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POLYANILINE MATRIX AS ACTIVE LAYER FOR SENSORS

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ABSTRACT

Objective: Conducting polymer has gained importance due to its environmental stability, good conductivity, immobilization of bio component and gas sensing ability. Objective to Synthesis ofconducting polymers and to fabricate by galvano-static method for sensors.

Material and method: All the chemical (Aniline and Hydrochloric acid)used in the investigation were analytical reagent grade The Method is electro polymerization was carried out by Galvanostatic technique. after synthesis, polymer coated electrodes were rinsed thoroughly in distilled water and dried in cold air and then used for subsequent characterization.

Results: Potential-time curves suggesting that building up of the film proceeds according to the same reaction along the full thickness of the polymer. The SEM micrograph is fibrillar like structure good porosity,

Conclusions: The PANI-HCl matrix have been successfully synthesized using Galvanostatic Method on ITO glass plate has uniform matrix and conductivity which has porous and fibriller good porosity and conductivity this active layer is suitable for immobilization of biocomponet for biosensors ,gas sensors and opticalsensors

Keywords: - Conducting polymersGalvanostaticMethod,Scanning Electron microscopy.

INTRODUCTION

Conducting polymer have been extensively exploitedin diverse Applications with immersive resultspolyaniline made attractiveas sensing elements for gases and biological agents polyaniline allow room temperature sensing of large number of toxic gas and pollutants with high selectivity and sensitivity. Polyaniline has gained importance due to its environmental stability, good conductivity and gas sensing ability. Nanoparticles to deliver both hydrophic and hydrophobic drug molecules. In this synthesis of polyaniline matrix was fabricated by galvano-static electrodeposition method. Structural and morphological characterizations were carried out using Scanning Electron Microscopy (SEM) and focus on advantage of nanoparticles.

According to International System of Units (SI) nanotechnology is typically measured in nanometers scale of 1 billionth of a meter (1nm corresponding to 10^{-9} m) referred as the „tiny science"., nanotechnology provides opportunities for the medical applications. [1-2]

Nanotechnology is associated with nano-meter sized objects. Living organisms are made up of cells. These cell parts, however, are nanosized deals with design, production and characterization on nano sized particles [3-5].

Fine particles have the range of 100-2500nm and ultrafine particles have the size of 1- 100nm [6]. They can also be designed to improve the pharmacological and therapeutic effects of the drugs [7].

Recent studies have developed a number of nano-sized particles such as metals, semiconductors and polymeric particles utilized in molecular imaging and particulate delivery vehicles [8-11,]. .

Advantages of nanoparticles

By using polymers drug release form nanoparticles can be modified which makes polymeric nanoparticle an ideal drug delivery system for cancer therapy, vaccines, contraceptives and antibiotics.[12].

Characterization of nano particles

Nanoparticles are generally characterized by their size, morphology and surface charge, using such advanced microscopic techniques as scanning electron microscopy (SEM), transmission electron microscopy (TEM) and atomic force microscopy (AFM). The average particle diameter, their size distribution and charge affect the physical stability and the in vivo distribution of the nanoparticles. Electron microscopy techniques are very useful in ascertaining the overall shape of polymeric nanoparticles, which may determine their toxicity.

SYNTHESIS OFPANI-HClMATRIX All the chemical used in the investigation were analytical reagent grade The electro polymerization of aniline was carried out by Galvanostatic technique. The Polyaniline Matrix was synthesized from an aqueous solution of distilled water containing 0.2 M aniline and 1 M of Hydrochloric acid (HCl). After synthesis, polymer coated electrodes were rinsed thoroughly in distilled water and dried in cold air and then used for subsequent characterization.

RESULTS

Galvanostatic studies of PANI-HCl Matrix

The PANI-HCl Matrix was synthesized on ITO coated glass from 0.2 M concentration of aniline and 1.0 M of HCl at 1.0 pH and temp 27 °C. The behavior of the potentiometric synthesis overshoot during first few second probably indicates difficult formation of dimmers and oligomers. After this, potential remain constant suggesting that building up of the film proceeds according to the same reaction along the full thickness of the polymer as shown in Figure 1.

The SEM micrograph for synthesized PANI film with optimized process parameters is shown in Fig 2. It is fibrillarNano rod like structure good porosity,

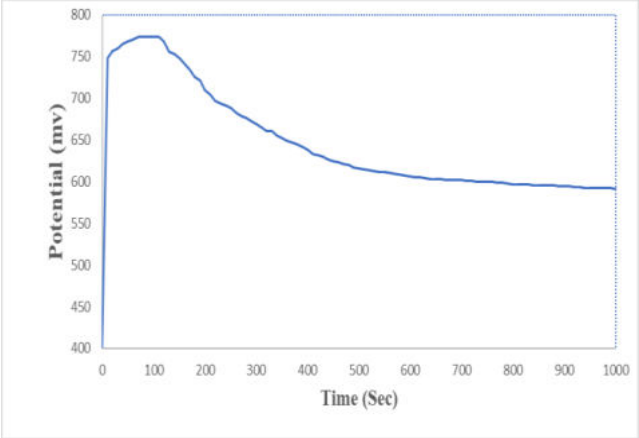

Fig. 1: Potential-time curves obtained synthesis of polyaniline Matrix

SEM STUDIES

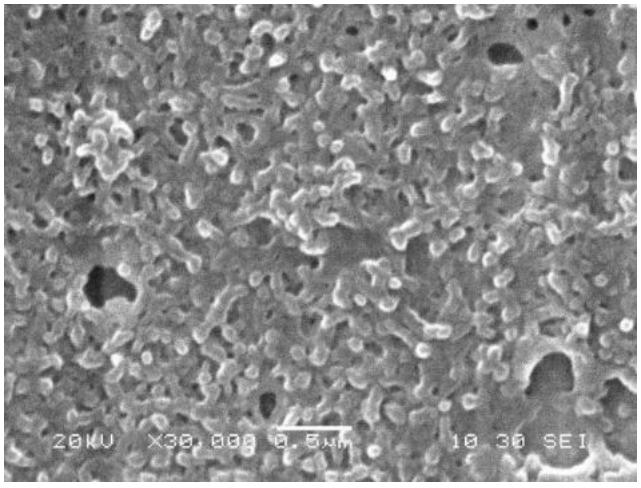

Fig 2: SEM micrograph of PANI-HCl matrix synthesized at 1.0 pH, 0.2 M aniline, 1.0 M HCl T=27 ºC.

CONCLUSIONS

The PANI-HCl matrix have been successfully synthesized on ITO glass plate has uniform matrix and has conductivity that was confirmed by four probe technique the SEM showed porous and fibrillar structure which is suitable for immobilization of biocomponent and on optical fiber for chemical optical biosensors.

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