briand D., Rooij N. F. D., Persaud K. C., Development of a New Generation of

Ammonia Sensors on Printed Polymeric Hotplates, *Analytical Chemistry*, **86** (2014) 8951–8958.

Daniel J. R., Whistler R. L., Roper H., *Industrial Polymers Handbook 1: Products, processes and applications*, **4** (2001) 2227.

Daniels J. S., Pourmand N., Label-Free Impedance Biosensors: Opportunities and Challenges, *Electroanalysis*, **19** (2007) 1239–125.

Deshpande N. G., Gudage Y. G., Sharma R., Vyas J. C., Kim J. B., Lee Y.P., Studies on tin oxide-intercalated PANI nanocomposite for ammonia gas sensing applications, *Sensors and Actuators B*, **138** (2009) 76–84.

Detsri E., Popanyasaka J., Fabrication of silver nanoparticles/PANI composite thin films using Layer-by-Layer self-assembly technique for ammonia sensing, *Colloids and Surfaces A: Physicochemical Engineering Aspects*, **467** (2015) 57–65.

Devi R., Yadav S., Pundir, C.S., Rawal R., Chawla S., Dahiya T., Pundir C.S., Development of an amperometric sulfite biosensor based on a gold nanoparticles/chitosan/MWCNTs/PANI-modified gold electrode, *Analytical Bioanalytical Chemistry*, **401** (2011) 2599–2608.

Devi R., Yadav S., Pundir C.S., Amperometric determination of xanthine in fish meat by zinc oxide nanoparticle/chitosan/multiwalled carbon nanotube/PANI composite film bound xanthine oxidase, *Analyst*, **137** (2012) 754–759.

Dhand C., Arya S. K., Datta M., Malhotra B. D., Polyaniline-carbon nanotube composite film for cholesterol biosensor, *Analytical biochemistry*, **383** (2008) 194–199.

Dhand C., Das M., Datta M., Malhotra B. D., Recent advances in polyaniline based biosensors, *Biosensors and bioelectronics*, **26** (2011) 2811–2821.

Dhawale D. S., Salunkhe R. R., Jamadade V. S., Dubal D. P., Pawar S. M., Lokhande C. D., Hydrophilic polyaniline nanofibrous architecture using room temperature electrosynthesis method for supercapacitor application, *Current Applied Physics*, **10** (2010) 904–909.

Ding L., Su B., A non-enzymatic hydrogen peroxide sensor based on platinum nanoparticle–PANI nanocomposites hosted in mesoporous silica film, *Journal of Electroanalytical Chemistry*, **736** (2015) 83–87.

Dou P., Liu Z., Cao Z., Zheng J., Wang C., Xu X., Rapid synthesis of hierarchical nanostructured PANI hydrogel for high power density energy storage application and three-dimensional multilayers printing, *Journal of Materials Science*, **51** (2016) 4274–4282.

Du X., Chen Y., Dong W., Han B., Liu M., Chen Q., Zhou J., A nanocomposite-based electrochemical sensor for non-enzymatic detection of hydrogen peroxide, *Oncotarget*, **8** (2017) 13039–13047.

Dumitriu S., *Polysaccharides: Structural Diversity and Functional Versatility*, 2nd. Marcel Dekker; New York. (2004).

Duran N. G., Karakısla M., Aksu L., Sacak M., Conducting PANI/kaolinite composite: Synthesis, characterization and temperature sensing properties, *Materials Chemistry and Physics*, **118** (2009) 93–98.

Elie A. G., Electroconductive hydrogels: Synthesis, characterization and biomedical applications, *Biomaterials*, **31** (2010) 2701–2716.

Erden F., Lai S. C., Chi H., Wang F., He C., Tailoring the Diameters of PANI Nanofibers for Sensor Application, *ACS Omega*, **2** (2017) 6506–6513.

Fan Y., Liu J. H., Yang C. P., Yu M., Liu P., Graphene–PANI composite film modified electrode for voltammetric determination of 4-aminophenol, *Sensors and Actuators B*, **157** (2011) 669-674.

Fang F. F., Choi H. J., Joo J., Conducting polymer/clay nanocomposites and their applications, *Journal of Nanoscience and Nanotechnology*, **8** (2008)1559-81.

Fang L., Liang B., Yang G., Hu Y., Zhu Q., Ye X., A needle-type glucose biosensor based on PANI nanofibers and PU/E-PU membrane for long-term invasive continuous monitoring, **97** (2017) 196-202.

Farias R. F. D., Effect of adsorbed PANI on the thermal stability of iron and arsenic oxides, *Quimica Nova*, **23** (2000) 313-315.

Feng X., Cheng H., Pan Y., Zheng H., Development of glucose biosensors based on nanostructured graphene-conducting PANI composite, *Biosensors and Bioelectronics*, **70** (2015) 411-417.

Forsyth R., Devadoss A., Guy O. J., Graphene Field Effect Transistors for Biomedical Applications: Current Status and Future Prospects, *Diagnostics (Basel)*, **7** (2017) E45.

Fryczkowski R., Gorczowska M., Fryczkowska B., Janicki J., The effect of solvent on the properties of nanofibres obtained by electrospinning from a mixture of poly(3-hydroxybutyrate) and polyaniline, *Synthetic Metals*, **166** (2013)14-21.

Fu J., Pang Z., Yang J., Huang F., Cai Y., Wei Q., Fabrication of PANI/carboxymethyl cellulose/cellulosenanofibrous mats and their biosensing application, *Applied Surface Science*, **349** (2015) 35-42.

Fu, J.; Qiao, H.; Li, D.; Luo, L.; Chen, K.; Wei, Q. Laccase biosensor based on electrospun copper/carbon composite nanofibers for catechol detection. *Sensors* **2014**, *14*, 3543-3556.

Fuke M. V., Kanitkar P., Kulkarni M., Kale B. B., Aiyer R.C., Effect of particle size variation of Ag nanoparticles in PANI composite on humidity sensing, *Talanta*, **81** (2010) 320–326.

Gangopadhyay R., De A., Conducting polymer nanocomposites: A brief overview, *Chemical Material*, **12** (2000) 608-622.

Garjonyte R., Malinauskas A., Amperometric glucose biosensors based on Prussian Blue- and PANI-glucose oxidase modified electrodes, *Biosensors and Bioelectronics*, **15** (2000) 445-451.

Gautam V., Singh K. P., Srivastava A., Yadav V. L., Preparation and characterization of polyaniline, multiwall carbon nanotubes and starch bionanocomposite material for potential bioanalytical applications, *Polymer composites*, **38** (2017) 496–506.

Gautam V., Srivastava A., Singh K. P., Yadav V. L., Vibrational and gravimetric analysis of polyaniline/polysaccharide composite materials, *Polymer Science, Series A*, **58** (2016) 206-219.

Ghadimi F., Safa K. D., Massoumi B., Entezami A. A., Polyaniline doped with sulphosalicylic, salicylic and citric acid in solution and solid-state, *Iranian Polymer Journal*, **3** (2002) 1-9.

Ghanbarzadeh S., Hamishehkar H., Application of Graphene and its Derivatives in Cancer Diagnosis and Treatment, *Drug Research journal (Stuttg)*, (2017) doi: 10.1055/s-0042-115638.

Ghatak S., Chakraborty G., Meikap A. K., Woods T., Babu R., Blau W. J., Synthesis and characterization of Polyaniline/Carbon nanotube composites, *Journal of Applied Polymer Science*, **119** (2010) 1016-1025.

Gill E., Arshak A., Arshak K., Korostynska O., pH Sensitivity of Novel PANI/PVB/PS₃ Composite Films, *Sensors*, **7** (2007) 3329-3346.

Giz M. J., Maranhao S. L. A., Torresi R. M., AFM morphological study of electropolymerised polyaniline films modified by surfactant and large anions, *Electrochemistry Communication*, **2** (2000) 377-381.

Goor O. J. G. M., Hendrikse S. I. S., Dankers P. Y. W., Meijer E. W., From supramolecular polymers to multi-component biomaterials, *Chemical Society Review*, **46** (2017) 6621-6637.

Gospodinova N., Terlemezyan L., Conducting Polymers prepared by Oxidative Polymerization: Polyaniline, *Progress in Polymer Science*, **23** (1998) 1443-1484.

Granska M. A., Szostak R., Raman Spectroelectrochemistry of Polyaniline Synthesized Using Different Electrolytic Regimes – Multivariate Analysis, *International Journal of Electrochemical Science*, **8** (2013) 8951-8965.

Green R. A., Baek S., Warren L. A. P., Martens P. J., Conducting polymer-hydrogels for medical electrode applications. *Science and Technology of Advanced Materials*, **11** (2010) 14107–14120.

Guo H., He W., Lu Y., Zhang X., Self-crosslinked PANI hydrogel electrodes for electrochemical energy storage, *Carbon*, **92** (2015) 133-141.

Hall N., Twenty-five years of conducting polymers, *Chemical Communication*, **7** (2003) 1–4.

Harun M. H., Elias S., Kassim A., Yahya N., Mahmud E., Conjugated Conducting Polymers: A Brief Overview, *Journal of the American Statistical Association*, **2** (2007) 62-63.

Hasegawa Y., Inoue Y., Deguchi K., Ohki S., Tansho M., Shimizu T., Yazawa K., Molecular dynamics of a PANI/ β -cyclodextrin complex investigated by ¹³C solid-state NMR *J Phys Chem B*. **116**, 6 (2012),1758-64.

Hatchett D. W., Josowicz M., Janata J., Acid doping of polyaniline: spectroscopic and electrochemical studies, *Journal of Physical Chemistry B*, **103** (1999) 10992-10998.

