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Electrochemical Fabrication of Poly(glycine) Films on Glassy Carbon Electrode for Electro-oxidation of Furosemide Drug

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Introduction

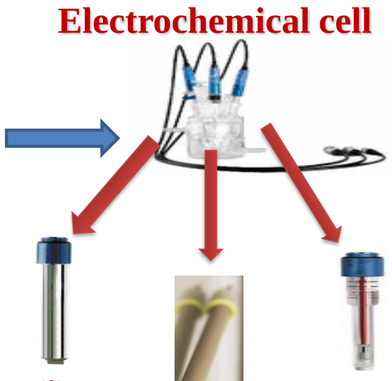
Drugs that facilitate diuresis are widely used for the treatment of edematous conditions and in the management of hypertension and other conditions for which the increase in urinary flow can relieve symptoms **[1].** The 4-chloro- 2-[(2-furylmethyl) amino]-5-sulfamoylbenzoic acid, also known as furosemide **(FUR),** is a widely used diuretic in the treatment of hypertension and edematous conditions caused by fluid overload, for which an enhanced urinary flow rate could alleviate the symptoms **[2].**
Polymer film modified electrodes (PMEs) have receive much attention due to their high stability, sensitivity and selectivity towards analytes, strong adherence to electrode surface, ability to provide larger surface area by forming homogeneous film, and ability to promote electron transfer rates, The electropolymerization of the electrode by poly-glycine causes the desired properties of low cost, increased sensitivity and selectivity, and enhanced electrochemical response because of increased electrode active surface area **[3].** Based on the above advantages of poly-glycine film, economical,simple and sensitive electrochemical sensor was developed for selective and sensitive detection of **FUR.**
The current research work aimed to we present a novel, simple, fast, low-cost ,electroanalytical method for the determination of **FUR** using Poly(Gly)/GCE.

Experimental

PGZ402 potentiostat/galvanostat (Radiometer analytical)

Logiciel VoltaMaster4

Electrochemical cell

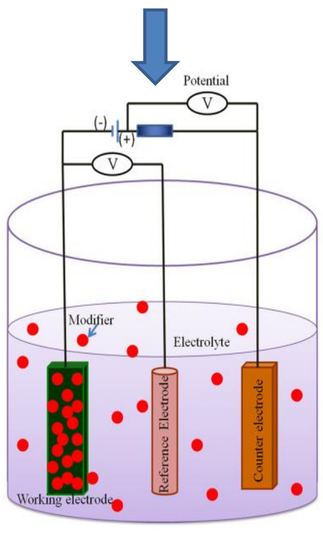


Electrode modification

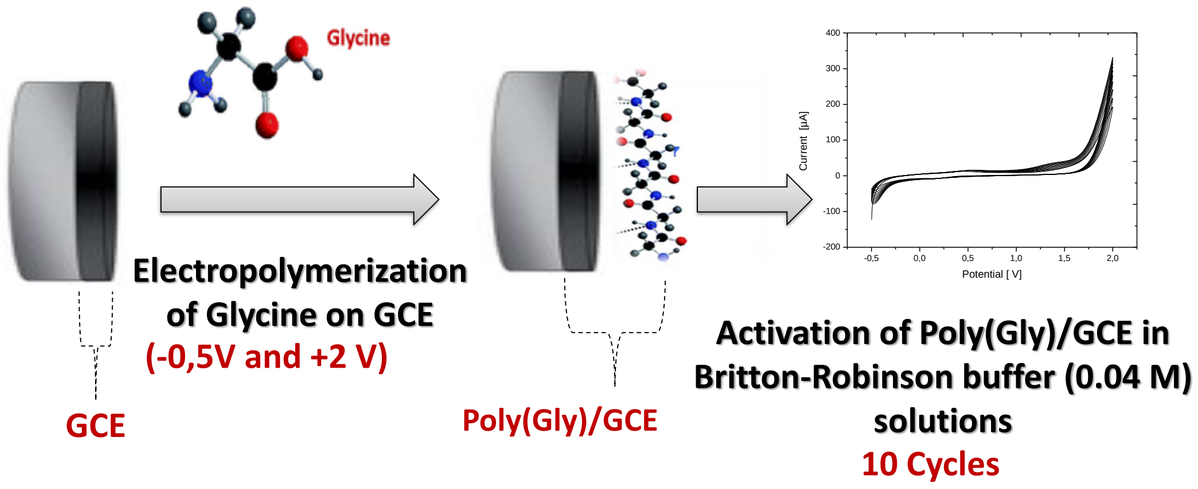
Bare GC Electrode is polished with Al_2O_3 slurry (1.0 µm and 0.4 µm)

The electropolymerization of Glycine at GCE was done in aqueous solution containing 0,01M Glycine and 0,05M H_3BO_3 using cyclic voltammetry method, The Poly(Gly)/GCE cycled between (-0,5V and +2 V) with a scan rate of 50 mv s^{-1}

Electrochemical activation of Poly(Gly)/GCE in Britton-Robinson buffer (0.04 M) solutions



Electrochemical modification of GCE



Results and discussion

Electro-oxidation of furosemide (FUR) at Poly(Gly)/GCE Electrode

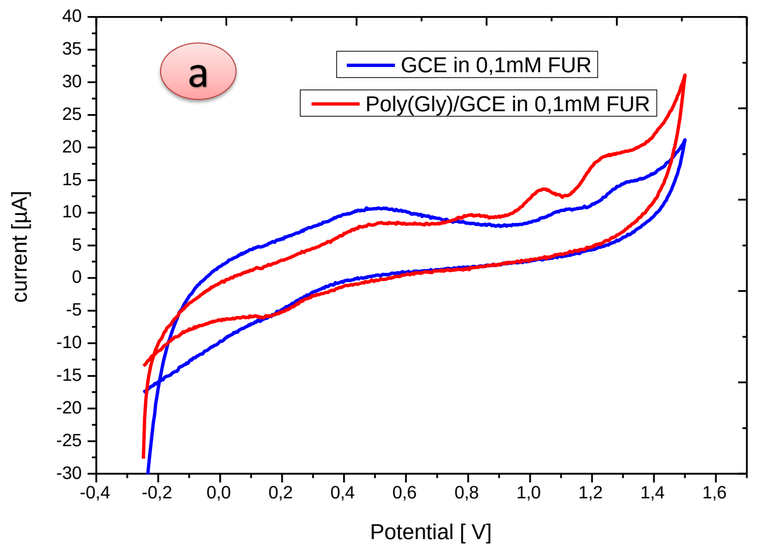


Figure 1. (a) CVs and (b) SWVs of 0.1 mM Fur in 0.04M BRB using the bare GCE and Poly(Gly)/GCE electrode (pH 1.82) solution with a scan rate of 50 mv s^{-1}.

Furosemide (FUR) at the **bare GCE** exhibited **two anodic peaks**, one at **1.01 V** and another at **1.14V.**
On **Poly(Gly)/GCE** , a significant increase in the responses current were observed at **0,9 V** and **1,66V** This can be due to the strong adsorption of FUR molecules on the surface Poly(Gly)/GCE film.
No reduction peak was Observed in the reverse scan, suggesting that the electrochemical reaction was a totally irreversible process.

Conclusion

- Poly (Gly)/GCE electrode was prepared by electropolymerization of glycine on the GCE.
- The Poly (Gly)/GCE showed noticeable enhancement for the charge transfer across the film interface and can be used as an electrochemical sensor for pharmaceutical compounds (Furosemide).

References

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