POLYANILINE/POLY (3-AMINOPHENYLBORONIC ACID) FILM AND ITS SENSING PROPERTIES

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Biologically compounds can be detected using conducting polymers, compound capable to offer some practical advantages. Well-known conducting polymer is polyaniline (PANI) due to its stability electronic properties and strong interactions with analytes [1]. Various sensors and biosensors, such as enzyme sensors, DNA sensors and immunosensors based on PANI are reported in the literature. Most applications of PANI require good mechanical properties and proper workability. The basic polymers have the highest conductivities, but in return, they are difficult to process. To ensure proper workability most known ways are synthesis of mixtures, composite materials (with other polymers having the desired mechanical properties) or derivatization of the base polymers. These methods make a compromise between solubility and fusibility on the one hand and conductivity and stability on the other. In order to increase the processability of polyaniline, other methods have been proposed which involve either substituting aniline at the nucleus or a hydrogen at nitrogen with different groups such as alkyl, alkoxy, aryl or halogen, or copolymerizing it with other suitable momomers. However, the obtained polymers have the disadvantage of lower conductivity and small molar masses. The functionalization of aniline boronic grups generated poly(aniline boronic acid) PABA [2] a polymer which exhibits redox activity also in solutions with neutral pH. The polyaniline(PANI)/poly(3-aminophenyl boronic acid) (PABA)-film was obtained for the detection of diols. The study involved the electrochemical polymerization of 3-aminophenylboronic acid (3-APBA) in the absence or presence of fluoride on the surface of non-noble electrodes. The PANI/ PABA films were tested for detection of dopamine (DA). The electropolymerization conditions were optimized in order to enhance the sensing performance. Cyclic voltammetry was used for deposition and characterization of the PANI/PABA. The electrochemical impedance spectra describe the different phenomena occurring at the interfaces and were presented by Nyquist and Bode representations. The changes in the PANI/PABA capacitance and resistance properties was monitored by EIS. The film thickness was adjusted from the amount of charge that passes during the potentiostatic deposition process. After electrochemical deposition the polymer modified electrodes was washed with distilled water and with phosphate buffer pH 7.4. The gradual change in impedance due to the effect of boronic acid complexation on resistance of polymer film was correlated with de DA concentration and the response was found to be linear between 10^{-1} to 10^{-10} mol L^{-1}.

Acknowledgements
The authors are acknowledging the Romanian Academy for financial support in the frame of Programme 2/2019 from ICT.

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