Helali M. O. H., Ibrahim M., Shafique M. Z., Rahman M. M., Biswas S. K., Islam M. S., Formulation, preparation and preservation of lemon (Citrus limon L.) Cordial, *Journal of Bio-Science*, **16** (2008) 125-127.

Holmberg K., Surfactant-templated nanomaterials synthesis, *Journal of Colloid and Interface Science*, **274** (2004) 355-364.

Holzinger M., Goff A. L., Cosnier S., Nanomaterials for biosensing applications: a review, *Frontiers in Chemistry*, **2** (2014) 1-10.

Homaei A. A., Sariri R., Vianello F., Stevanato R., Enzyme immobilization: an update, *Journal of Biological Chemistry*, **6** (2013) 185-205.

Hong S.Y., Lee Y.H., Park H., Jin S. W., Jeong Y. R., Yun J., You I., Zi G., Ha J. S. Stretchable Active Matrix Temperature Sensor Array of Polyaniline Nanofibers for Electronic Skin, *Advanced Materials*, **28** (2016) 930-935.

Hu Y. F., Zhang Z. H., Zhang H. B., Luo L. J., Yao S. Z., Electrochemical determination of L-phenylalanine at PANI modified carbon electrode based on β -

cyclodextrin incorporated carbon nanotube composite material and imprinted sol-gel film, *Talanta*, **84** (2011) 305-13.

Hua M. Y., Chen C. J., Chen H. C., Tsai R. Y., Cheng W., Cheng C. L., Liu Y. C., Preparation of a Porous Composite Film for the Fabrication of a Hydrogen Peroxide Sensor, *Sensors*, **11**(2011) 5873-5885.

Hua M.Y., Lin Y.C., Tsai R. Y., Chena H.C., Liu Y.C., A hydrogen peroxide sensor based on a horseradish peroxidase/PANI/carboxy-functionalized multiwalled carbon nanotube modified gold electrode, *Electrochimica Acta*, **56** (2011) 9488-9495.

Hua Y., Zhanga Z., Zhanga H., Luo L., Yao S., Electrochemical determination of l-phenylalanine at PANI modified carbon electrode based on -cyclodextrin incorporated carbon nanotube composite material and imprinted sol-gel film, *Talanta*, **84** (2011) 305–313.

Huang J. E., Li X. H., Xu J. C., Li H. L., Well-dispersed single-walled carbon nanotube/Polyaniline composite films, *Carbon*, **41** (2003) 2731-2736

Huang J., Virji S., Weiller B. H., Kaner R.B., Nanostructured PANI sensors, *Chemistry*, **10** (2004)1314-1319.

Huang W. S., MacDiarmid A. G., Optical properties of polyaniline, *Polymer*, **34** (1993) 1833-1845.

Huang W.S., Humphrey B. D., MacDiarmid A. G., Polyaniline, a novel conducting polymer. Morphology and chemistry of its oxidation and reduction in aqueous electrolytes, *Journal of the Chemical Society, Faraday Transactions*, **82** (1986) 2385–2400.

Huang Y. Y., Terentjev E. M., Dispersion of carbon nanotubes: Mixing, sonication, stabilization, and composite properties, *Polymers*, **4** (2012) 275-295.

Huang J., Wan M., Polyaniline doped with different sulfonic acids by in situ doping polymerization, *Journal of Polymer Science (Part A) Polymer Chemistry*, **1999**, 37, 1277-1284.

Hung C. C., Wen T. C., Wei Y., Site-selective deposition of ultra-fine Au nanoparticles on PANI nanofibers for H₂O₂ sensing, *Materials Chemistry and Physics*, **122** (2010) 392–396.

Imato T., Morioka H., Catechol sensor based on ascorbate oxidase immobilized polymer-modified graphite electrode, *Sensors and Actuators B: Chemical*, **13** (1993) 68-72.

Miller J. N. B., *Food Sci. Technol. (New York)*, 113, 603 (2001).

Jabeen N., Xia Q., Yang M., Xia H., Unique Core-Shell Nanorod Arrays with Polyaniline Deposited into Mesoporous NiCo₂O₄ Support for High-Performance Supercapacitor Electrodes *ACS Appl. Mater. Interfaces*, **8** (2016) 6093-6100.

Jamal R., Xu F., Shao W., Abdiryim T., The study on the application of solid-state method for synthesizing the PANI/noble metal (Au or Pt) hybrid materials, *Nanoscale Research Letters*, **8** (2013) 117-125.

Janaki V., Vijayaraghavan K., Oh B.T., Lee K. J., Muthuchelian K., Ramasamy A. K., Kannan S. K., Starch/polyaniline nanocomposite for enhanced removal of reactive dyes from synthetic effluent, *Carbohydrate Polymers*, **90** (2012) 1437-1444.

Janata J., Josowicz M., Conducting polymers in electronic chemical sensors, *Nature Materials*, **2** (2003) 19-24.

Jia B., Zhang W., Preparation and Application of Electrodes in Capacitive Deionization (CDI): a State-of-Art Review, *Nanoscale Research Letters*, **11** (2016) 64.

Kamal H., Elrahim F. M. A., Lotfy S., Characterization and some properties of cellulose acetate-co-polyethylene oxide blends prepared by the use of gamma irradiation, *Journal of Radiation Research and Applied Sciences*, **7** (2014) 146-153.

Kar P., Choudhury A., Carboxylic acid functionalized multi-walled carbon nanotube doped Polyaniline for chloroform sensors, *Sensors and Actuators B*, **183** (2013) 25-33.

Karagiannidis P. G., Hodge S. A., Lombardi L., Tomarchio F., Decorde N., Milana, S., Goykhman I., Su Y., Mesite S. V., Johnstone D. N., Leary R. K., Midgley P. A., Pugno N. M., Torrisi, F., Ferrari A.C., Microfluidization of Graphite and Formulation of Graphene-Based Conductive Inks, *ACS Nano*, **11** (2017) 2742-2755.

Kaur B., Srivastava R., Satpati B., Silver nanoparticle decorated PANI-zeolite nanocomposite material based non-enzymatic electrochemical sensor for nanomolar detection of lindane, *Royal Society of Chemistry Advances*, **5** (2015) 57657.

Khairkar S. R., Raut A. R., Synthesis of Chitosan-graft-PANI-Based Composites, *American Journal of Materials Science and Engineering*, **2** (2014) 62-67.

Khan A. A. P., Khan A., Asiri A.M., Alhogbia B.G., Ashraf G.M., Graphene Oxide based metallic nanoparticles and their some biological and environmental application, *Current Drug Metabolism*, **18** (2017) doi: 10.2174/1389200218666171016100507.

Khan A. R., Dhayal M., Chitosan/PANI hybrid conducting biopolymer base impedimetric immunosensor to detect Ochratoxin, *Biosensors and Bioelectronics*, **24** (2009) 1700-705.

Khan A., Asiri A. M., Rub M. A., Azum N., Khan A. A. P., Khan I., Mondal P. K., Review on composite cation exchanger is interdisciplinary materials in analytical chemistry, *International Journal of Electrochemical Science*, **7** (2012) 3854-3902.

Khan M. J., Husain Q., Ansari S.A., PANI-assisted silver nanoparticles: a novel support for the immobilization of α -amylase, *Applied Microbiology and Biotechnology*, **97** (2013) 1513-1522.

Khare R., Bose S., Carbon nanotube based composites-a review, *Journal of Minerals & Materials Characterization & Engineering*, **4** (2005) 31-46.

Kissinger P. T., Heineman W. R., Cyclic voltammetry, *Journal of Chemical Education*, **60** (1983) 702-706.

Kizil R., Irudayaraj J., Seetharaman K., Characterization of Irradiated Starches by Using FT-Raman and FTIR Spectroscopy, *Journal of Agricultural and Food Chemistry*, **50** (2002) 3912-3918.

Komsiyska L., Tsakova V., Ascorbic Acid Oxidation at Nonmodified and Copper-Modified PANI and Poly-ortho-methoxyaniline Coated Electrodes, *Electroanalysis*, **8** (2006) 807-813.

Kondawar S. B., More A. M., Sharma H. J., Dongre S. P., Ag-SnO₂/PANI composite nanofibers for low operating temperature hydrogen gas sensor, *Journal of materials nanoscience*, **4** (2017) 13-18.

Kostic R., Rakovic D., Davidova I. E., Gribov L. A., Vibrational spectroscopy of the leucoemeraldine form of Polyaniline: Theoretical study, *Physical Review B*, **45** (1992) 728.

Kulkarni S. B., Shaikh B. B. R., Lokhande C. D., Joshi S. S., ZnO/PANI Nanocomposite Thin Films: Room Temperature LPG Sensor, *Journal of Shivaji University (Science & Technology)*, **41** 2014-2015.

Kulkarni M. V., Viswanath A. K., Marimuthu R., Seth, T., Synthesis and characterization of polyaniline doped with organic acids. *Journal of polymer science part A: polymer chemistry* **42** (2004) 2043-2049.

Kumar S. K., Krishnamoorti R., Nanocomposites: Structure, phase behavior, and properties, *Annual Review of Chemical and Biomolecular Engineering*, **1** (2010) 37-58.

Kumar V., Mahajan R., Kaur I., Kim K. H., Simple and Mediator-Free Urea Sensing Based on Engineered Nanodiamonds with PANI Nanofibers Synthesized in Situ, *ACS Applied Material Interfaces*, **9** (2017) 16813-16823.

Kumar V., Patil V., Apte A., Harale N., Patil P., Kulkarni S., Ultrasensitive Gold Nanostar-PANI Composite for Ammonia Gas Sensing, *Langmuir*, **31** (2015) 13247-13256.

