IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 12, Issue 4, December 2021
Impact Factor: 5.731

Cyclic Voltametry Study of PANI/ZnOUrease Based Biosensor with Stainless Steel Electrode as Transducer

Ashish P. Mahajan[1], Himani M. Gaidhane1, Subhash B. Kondawar2
Department of Physics, Kamla Nehru Mahavidyalaya, Nagpur, India[1]
Department of Physics, Rashtrasant Tukadoi Maharaj Nagpur University, Nagpur, India[2]
shshmhjn@yahoo.co.in[1]

Abstract: *The electrochemical characteristic Cyclic Voltametry (CV) was studied for Electrodeposited Polyaniline (PANI)/ZnOnano composite onto a stainless steel transducer. The Cyclic Voltametry was studied during electrode position of PANI/ZnO on the stainless steel electrode. Good cyclic voltammogram for 15 wt% composition was observed as compared to others. The PANI/ZnO film also offers a more symmetrical voltammogram, with oxidation starting at a lower potential (0.05 to 0.08 V) compared to pure PANI, indicating that the presence of the ZnO promotes the electron-transfer of the oxidation process. Cyclic Voltametry of PANI/ZnO/Urease electrode shows the oxidation potential peaks occurs in CV of ZnO-PANI 15% film depicts the oxidized potential at around 0.2V, which is at higher potential as compared to other lower weight %, indicating larger surface area and larger potential window as compared to others. The magnitude of peak current gets increased with increasing concentration of ZnO, which ensure quick response time of the sensor. The CV of PANI/ZnO/Urease in potential window of -0.1 to 0.1V shows resistive effect of PANI. Also, the cyclic voltammogram of PANI/ZnO/Urease 15% shows more ohmic behavior as compared to other compositions and PANI..*

Keywords: Polyaniline, Zinc oxide, Urease, Cyclic Voltametry, Stainless steel, biosensor

REFERENCES

[1]. Jaffrezic-Renault N., Dzyadevych S.V., 2008. Sensors 8, 2569-2588.
[2]. Branzoi F., Branzoi V., Musina A., 2012.Surf. Interface Anal. 44,895–898.
[3]. Camalet J.-L., Lacroix J.-C., Dung Nguyen T., Aeiyach S., Pham M. C., Petitjean J., Lacaze P.-C., 2000. Journal of Electroanalytical Chemistry 485, 13–20.
[4]. Obaid A. Y., El-Mossalamy E. H., Al-Thabaiti S. A., El-Hallag I. S., Hermas A. A., Asiri A. M., 2014. Int. J. Electrochem. Sci. 9, 1003–1015.
[5]. Cevik E., Senel M., Abasıyanık M. F., 2012. J Solid State Electrochem. 16,367–373.
[6]. Ghasemi S., Mousavi M. F., Shamsipur M., 2008. Solid State Electrochem. 12, 259-269.
[7]. Usman Ali S. M., Ibupoto Z. H., Salman S., Nur O., Willander M., Danielsson B, 2011. Sensors and Actuators B. 160, 637– 643.
[8]. Davis J., Vaughan D. H., Cardosi M., 1995. Enzyme and Microbial Technology 17, 1030-1035.
[9]. Luo Y.-C, Do J.-S, 2004. Biosensors and Bioelectronics 20, 15–23.
[10]. Kuralay F., Ozyoruk H., Yıldız A., 2006. Sensors and Actuators B 114, 500–506.
[11]. Volotovsky V., Nam Y. J., Kim N., 1997. Sensors and Actuators B 42, 233–237.
[12]. Zhylyak G. A., Dzyadevich S. V., Korpan Y. I., Soldatkin A. P., El'skaya A. V., 1995. Sensors and Actuators B 24-25, 145-148.
[13]. Sochor J., Zitka O., Hynek D., Jilkova E., Krejcova L., Trnkova L., Adam V., Hubalek J., Kynicky J., Vrba R., Kizek R., 2011. Sensors 11, 10638-10663.
[14]. Nepomuscene N. J., Daniel D., Krastanov A., 2007. Biotechnol. &Biotechnol EQ. 377-381.
[15]. Talat M., 2009. Biotechnology and Bioprocess Engineering. 14,474-481.
[16]. Malinauskas A., Malinauskienë Revising J.,2005. Chemijathe kinetics of aniline electropolymerization under controlled potential conditions, 16, 1, 1–7.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 12, Issue 4, December 2021
Impact Factor: 5.731

[17]. Dhand A., M. Das, G. Sumana, A. K. Srivastava, M. K. Pandey, C. G. Kim, M. Datta, B. D. Malhotra,2010. Nanoscale,Preparation, characterization and application of polyanilinenanospheres to biosensing,, 2, 747–754.
[18]. Lakard B., Herlem G., Lakard S., Antoniou A., Fahys B., 2004. Biosensors and Bioelectronics 19, 1641–1647.
[19]. Sapurina Y., Shishov M. A., 2012. New Polymers for Special Applications. 251-312.
[20]. Menon R., Mukherjee A. K., 2014. Encyclopedia of Nanoscience and Nanotechnology 8, 715–729.
[21]. Sankar A., Vijayan M., Rameshkumar S., 2011. Int. Jour. of Envir. Sci. and Research 1(1), 4-10.
[22]. Sharma D., Kaith. B. S., Rajput J., 2014. The Scientific World Jour., 1-13.
[23]. Vilaric M. J. , Gonzalez-Aguilar G., 2012. Envir. Prog. &Sust. Ene. 00, 1-6.
[24]. Palomera N., Balaguera M., Arya S. K., Hernández S., Tomar M. S., Ramírez-Vick J. E., Singh S. P., 2011. Journal of Nanoscience and Nanotechnology 11, 6683–6689.
[25]. Chey O., Ibupoto Z. H., Khun K., Nur O., Willander M., 2012. Sensors 12, 15063-15077.