Kunzo P., Lobotka P., Kovacova E., Chrissopoulou K., Papoutsakis L., Anastasiadis S.H., Krizanova Z., Vavra I., Nanocomposites of PANI and titania nanoparticles for gas sensors, *Physica Status Solidi A*, **210** (2013) 2341-2347.

Kurbanoglu S., Ozkan S.A., Merkoci A., Nanomaterials-based enzyme electrochemical biosensors operating through inhibition for biosensing applications, *Biosensors and Bioelectronics*, **15** (2017) 886-898.

Lakard B., Magnin D., Deschaume O., Vanlancker G., Glinel K., Demoustier-Champagne S., Nysten B., Jonas A.M., Bertrand, Yunus S., Urea potentiometric enzymatic biosensor based on charged biopolymers and electrodeposited PANI, *Biosensors and Bioelectronics*, **26** (2011) 4139-4145.

Lakshmi D., Bossi A., Whitcombe M.J., Chianella I., Fowler S. A., Subrahmanyam, S., Piletska E. V., Piletsky S. A., Electrochemical Sensor for Catechol and Dopamine Based on a Catalytic Molecularly Imprinted Polymer-Conducting Polymer Hybrid Recognition Element, *Analytical Chemistry*, **81** (2009) 3576-3584.

Lee J. H., Hong H. G., Nonenzymatic electrochemical sensing of hydrogen peroxide based on a PANI-MnO₂ nanofiber-modified glassy carbon electrode, *Journal of Applied Electrochemistry*, **45** (2015) 1153-1162.

Lee T. M. H., Over-the-Counter Biosensors: Past, Present, and Future, *Sensors*, **8** (2008), 5535-5559.

Li D., Huang J., Kaner R.B., PANI nanofibers: a unique polymer nanostructure for versatile applications, *Accounts of Chemical Research*, **42** (2009) 135-45.

Li F., Yang L., Can Zhao C., Du Z., Electroactive gold nanoparticles/PANI/polydopamine hybrid composite in neutral solution as high-performance sensing platform, *Analytical Methods*, **3** (2011) 1601-1606.

Li G., Zheng J., Ma X., Sun Y., Fu J., Wu G., Development of QCM Trimethylamine Sensor Based on Water Soluble Polyaniline, *Sensors (Basel)*, **7** (2007) 2378-2388.

Li R., Guo D., Ye J., Zhang M., Stabilization of Prussian blue with PANI and carbon nanotubes in neutral media for in vivo determination of glucose in rat brains, *Analyst*, **140** (2015) 3746-3752.

Li Y., Zheng J. L., Feng J., Jing X. L., Polyaniline micro-/nanostructures: morphology control and formation mechanism exploration, *Chemical Papers*, **67** (2013) 876-890.

Li, W. G.; Wan, M. Porous polyaniline films with high conductivity. *Synthetic Metals*, **1998**, 92, 121-126.

Liana D. D., Raguse B., Gooding J. J., Chow E., Toward Paper-Based Sensors: Turning Electrical Signals into an Optical Readout System, *ACS Applied Material Interfaces*, **2** (2015) 19201-19209.

Liang J., Wei M., Wang Q., Zhao Z., Liu A., Yu Z., Tian Y., Sensitive Electrochemical determination of Hydrogen Peroxide Using Copper Nanoparticles in a PANI Film on a Glassy Carbon Electrode, *Analytical Letters*, (2017) 10.1080/00032719.2017.1343832.

Lilly R. V., Devaki S. J., Narayanan R. K., Sadanandhan N. K., Design of a nanostructured electromagnetic PANI-keggin iron-clay composite modified electrochemical sensor for the nanomolar detection of ascorbic acid, *Journal of Applied Polymer Science*, (2014), DOI: 10.1002/APP.40936.

Lin Y. F., Chen C. H., Xie W. J., Yang S. H., Hsu C. S., Lin M. T., Jian W. B., Nano approach investigation of the conduction mechanism in PANI nanofibers, *ACS Nano*, **5** (2011) 1541-1548.

Lin, D. D.; Zhang, Z. J.; Zhao, B.Y.; Chen, L.S.; Hu, K. Rapid synthesis of porous polyaniline and its application in electrorheological fluid, *Smart Materials and Structures*, **15** (2006) 1641-1645.

Liu P., Polymer modified clay minerals: A review, *Applied Clay Science*, **38** (2007) 64-76.

Liu Y., Kumar S., Polymer/Carbon Nanotube Nano Composite Fibers—A Review, *ACS Applied Material Interfaces*, **6** (2014). 6069-6087.

Liu M., Li B., Zhou H., Chen C., Liu Y., Liu T., Extraordinary rate capability achieved by a 3D “skeleton/skin” carbon aerogel–polyaniline hybrid with vertically aligned pores, *Chemical Communication*, **53** (2017) 2810-2813.

Lu D.R., Xiao C.M., Xu S.J., Starch-based completely biodegradable polymer materials, *Express Polymer Letters*, **3** (2009) 366-375.

Luo C., Wang Y., Li X., Jiang X., Gao P., Sun K., Zhou J., Zhang Z., Jiang Q., An Optical Sensor with Polyaniline-Gold Hybrid Nanostructures for Monitoring pH in Saliva, *Nanomaterials (Basel)*, **7** (2017) E67.

Lv A., Pan Y., Chi L., Gas Sensors Based on Polymer Field-Effect Transistors, *Sensors (Basel)*, **17** (2017) E213.

Ma X., Gao M., He X., Li G., Morphology tailoring of nano/micro-structured conductive polymers, composites and their applications in chemical sensors, *Recent Patents on Nanotechnology*, **4** (2010)150-63.

Macdiarmid A. G., Chiang J. C., Richter A. F., Epstein A. J., Polyaniline: a new concept in conducting polymers, *Synthetic Metals*, **18** (1987) 285-290.

Magdassi S., Bassa A., Vinetsky Y., Kamyshny A., Silver Nanoparticles as Pigments for Water-Based Ink-Jet Inks, *Chemical Materials*, **15** (2003) 2208–2217.

Mahajana A. P., Kondawara S.B., Mahore R. P., Meshrama B. H., Virutkar P.D., PANI/MnO₂ nanocomposites based stainless steel electrode modified enzymatic urease biosensor, *Procedia Materials Science*, **10** (2015) 699-705.

Maity P. C., Khandelwal M., Synthesis time and temperature effect on polyaniline morphology and conductivity, *American journal of materials synthesis and processing*, **1** (2016) 37-42.

Majumder M., Choudhary R. B., Thakur A. K., Karbhal I., Impact of rare-earth metal oxide (Eu₂O₃) on the electrochemical properties of a polypyrrole/CuO polymeric composite for supercapacitor applications, *RSC Advances*, **7** (2017) 20037-20048.

Mantia F. P. L., Morreale M., Green composites: a brief review composites part-A, *Applied science and manufacturing*, **42** (2011) 579-588.

Mao S., Chang J., Pu H., Lu G., He Q., Zhang H., Two-dimensional nanomaterial-based field-effect transistors for chemical and biological sensing, *Chemical Society Review*, (2017) doi: 10.1039/c6cs00827e.

Martin C. R., Membrane-based synthesis of nanomaterials, *Chemistry of Materials*, **8** (1996) 173-1746.

Mattos I. L. D., Gorton L., Ruzgas T., Sensor and biosensor based on Prussian Blue modified gold and platinum screen printed electrodes, *Biosensors and Bioelectronics*, **18** (2003)193-200.

Matysiak E., Donten M., Kowalczyk A., Bystrzejewski M., Grudzinski I. P., Nowicka A. M., A novel type of electrochemical sensor based on ferromagnetic carbon-encapsulated iron nanoparticles for direct determination of hemoglobin in blood samples, *Biosensors and Bioelectronics*, **64** (2015) 554-559.

Mawad D., Stewart E., Officer D. L., Romeo T., Wagner P., Wagner K., Wallace G. G., A single component conducting polymer hydrogel as a scaffold for tissue engineering, *Advanced Functional Materials*, **22** (2012)2692–2699.

McAuley C. B., Katelhon E., Barnes O., Compton R. G., Laborda E., Molina A., Staircase, cyclic and differential voltammetries of the nine-member square scheme at microelectrodes of any geometry with arbitrary chemical stabilization of the three redox states, *Chemistry Open*, **4** (2015) 224-60.

Mirmohseni A., Dorraji, M. S. S., Hosseini M. G, Influence of metal oxide nanoparticles on pseudocapacitive behavior of wet-spun PANI-multiwall carbon nanotube fibers, *Electrochimica Acta*, **70** (2012) 182-192.

Mitra B. C., Environment friendly composite materials: biocomposites and green composites, *Defence science journal*, **64** (2014) 244-261.

Mittal, A. K.; Chisti, Y.; Banerjee, U. C. Synthesis of metallic nanoparticles using plant extracts, *Biotechnology Advances*, **31** (2013) 346-356.

Miyagawa H., Misra M., Mohanty A. K., Mechanical properties of carbon nanotubes and their polymer nanocomposites, *Journal of Nanoscience and Nanotechnology*, **5** (2005) 1593-615.

Moghaddam A. S., Iranizad E. S., Pumera M., Two-dimensional transition metal dichalcogenide/conducting polymer composites: synthesis and applications, *Nanoscale*, **9** (2017) 8052-8065.

Moghaddam M. G., Eslahi H., Synthesis, characterization and antibacterial properties of a novel nanocomposite based on PANI/polyvinyl alcohol/Ag, *Arabian Journal of Chemistry*, **7** (2014) 846–855.

Moiseev Y. V., Khalturin N. A., Zaikov G. E., The mechanism of the acid-catalysed hydrolysis of glycosides, *Carbohydrate research*, **51** (1976), 23-37.

Molapo K. M., Ndangili P. M., Ajayi R. F., Electronics of conjugated polymers (I): polyaniline, *International Journal of Electrochemical Science*, **7** (2012) 11859-11875.

Montilla F., Cotarelo M. A., Morallon E., Hybrid sol-gel conducting polymer synthesised by electrochemical insertion: tailoring the capacitance of polyaniline., *Journal of Materials Chemistry*, **19** (2009) 305-310.

Mousty C., Sensors and biosensors based on clay-modified electrodes—new trends, *Applied Clay Science*, **27** (2004) 159-177.

Mu, S. Catechol sensor using poly(aniline-co-o-aminophenol) as an electron transfer mediator, *Biosensors and Bioelectronics*, **21** (2006) 1237-1243.

Muralikrishna S., Nagaraju D. H., Balakrishna R. G., Surareungchai W., Ramakrishna T., Shivanandareddy A. B., Hydrogels of PANI with graphene oxide for highly sensitive electrochemical determination of lead ions, *Analytica Chimica Acta*, **990** (2017) 67-77.

Nambiar S., Yeow J. T., Conductive polymer-based sensors for biomedical applications, *Biosensors and Bioelectronics*, **15** (2011) 1825-32.

Narang J., Chauhan N., Pundir C. S., A non-enzymatic sensor for hydrogen peroxide based on PANI, multiwalled carbon nanotubes and gold nanoparticles modified Au electrode, *Analyst*, **136** (2011) 4460-4466.

Nascimento G. M. D., Temperini M. L. A., Studies on the resonance raman spectra of polyaniline obtained with near-IR excitation, *Journal of Raman Spectroscopy*, **39** (2008) 772-778.

Naseem, A. R.; Deshpande, R.; Somani, S. P.; Chakaney, S. D.; Saptarshi, P. G.; Somani, P. R.; Environment-Friendly Synthesis of Nano-Structured Conducting Polyaniline Using Lemon Juice, *Journal of Green Science and Technology*, **1** (2014) 127-130.

Nawaz M. A., Rauf S., Catanante G., Nawaz M. H., Nunes G., Marty J. L., Hayat A., One Step Assembly of Thin Films of Carbon Nanotubes on Screen Printed Interface for Electrochemical Aptasensing of Breast Cancer Biomarker, *Sensors (Basel)* **6** (2016) 1651-1627.

Nazari M., Kashanian S., Rafipour R., Laccase immobilization on the electrode surface to design a biosensor for the detection of phenolic compound such as catechol, *Spectrochimica Acta Part A: Molecular and biomolecular spectroscopy*, **145** (2015)130-138.

Nie Q., Pang Z., Lu H., Cai Y., Wei Q., Ammonia gas sensors based on In₂O₃/PANI mhetero-nanofibers operating at room temperature, *Journal of Nanotechnology*, **7** (2016) 1312–1321.

Norfun p., Arqueropanyo O., Liawruangrath S., Ounnunkad K., Electrochemical Flow Injection Determination of Ascorbic Acid in Fruit Samples Employing a Graphene-PANI Electrode, *International Journal of Chemical Engineering and Applications*, **7** (2016) 142-145.

Oja S. M., Fan Y., Armstrong C. M., Defnet P., Zhang B., Nanoscale electrochemistry revisited, *Analytical Chemistry*, **88** (2016) 414-430.

Olad A., Ilghami F., Nosrati R., Surfactant-assisted synthesis of polyaniline nanofibres without shaking and stirring: effect of conditions on morphology and conductivity, *Chemical Papers*, **66** (2012) 757-764.

Omara W., Amin R., Elhaes H., Ibrahim M., Elfeky S.A., Preparation and Characterization of Novel Polyaniline Nanosensor for Sensitive Detection of Formaldehyde, *Recent Pat Nanotechnology*, **9** (2015) 195-203.

Oueiny C., Berlioz S., Perrin F. X., Carbon nanotube–PANI composites, *Progress in Polymer Science*, **39** (2014) 707-748.

Ozdemir C., Yeni F., Odaci D., Timur S., Electrochemical glucose biosensing by pyranose oxidase immobilized in gold nanoparticle-PANI/AgCl/gelatin nanocomposite matrix, *Food Chemistry*, **119** (2010) 380-385.

Ozerol E. A., Bozdogan, A. C., Senkal B. F., Okutan M., The effect on the impedance characteristics of the metal oxides (Al_2O_3 and ZnO) doping into PANI, *Materials Science in Semiconductor Processing*, **56** (2016) 357-361.

Pahimanolis N., Salminen A., Penttila P. A., Korhonen J. T., Johansson L. S., Ruokolainen J., Serima R., Seppala J., Nanofibrillated cellulose/carboxymethyl cellulose composite with improved wet strength, *Cellulose*, **20** (2013) 1459-1468.

Pakapongpan S., Mensing J. P., Phokharatkul D., Lomas T., Tuantranont A., Highly selective electrochemical sensor for ascorbic acid based on a novel hybrid graphene-copper phthalocyanine-PANI nanocomposites, *Electrochimica Acta*, **133** (2014) 294-301.

Pana L., Yub G., Zhai D., Lee H. R., Zhaod W., Liue N., Wangd H., Tee B. C. K., Shi Y., Cui Y., Bao Z., Hierarchical nanostructured conducting polymer hydrogel with high electrochemical activity, *Proceedings of the National Academy of Sciences of the United States of America*, **109** (2012) 9287-9292.

Pandey P., Singh S. P., Arya S. K., Sharma A., Datta M., Malhotra B. D., Gold Nanoparticle-PANI Composite Films for Glucose Sensing, *Journal of Nanoscience and Nanotechnology*, **8** (2008) 1-6.

Pandey S., Ramontja J., Rapid, facile microwave-assisted synthesis of xanthan gum grafted PANI for chemical sensor, *International Journal of Biological Macromolecule*, **89** (2016) 89-98.

Pang Z., Nie Q., Lv P., Yu J., Huang F., Wei Q., Design of flexible PANI-coated nanofibers with high ammonia sensing response values, *Nanotechnology*, **28** (2017) 225501.

Park H., Jeong Y. R., Yun J., Soo Yeong Hong S. Y., Jin S., Lee S. J., Zi G., Ha J. S., Stretchable Array of Highly Sensitive Pressure Sensors Consisting of PANI Nanofibers and Au-Coated Polydimethylsiloxane Micropillars, *American Chemical Society Nano*, **9** (2015) 9974-9985.

Park S., Kang Y. J., Majd S., A review of patterned organic bioelectronic materials and their biomedical applications, *Advanced Materials*, **27** (2015) 7583-7486.

Pasqui D., Torricelli P., De C. M., Fini M., Barbucci R., Carboxymethyl cellulose-hydroxyapatite hybrid hydrogel as a composite material for bone tissue engineering applications, *Journal of Biomedical Materials Research part A*, **102** (2014) 1568-1579.

Pavlidou S., Papaspyrides C. D., A review on polymer-layered silicate nanocomposites, *Progress in Polymer Science*, **33** (2008) 1119-1198.

Pawlak A., Mucha M., Thermogravimetric and FTIR studies of chitosan blends, *Thermochimica Acta*, **396** (2003) 153-166.

Peng H., Ma G., Ying W., Wang A., Huang H., Lei Z., In situ synthesis of polyaniline/sodium carboxymethyl cellulose nanorods for high-performance redox supercapacitors, *Journal of Power Sources*, **211** (2012) 40-45.

Pillay V., Tsai T. S., Choonara Y. E., Du T. L. C., Kumar P., Modi G., Naidoo D., Tomar L. K., Tyagi C., Ndesendo V. M., A review of integrating electroactive polymers as responsive systems for specialized drug delivery applications, *Journal of Biomedical Materials Research*, **102** (2014) 2039-2054.

Poppinga S., Zollfrank C., Prucker O., Rhe J., Menges A., Cheng T., Speck T., Toward a New Generation of Smart Biomimetic Actuators for Architecture, *Advance Materials*, (2017), doi: 10.1002/adma.201703653.

Porter T. L., Thompson D., Bradley M., Nanometer-scale structure of hectorite–aniline intercalates, *Journal of Vacuum Science & Technology A: Vacuum, Surfaces, and Films* **15**, **500** (1997); <https://doi.org/10.1116/1.580880>.

Prakash R., Electrochemistry of polyaniline: Study of the pH effect and electrochromism, *Journal of Applied Polymer Science*, **83** (2002) 378-385.

Pruna A., Branzoi V., Branzoi F., Application of template-based polyaniline nanotubes synthesized in anodic porous alumina, *Revue Roumaine de Chimie*, **55** (2010) 293-298.

Pud A. A., Nikolayeva O. A., Vretik L. O., Noskov Y.V., Ogurtsov N. A., Kruglyak O. S. Fedorenko E. A., New nanocomposites of polystyrene with PANI doped with lauryl sulfuric acid, *Nanoscale Research Letters*, **12** (2017) 1-11.

Qaiser A. A., Hyland M. M., Patterson D. A., Surface and charge transport characterization of polyaniline-cellulose acetate composite membranes, *Journal of Physical Chemistry B*, **115** (2011) 1652-1661.

Qazi T.H., Rai R., Boccaccini A.R., Tissue engineering of electrically responsive tissues using PANI based polymers: a review, *Biomaterials*, **35** (2014) 9068-86.

Qiu J.D., Shi L., Liang R. P., Wang G.C., Xia X. H., Controllable Deposition of a Platinum Nanoparticle Ensemble on a PANI/Graphene Hybrid as a Novel Electrode Material for Electrochemical Sensing, *Chemical. European. Journal*, **18** (2012) 7950-7959.

Qiu X., Hu S., “Smart” materials based on cellulose: a review of the preparations, properties, and applications, *Material*, **6** (2013) 738-781.

Qu F., Yang M., Jiang J., Shen G., Yu R., Amperometric biosensor for choline based on layer-by-layer assembled functionalized carbon nanotube and PANI multilayer film, *Analytical Biochemistry*, **344** (2005) 108-114.

Radhakrishnan R., Suni I. I., Bever C. S., Bruce D., Hammock Impedance Biosensors: Applications to Sustainability and Remaining Technical Challenges, *ACS Sustain Chemistry and Engineering*, **2** (2014) 1649-1655.

Radhakrishnan S., Krishnamoorthy K., Sekar C., Wilson J., Kim S. J., A promising electrochemical sensing platform based on ternary composite of PANI–Fe₂O₃–reduced graphene oxide for sensitive hydroquinone determination, *Chemical Engineering Journal*, **259** (2015) 594–602.

Radhapyari K., Khan R., Biosensor for the selection of selective anticancer drug gemcitabine based on PANI-gold nanoparticles, *Advance Material Letter*, **6** (2015) 13-18.

Radhapyari K., Kotoky P., R. Das M. R., Khan R., Graphene–PANI nano composite based biosensor for detection of antimalarial drug artesunate in pharmaceutical formulation and biological fluids, *Talanta*, **111** (2013) 47-53.

Rahemi V., Garrido J. M. P. J., Borges F., Brett C. M. A., Garrido E. M. P. J., Electrochemical sensor for simultaneous determination of herbicide MCPA and its metabolite 4-chloro-2-methylphenol, Application to photodegradation environmental-monitoring, *Environental Science of Pollution Resources* **22** (2015) 4491-4499.

Rahemi V., Vandamme J. J., Garrido J. M., Borges F., Brett C. M., Garrido E. M., Enhanced host-guest electrochemical recognition of herbicide MCPA using a β -cyclodextrin carbon nanotube sensor, *Journal of Physical Chemistry B*, **116** (2012) 1758-1764.

Rahman M. M., Khan A., Hadi M., H. M., Asiri A. M., Hydrazine sensor based on silver nanoparticle-decorated PANI tungstophosphate nanocomposite for use in environmental remediation, *Microchimical Acta*, **183** (2016) 1787-1796.

Rana U., Chakrabarti L., Malik S., Benzene tetracarboxylic acid doped PANI nanostructures: morphological, spectroscopic and electrical characterization, *Journal of Materials Chemistry*, **22** (2012) 15665-15671.

Rao P. S., Anand J., Palaniappan S.P., Sathyanarayana D. N., Effect of sulphuric acid on the properties of polyaniline-HCl salt and its base, *European polymer journal*, **36** (2000) 915-921.

Ravichandran R., Sundarrajan S., Venugopal J. R., Mukherjee S., Ramakrishna S., Applications of conducting polymers and their issues in biomedical engineering, *Journal of the Royal Society Interface*, **7** (2010) 559-S579.

Ravikiran Y. T., Kotresh S., Vijayakumari S. C., Thomas S., Liquid petroleum gas sensing performance of polyaniline carboxymethyl cellulose composite at room temperature, *Current applied physics*, **14** (2014) 960-964.

Rawal R., Chawla S., Devender, Pundir C.S., An amperometric biosensor based on laccase immobilized onto Fe₃O₄NPs/cMWCNT/PANI/Au electrode for determination of phenolic content in tea leaves extract, *Enzyme and Microbial Technology*, **51** (2012) 179-185.

Rawal R., Chawla S., Pundir C.S., Polyphenol biosensor based on laccase immobilized onto silver nanoparticles/multiwalled carbon nanotube/PANI gold electrode, *Analytical Biochemistry*, **419** (2011) 196-204.

Rawal R., Chawla S., Chauhan N., Dahiya T., Pundir C. S., Construction of amperometric uric acid biosensor based on uricase immobilized on PBNPs/cMWCNT/PANI/Au composite. *International Journal of Biological Macromolecule*, **50** (2012)112-118.

Reetu P., Kumar D., Effect of Preparation Conditions on the Conductivity of PANI Impregnated Polyacrylate Conducting Hydrogel, *Journal of Nanoscience and Nanotechnology*, **17** (2017) 5008-5014.

Ren X., Ma H., Zhang T., Zhang Y., Yan T., Du B., Wei Q., Sulfur-Doped Graphene-Based Immunological Biosensing Platform for Multianalysis of Cancer Biomarkers, *ACS Applied Material Interfaces*, DOI: 10.1021/acsami.7b13416.

Ricci F., Palleschi G., Sensor and biosensor preparation, optimisation and applications of Prussian blue modified electrodes, *Biosensors and Bioelectronics*, **21** (2005) 389-407.

Rivero O., Sanchis C., Huerta F., Morallon E., On the catalytic oxidation of ascorbic acid at self-doping polyaniline films, *Physical Chemistry Chemical Physics*, **14** (2012)10271-10278.

Roya A. K., Nisha V. S., Dhanda C., Malhotra B.D., Molecularly imprinted polyaniline film for ascorbic acid detection, *Journal of Molecular Recognition*, **24** (2011) 700-706.

Saberi R. S., Shahrokhian S., Marrazza G., Amplified Electrochemical DNA Sensor Based on PANI Film and Gold Nanoparticles, *Electroanalysis*, **25** (2013) 1373-1380.

Sabzi R. E., Rezapour K., Samadi N., Polyaniline-multiwalled carbon nanotube nanocomposites as a dopamine sensor, *Journal of Serbian chemical Society*, **75** (2010) 537-549.

Sadeghi S., Fooladi E., Malekaneh M., A New Amperometric Biosensor Based on Fe₃O₄/ PANI/Laccase/Chitosan Biocomposite-Modified Carbon Paste Electrode for determination of Catechol in Tea Leaves, *Applied Biochemical and Biotechnology*, **175** (2015) 1603-1616.

Saikia J. P., Banerjee S., Konwar B. K., Kumar A., Biocompatible novel Starch/Polyaniline composites: Characterization, anti-cytotoxicity and antioxidant activity, *Colloids and Surfaces B: Biointerfaces*, **81** (2010) 158-164.

Sanjay P.N., Gayithri K.C., Kumar S. K. N, Krishna V., Prasad D. J., TiO₂-PANI based anti-typhi immobilized nanosensor for salmonella typhi detection, *Materials Today: Proceedings*, **3** (2016) 1772-1777.

Santana A. C. O., Southgate E. F., Mendes J.P. B.G., Dweck J., Alhadeff E. M., Ramirez N. I. B., Characterization of an hrp-aox-PANI-graphite composite biosensor, *Journal of Electrochemical Science and Engineering*, **4** (2014) 165-175.

Sapurina I., Stejskal J., The mechanism of the oxidative polymerization of aniline and the formation of supramolecular Polyaniline structures, *Polymer International*, **57** (2008) 1295-1325.

Sarma A.K., Vatsyayan P., Goswami P., Minter S. D., Recent advances in material science for developing enzyme electrodes, *Biosensors and Bioelectronics*, **24** (2009) 2313-2322.

Sathiyam A., Merlin J. P., Electrochemical sensing of Dopamine using PANI/Copper Nano Composite, *Journal of Advanced Chemical Sciences*, **3** (2017) 462-464.

Saxena V., Malhotra, B. D., Menon R., Charge transport and electrical properties of doped conjugated polymers. In Handbook of Polymers in Electronics; Malhotra, B.D., Ed.; Rapra Technology Limited: Shrewsbury, Shropshire, UK, (2002) 3-65.

Scheller F. W., Yarman A., Bachmann T., Hirsch T., Kubick S., Renneberg R., Schumacher S., Wollenberger U., Teller C., Bier F. F., Future of biosensors: a personal view, *Advances in Biochemical Engineering and Biotechnology*, **140** (2013) doi: 10.1007/10_2013_251.

Sedaghat S., Synthesis and characterization of new biocompatible copolymer: chitosan-graft-polyaniline, *Sedaghat International Nano Letters*, **4** (2014) 1-6.

Sen T., Mishra S., Shimpi N. G., Synthesis and sensing applications of polyaniline nanocomposites: a review, *RSC Advances*, **6** (2016) 42196-42222.

Sethuraman V., Muthuraja P., Manisankar P., Fabrication of an efficient polyaniline–polyphenol oxidase based biosensor for catechol, *Analytical Methods*, **5** (2013) 6523-6530.

Shahadat M., Khan M. Z., Rupani P. F., Embrandiri A., Sultana S., Ahammad S. Z., Wazed A. S., Sreekrishnan T. R., A critical review on the prospect of PANI-grafted biodegradable nanocomposite, *Advanced Colloid Interface Science*, **8686** (2017) 30317-30322.

Shan S J., Zhao y.,Tang H., Cui F. Y., A Mini-review of Carbonaceous Nanomaterials for Removal of Contaminants from Wastewater, *IOP Conf. Series: Earth and Environmental Science*, **68** (2017) 012003.

Sharaf S., Abd El-Hady A. E. M. M., Farouk A., Development of a novel conductive CMC\PANI hydrogel, *International Journal of Current Research*, **7** (2015)17366-17370.

Sharma R., Malik R., lamba S., Annapoorani S., Metal oxide/PANI nanocomposites: Cluster size and composition dependent structural and magnetic properties, *Bulletin Material Science*, **31** (2008) 409–413.

Shi Y., Pan L., Liu B., Wang Y., Cui Y., Bao Z., Yu G., Nanostructured conductive polypyrrole hydrogels as high-performance, flexible supercapacitor electrodes, *Journal of Materials Chemistry A*, **2** (2014) 6086–6091.

Shi Z., Gao X., Ullah M. W., Li S., Wang Q., Yang G., Electroconductive natural polymer-based hydrogels, *Biomaterials*, **11** (2016) 40-54.

Shirsat M. D, Mangesh A. Bangar M. A., Deshusses M. A., Myung N.V., Mulchandani A., PANI nanowires-gold nanoparticles hybrid network based chemiresistive hydrogen sulfide sensor, *Applied Physics Letters*, **94** (2009), 083502.

Shukla S. K., Minakshi V., Bharadavaja A., Shekhar A., Tiwari A., Fabrication of electro-chemical humidity sensor based on zinc oxide/PANI nanocomposites, *Advanced Materials Letters*, **3** (2012) 421-425.

Shukla S. K., Singh N. B., Rastogi R. P., Efficient ammonia sensing over zinc oxide/PANI nanocomposite, *Indian Journal of Engineering & Materials Sciences*, **20** (2013) 319-324.

Shukla S. K., Turner A. P., Tiwari A., Cholesterol Oxidase Functionalised PANI/Carbon Nanotube Hybrids for an Amperometric Biosensor, *Journal of Nanoscience and Nanotechnology*, **15** (2015)3373-3377.

Sies H., Hydrogen peroxide as a central redox signaling molecule in physiological oxidative stress: Oxidative eustress, *Redox Biology*, **11** (2017) 613-619.

Silva J. E. P., Temperini M. L. A., Torresi S. I. D., Characterization of conducting polyaniline blends by resonance Raman spectroscopy, *Journal of the Brazilian Chemical Society*, **16** (2005) 322-327.

Silva J. S., De B. A, Constantino C. J., Simoes F. R., Ferreira M., Layer-by-layer films based on carbon nanotubes and PANI for detecting 2-chlorophenol, *Journal of Nanoscience and Nanotechnology*, **14** (2014)6586-6592.

Silverstein R. M., Webster F. X., Kiemle D., Bryce D. L., Spectrometric Identification of Organic Compounds, 8th Edition, *John, (2014) Wiley and Sons, INC.*

Singh R. P., Tiwari A., Pandey A. C., Inorg J., Silver/PANI Nanocomposite for the Electrocatalytic Hydrazine Oxidation, *Organomet Polymer*, **21** (2011) 788-792.

Singh V., Mohan S., Singh G., Pandey P.C., Prakash R., Synthesis and characterization of PANI–carboxylated PVC composites: Application in development of ammonia sensor, *Sensors and Actuators B*, **132** (2008) 99-106.

Sk M. M., Yue C. Y., Synthesis of polyaniline nanotubes by self-assembly behavior of vitamin C: A mechanistic study and its application in electrochemical supercapacitor, *Journal of Materials Chemistry A*, **2** (2014) 2830-2838.

Song E., Choi J. W., Conducting polyaniline nanowire and its applications in chemiresistive sensing, *Nanomaterials*, **3** (2013) 498-523.

Song E., Choi J. W., Conducting PANI Nanowire and Its Applications in Chemiresistive Sensing, *Nanomaterials (Basel)*, **3** (2013) 498-523.

Song E., Choi J.W., A selective hydrogen peroxide sensor based on chemiresistive PANI nanowires modified with silver catalytic nanoparticles, *Journal of Micromechanics and Microengineering*, **24** (2014) 065004.

Song K., Zhang Y., Meng J., Green E. C., Tajaddod N., Li H., Minus M. L., Structural Polymer-Based Carbon Nanotube Composite Fibers: Understanding the Processing-Structure-Performance Relationship, *Materials*, **6** (2013) 2543-2577.

Song M. J., Kim J. H., Lee S. K., Lee J. H., Lim D. S., Hwang S. W., Whang D., Pt-PANI nanocomposite on boron-doped diamond electrode for amperometric biosensor with low detection limit, *Microchimica Acta*, **171** (2010) 249-255.

Song S., Xu H., Fan C., Potential diagnostic applications of biosensors: current and future directions, *International Journal of Nanomedicine*, **1** (2006) 433-440.

Souto J., Mendez M. L. R., Gonzalez J. S., Saja A. J., *Thin Solid Films* **1996**, *284*, 888.

Spain E., Kojima R., Kaner R.B., Wallace G.G., O'Grady J., Lacey K., Barry T., Keyes T.E., Forster R.J., High sensitivity DNA detection using gold nanoparticle functionalized PANI nanofibres, *Biosensors and Bioelectronics*, **26** (2011) 2613-2618.

Sridhar B. C., Sasikala M., Husain J., Pradeep M. V. N., Prasad A., Synthesis, characterization, electrical and sensor behavior of PANI/In₂O₃ nano composites, *Ferroelectrics*, **502** (2016) 159-169.

Srikanth V. V., Ramana G. V., Kumar P. S., Perspectives on State-of-the-Art Carbon Nanotube/PANI and Graphene/PANI Composites for Hybrid Supercapacitor Electrodes, *Journal Nanoscience Nanotechnology*, **16** (2016) 2418-2424.

Srivastava M., Srivastav S. K., Nirala N. R., Prakash R., A chitosan-based PANI–Au nanocomposite biosensor for determination of cholesterol, *Analytical Methods*, **6** (2014) 817-824.

Stasyuk N., Smutok O., Gayda G., Vus B., Koval chuk Y., Gonchar M., Bi-enzyme L-arginine-selective amperometric biosensor based on ammonium-sensing PANI-modified electrode, *Biosensors and Bioelectronics*, **37** (2012) 46-52.

Stephen M., Phillips G. O., Williams P. A., Food Polysaccharides and Their Applications. Taylor & Francis Group 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL, 33487 (2006).

Stradiotto N. R., Yamanaka H., Zanoni M. V. B., Electrochemical Sensors: A Powerful Tool in Analytical Chemistry, *Journal of the Brazilian Chemical Society*, **14** (2003) 159-173.

Suea N. A., Rattananat P., Wongravee K., Chailapakul O., Art M. S., Droplet-based glucosamine sensor using gold nanoparticles and PANI-modified electrode, *Talanta* **158** (2016) 134-141.

Sun C., Deng N., An H., Cui H., Zhai J., Electrocatalytic reduction of bromate based on Pd nanoparticles uniformly anchored on PANI/SBA-15, *Chemosphere*, **141** (2015) 243-249.

Sun W., Gong S., Shi F., Cao L., Ling L., Zheng W., Wang W., Direct electrochemistry and electrocatalysis of hemoglobin in graphene oxide and ionic liquid composite film, *Materials Science and Engineering C*, **40** (2014) 235-241.

Sun Y., Du H., Lan Y., Wang W., Liang Y., Feng C., Yang M., Preparation of hemoglobin (Hb) imprinted polymer by Hb catalyzed eATRP and its application in biosensor, *Biosensors and Bioelectronics*, **77** (2016) 894-900.

Supri A. G., Young H. C., Conductive Polymer Based on Polyaniline-Eggshell Powder (PANI-ESP) Composites, *Journal of Physical Science*, **21** (2010) 81–97.

Suvarnaphaet P., Pechprasarn S., Graphene-Based Materials for Biosensors: A Review, *Sensors (Basel)*, **17** (2017) E2161.

Svancara I., Vytras K., Kalcher K., Walcarius A., Wang J., Carbon paste electrodes in facts, numbers and notes: A review on the occasion of the 50-years jubilee of carbon paste in electrochemistry and electroanalysis, *Electroanalysis*, **21** (2009) 7-28.

Swain S. R., Jena I., Polymer/Carbon Nanotube Nanocomposites: A Novel Material, *Asian Journal of Chemistry*, **22** (2010) 1-15.

Syed A. A., Dinesan M. K., Review: PANI-A novel polymeric material, *Talanta*, **38** (1991) 815-37.

Tamer U., Seckin A. I., Temur E., Torul H., Fabrication of Biosensor Based on PANI/Gold Nanorod Composite, *International Journal of Electrochemistry*, (2011) 1-8. Article ID 869742

Tan Y., Guo X., Zhang J., Kan J., Amperometric catechol biosensor based on polyaniline–polyphenol oxidase, *Biosensors and Bioelectronics*, **25** (2010) 1681-1687.

Tang Q., Wu J., Sun H., Lin J., Fan S., Hu D., PANI/polyacrylamide conducting composite hydrogel with a porous structure, *Carbohydrate Polymers*, **74** (2008) 215-219.

Tang L., Zeng G., Liu J., Xu X., Zhang Y., Shen G., Li Y., Liu C., Catechol determination in compost bioremediation using a laccase sensor and artificial neural networks, *Analytical and Bioanalytical Chemistry*, **391** (2008) 679-685.

Tembe, S.; Chaudhari, P. S.; Bhoraskar, S. V.; S. F. D'Souza, S. F.; Meena S. Karve, M. S.; Conductivity-Based Catechol Sensor Using Tyrosinase Immobilized in Porous Silicon, *IEEE Sensors journal*, **8** (2008) 1593-1597.

Tester R. F., Karkalas J., Polysaccharides. II. Polysaccharides from Eukaryotes, *Biopolymers*, **6** (2002) 381-438.

Thangarathinavelu M., Tripathi A. K., Goel T. C., Varma I. K., PANI and other polymers Preparation and Characterization of PANI-PVC Polymer Composite Film, *Journal of Applied Polymer Science*, **51** (1994) 1347-1349.

Tian S., Liu J., Zhu T., Knoll W., PANI/Gold Nanoparticle Multilayer Films: Assembly, Properties, and Biological Applications, *Chemical. Materials*, **16** (2004) 4103-4108.

Tiwari A., Singh V., Synthesis and characterization of electrical conducting chitosan-graft-PANI, *Polymer Letters*, **1** (2007) 308-317.

Tiwari I., Singh K. P., Composite materials based on ormosil for the construction of electrochemical sensors and biosensors, *Russian Journal of General Chemistry*, **82** (2012) 157-167.

Tiwari I., Singh K. P., In Situ Synthesis of Polymer Nanocomposites from PANI/PAA/MWCNTs: Analysis and Characterization, *International Journal of Polymer Analysis and Characterization*, **17** (2012) 371-380.

Tiwari I., Singh K. P., Singh M., An insight review on the application of polymer-carbon nanotubes based composite material in sensor technology, *Russian journal of general chemistry*, **79** (2009) 2685-2694.

Tiwari I., Singh K. P., Singh M., Banks C. E., PANI/polyacrylic acid/multi-walled carbon nanotube modified electrodes for sensing ascorbic acid, *Analytical. Methods*, **4** (2012), 118-124.

Tiwari I., Singh K. P., Singh M., Upadhyay B. C., Tripathi V. S., A novel amperometric hydrogen peroxide biosensor based on horseradish peroxidase incorporated in organically modified sol-gel glass matrix/graphite paste with multiwalled carbon nanotubes, *Analytical Letters*, **43** (2010) 2019-2030.

Tran H. D., D Arcy J. M., Wang Y., Beltramo P. J., Strong V. A., Kaner R. B., The Oxidation of Aniline to Produce “PANI”: A Process Yielding Many Different Nanoscale Structures, *The Journal of Materials Chemistry*, **21** (2011) 3534–3550.

Tsai T. S., Pillay V., Choonara Y. E., Toit L. C. D., Modi G., Naidoo D., Kumar P., A Polyvinyl Alcohol-PANI Based Electro-Conductive Hydrogel for Controlled Stimuli-Actuable Release of Indomethacin, *Polymers*, **3** (2011) 150-172.

Uppalapati D., Boyd B. J., Garg S., Sejdic J. T., Svirskis D., Conducting polymers with defined micro- or nanostructures for drug delivery, *Biomaterials*, **111** (2016) 149-162.

Vaghela C., Kulkarni M., Haram S., Karve M., Aiyer R., Biopolymer-PANI Composite for a Wide Range Ammonia Gas Sensor, *IEEE Sensors Journal*, **16** (2016) 4318 - 4325.

Vaghela C., Kulkarni M., Karve M., Aiyer R., Haram S., Agarose-guar gum assisted synthesis of processable PANI composite: morphology and electro-responsive characteristics, *Royal Society of Chemistry Advances*, **4** (2014) 59716-59725.

Valentin N. P., Carbon nanotubes: Properties and Applications, *Materials Science and Engineering*, **43** (2004) 61-102.

Venkatesana J., Ryua B., Sudha P. N., Kim S. K., Preparation and characterization of chitosan-carbon nanotube scaffolds for bone tissue engineering, *International Journal of Biological Macromolecules*, **50** (2012) 393-402.

Vijayakumar B., Anjana K. O., Rao G. R., PANI/clay Nanocomposites: Preparation, Characterization and Electrochemical Properties, *Materials Science and Engineering*, **73** (2015) 1-10.

Volder M. F. D., Tawfick S. H., Baughman R.H., Hart A. J., Carbon nanotubes: present and future commercial applications, *Science*, **339** (2013) 535-539.

Vytras K., Svancara I., Metelka R., Carbon paste electrodes in electroanalytical chemistry, *Journal of Serbian Chemical Society*, **74** (2009) 1021-1033.

Wadea T. L., Wegrowe J. E., Template synthesis of nanomaterials, *European Physical Journal Applied Physics*, **29** (2005) 3-22.

Wan M. A., Template-Free Method Towards Conducting Polymer Nanostructures, *Advance Materials*, **20** (2008) 2926-2932.

Wan D., Yuan S., Li G. L., Neoh K. G., Kang E. T., Glucose Biosensor from Covalent Immobilization of Chitosan-Coupled Carbon Nanotubes on PANI-Modified Gold Electrode, *Applied materials and interface*, **2** (2010) 3083-3091.

Wang J., Bunimovich Y. L., Sui G., Savvas S., Wang J., Guo Y., Heath J. R., Tseng H. R., Electrochemical fabrication of conducting polymer nanowires in an integrated microfluidic system, *Chemical Communication*, **29** (2006) 3075-3077.

Wang F., Yang C., Duan M., Tang Y., Zhu J., TiO₂ nanoparticle modified organ-like Ti₃C₂ MXene nanocomposite encapsulating hemoglobin for a mediator-free biosensor with excellent performances, *Biosensors and Bioelectronics*, **74** (2015) 1022-1028.

Wang J., Chan S., Carlson R.R., Luo Y., Ge G., Ries R. S., Heath J. R., Tseng, H. R., Electrochemically fabricated PANI nanoframework electrode junctions that function as resistive sensors, *Nano Letters*, **4** (2004) 1693-1697.

Wang J., Kong Z., Lv K., Teng C., Zhu Y., Conducting-Polymer-Based Materials for Electrochemical Energy Conversion and Storage, *Advance Materials*, (2017), doi: 10.1002/adma.201703044.

Wang J., Somasundaran P., Adsorption and conformation of carboxymethyl cellulose at solid-liquid interfaces using spectroscopic, AFM and allied techniques, *Journal of Colloid and Interface Science*, **291** (2005) 75-83.

Wang J., Wang X., Tang H., Gao Z., He S., Li J., Han S., Ultrasensitive electrochemical detection of tumor cells based on multiple layer CdS quantum dots-functionalized

polystyrene microspheres and graphene oxide-PANI composite, *Biosensors and Bioelectronics*, **100** (2018) 1-7.

Wang M., Duan X., Xu Y., Duan X., Functional Three-Dimensional Graphene/Polymer Composites, *ACS Nano*, **10** (2016) 7231-7247.

Wang T., Farajollahi M., Choi Y. S., Lin I. T., Marshall J. M., Thompson N. M., Kar-Narayan S. K., Madden J. D.W., Smoukov S. K., Electroactive polymers for sensing, *Interface Focus*, **6** (2016): 20160026, DOI: 10.1098/rsfs.2016.0026.

Wang X., Zou L., Fu H., Xiong Y., Tao Z., Zheng J., Li X., Noble Metal-Free Oxygen Reduction Reaction Catalysts Derived from Prussian Blue Nanocrystals Dispersed in PANI, *ACS Applied Material Interfaces*, **8** (2016) 8436-8444.

Wang Y., Jin J., Yuan C., Zhang F., Ma L., Qin D., Shana D., Lu X., A novel electrochemical sensor based on zirconia/ordered macroporous PANI for ultrasensitive detection of pesticides, *Analyst*, **140** (2015) 560-566.

Wang X., Sun T., Wang C., Wang C., Zhang W., Wei Y., ¹H NMR Determination of the doping level of doped polyaniline. *Macromol. Chem. Phys.* **2010**, 211, 1814-1819.

Wathoni N., Hasanah A.N., Gozali D., Wahyuni Y., Fauziah L. L., Determination of uric acid level by PANI and poly (allylamine): Based biosensor, *Journal of Advanced Pharmaceutical Technology & Research*, **5** (2014) 13-6.

Wei Y., Fang F., Yang W., Guo H., Niu X., Sun L., Preparation of a Nitrite electrochemical Sensor Based on PANI/ Graphene-Ferrocenecarboxylic Acid Composite Film Modified Glass Carbon Electrode and its Analytical Application, *Journal of the Brazilian Chemical Society*, **26** (2015) 2003-2013.

Wei Y., Hsueh K. F., Thermal analysis of chemically synthesized polyaniline and effects of thermal aging on conductivity, *Journal of polymer science Part A, Polymer chemistry*, **27** (2003) 4351-4363.

Wilson J., Radhakrishnan S., Sumathi C., Dharuman V., Polypyrrole–PANI–Au (PPy–PANi–Au) nano composite films for label-free electrochemical DNA sensing, *Sensors and Actuators B*, **171– 172** (2012) 216-222.

Wise D. L., Wnek G. E., Trantolo D. J., Cooper T. M., Gresser J. D., Marcel D., Electrical and Optical Polymer Systems: Fundamentals, Methods and Application; *CRC Press: Boca Raton, FL, USA*, (1998) 1031-1040.

Wu Y., Chen Y.X., Yan J., Quinn D., Dong P., Sawyer S.W., Soman P., Fabrication of conductive gelatin methacrylate-PANI hydrogels, *Acta Biomaterialia*, **33** (2016) 122-130.

Wu Y., Yong X., Yan C. J., Yang S., Dong P., Soman P., Fabrication of conductive PANI hydrogel using porogen leaching and projection microstereolithography, *Journal of Materials Chemistry B*, **3** (2015) 5352-5360.

Wu Z., Li L., Yan J. M., Zhang X. B., Materials Design and System Construction for Conventional and New-Concept Supercapacitors, *Advance Science (Weinh)*, **4** (2017) 600382.

Xi L., Ren D., Luo J., Zhu Y., Electrochemical analysis of ascorbic acid using copper nanoparticles/PANI modified glassy carbon electrode, *Journal of Electroanalytical Chemistry*, **650** (2010) 127–134.

Xian Y., Hu Y., Liu F., Xian Y., Wang H., Jin L., Glucose biosensor based on Au nanoparticles–conductive PANI nanocomposite, *Biosensors and Bioelectronics*, **21** (2006) 1996–2000.

Xiang T., Lin Z., Qu Y., Characterization and Gas Sensitivity of PANI/Coral-Like SnO₂ Hybrid Material Prepared by In Situ Polymerization, *Journal of Nanoscience and Nanotechnology*, **15** (2015) 4493-4499.

Xu J. J., Zhou D. M., Chen H. Y., Amperometric determination of ascorbic acid at a novel 'self-doped' PANI modified microelectrode, *Fresenius Journal of Analytical Chemistry*, **362** (1998) 234-238.

Xu L., Zhu Y., Yang X., Li C., Amperometric biosensor based on carbon nanotubes coated with PANI/dendrimer-encapsulated Pt nanoparticles for glucose detection, *Materials Science and Engineering C*, **29** (2009) 1306-1310.

Xu Q., Leng J., Li H.B., Lu G. J., Wang Y., Hu X. Y., The preparation of PANI/gold nanocomposites by self-assembly and their electrochemical applications, *Reactive & Functional Polymers*, **70** (2010) 663-668.

Xua Q., Gua S. X., Jin L., Zhoua Y., Yanga Z., Wang W., Hu X., Graphene/PANI/gold nanoparticles nanocomposite for the direct electron transfer of glucose oxidase and glucose biosensing, *Sensors and Actuators B*, **190** (2014) 562-569.

Xue H., Shen Z., A highly stable biosensor for phenols prepared by immobilizing polyphenol oxidase into polyaniline-polyacrylonitrile composite matrix, *Talanta*, **57** (2002) 289-295.

Yadav A., Kumar A., Pundir C.S., Amperometric creatinine biosensor based on covalently coimmobilized enzymes onto carboxylated multiwalled carbon nanotubes/PANI composite film, *Analytical Biochemistry*, **419** (2011) 277-283.

Yadav S., Devi R., Bhar P., Singhla S., Pundir C. S., Immobilization of creatininase, creatinase and sarcosine oxidase on iron oxide nanoparticles/chitosan-g-PANI modified Pt electrode for detection of creatinine, *Enzyme and Microbial Technology*, **50** (2012) 247-254.

Yadav S., Devi R., Kumar A., Pundir C. S., Tri-enzyme functionalized ZnO-NPs/CHIT/c-MWCNT/PANI composite film for amperometric determination of creatinine, *Biosensors and Bioelectronics*, **28** (2011) 64-70.

Yadav S., Devi R., Kumari S., Yadav S., Pundir C. S., An amperometric oxalate biosensor based on sorghum oxalate oxidase bound carboxylated multiwalled carbon nanotubes-PANI composite film, *Journal of Biotechnology*, **151** (2011) 212-217.

Yan B., Chen Z., Cai L., Chen Z., Fu J., Xu Q., Fabrication of PANI hydrogel: Synthesis, characterization and adsorption of methylene blue, *Applied Surface Science*, **356** (2015) 39-47.

Yan W., Feng X., Chen X., Hou W., Zhu J. J., A super highly sensitive glucose biosensor based on Au nanoparticles-AgCl@PANI hybrid material, *Biosensors and Bioelectronics*, **23** (2008) 925-931.

Yan W., Feng X., Chen X., Li X., Zhu J. J., A selective dopamine biosensor based on AgCl@PANI core-shell nanocomposites, *Bioelectrochemistry*, **72** (2008) 21-27.

Yan Y., Wu L., Guo Q., Huang S., A novel catechol electrochemical sensor based on Cobalt Hexacyanoferrate/(CoHCF)/Au/SBA-15J, *Analytical and Bioanalytical Technology*, **6** (2015) 1-7.

Yang J., Aslimovska L., Glaubitz C., Molecular dynamics of a PANI/ β -cyclodextrin complex investigated by ¹³C solid-state NMR, *Talanta*, **84** (2011) 305-13.

Yavuz A. G., Uygun A., Venkat R. Bhethanabotla V. R., Preparation of substituted PANI/chitosan composites by in situ electropolymerization and their application to glucose sensing, *Carbohydrate Polymers*, **81** (2010) 712-719.

Yijun Y., Che B., Zhihua S., Liang L., Chen W., Xue G., Carbon nanotube/Polyaniline core-shell nanowires prepared by in situ inverse microemulsion, *Synthetic Metals*, **150** (2005) 271-277.

Yin T., Wei W., Zeng J., Selective detection of dopamine in the presence of ascorbic acid by use of glassy-carbon electrodes modified with both PANI film and multi-walled carbon nanotubes with incorporated β -cyclodextrin, *Analytical Bioanalytical Chemistry*, **386** (2006) 2087–2094.

Yoon H., Current Trends in Sensors Based on Conducting Polymer Nanomaterials. *Nanomaterials (Basel)*, **3** (2013) 524-549.

Yu Z., Li H., Zhang X., Liu N., Tan W., Zhang X., Zhang L., Facile synthesis of NiCO₂O₄@PANI core-shell nanocomposite for sensitive determination of glucose, *Biosensors and Bioelectronics*, **75** (2016) 161–165.

Zagal J. H., Griveau S., Ozoemena K. I., Nyokong T., Bedioui F., Carbon nanotubes, phthalocyanines and porphyrins: attractive hybrid materials for electrocatalysis and electroanalysis, *Journal of Nanoscience and Nanotechnology*, **9** (2009) 2201-2214.

Zareh E. N., Moghadam P. N., Azariyan E., Sharifian I., Conductive and Biodegradable Polyaniline/Starch Blends and Their Composites With Polystyrene, *Iranian Polymer Journal*, **20** (2011) 319-328.

Zeng J., Li G., Gao H., Ru Z., Comparison of A and B Starch Granules from Three Wheat Varieties, *Molecules*, **16** (2011)10570-10591.

Zhai D., Liu B., Shi Y., Pan L., Wang Y., Li W., Zhang R., Yu G., Highly sensitive glucose sensor based on Pt nanoparticle/PANI hydrogel heterostructures, *ACS Nano*, **7** (2013) 3540–3546.

Zhang H. D., Tang C. C., Long Y. Z., Zhang J. C., Huang R., Li J. J., Gu C. Z., High-sensitivity gas sensors based on arranged PANI/PMMA composite fibers, *Sensors and Actuators A*, **219** (2014) 123–127.

Zhang L., Long Y., Chen Z., Wan M., The Effect of Hydrogen Bonding on Self-Assembled PANI Nanostructures, *Advance Functional Materials*, **14** (2004) 693–698.

Zhang L., Zhao G., Wang Y., PANI nanowire electrodes with high capacitance synthesized by a simple approach, *Materials Science and Engineering C*, **33** (2013) 209–212.

Zhang Y., Lin L., Feng Z., Zhou J., Lin Z., Fabrication of a PANI/Au nanocomposite modified nanoelectrode for sensitive dopamine nanosensor design, *Electrochimica Acta*, **55** (2009) 265–270.

Zhang Y., Rempel C., Liu Q., Processing and characteristics of canola protein-based biodegradable packaging: A review, *Critical Reviews in Food Science and Nutrition*, **54** (2014) 1353-1370.

Zhao H., Ding R., Zhao X., Li Y., Qu L., Pei H., Yildirim L., Wu Z., Zhang W., Graphene-based nanomaterials for drug and/or gene delivery, bioimaging, and tissue engineering, *Drug Discovery Today*, **22** (2017) 1302-1317.

Zhao T. K., Liu L. H., Li G. M., Du L., Zhao X., Yan J., Cheng Y. L., Dang A., Li T. H., Preparation and electrochemical property of CMC/MWCNT composite using ionic liquid as solvent, *Chinese science bulletin*, **57** (2012) 1620-1625.

Zhao X., Lv L., Pan B., Zhang W., Zhang S., Zhang Q., Polymer supported nanocomposites for environmental application: A review, *Chemical Engineering Journal*, **170** (2011) 381-394.

Zhao Y., Cao L., Li L., Cheng W., Xu L., Ping X., Pan L., Shi Y., Conducting Polymers and Their Applications in Diabetes Management, *Sensors (Basel)*, **16** (2016) 1787.

Zhao L., Lv B., Yuan H., Zhou Z., Xiao D., A sensitive chemiluminescence method for determination of hydroquinone and catechol, *Sensors*, **7** (2007) 578-588.

Zheng W., Hu L., Lee L. Y. S., Wong K. Y., Copper nanoparticles/PANI/graphene composite as a highly sensitive electrochemical glucose sensor, *Journal of Electroanalytical Chemistry*, **781** (2016) 155-160.

Zheng Y., Monty J., Linhardt R. J., Polysaccharide-based nanocomposites and their applications, *Carbohydrate Resource*, **405** (2015) 23–32.

Zhu J., Huo X., Liu X., Ju H., Gold Nanoparticles Deposited PANI–TiO₂ Nanotube for Surface Plasmon Resonance Enhanced Photoelectrochemical Biosensing, *American Chemical Applied Material Interfaces*, **8** (2016) 341-349.

Zhybak M., Beni V., Vagin M.Y., Dempsey E., Turner A.P., Korpan Y., Creatinine and urea biosensors based on a novel ammonium ion-selective copper-PANI nano-composite, *Biosensors and Bioelectronics*, **77** (2016) 505-511.

Zou Y., Sun L., Xu F., Prussian Blue electrodeposited on MWNTs-PANI hybrid composites for H₂O₂ detection, *Talanta*, **72** (2007) 437-42.