Cancer Detection Though Nano Biosensor With The Elastic

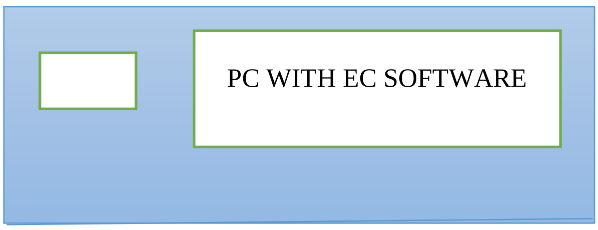
K.Kalyanbabu

Abstract: ***Cancer growing cells are to be detected by elasticsity in this research paper.Cancer is NOT a disease caused due to bacteria,fungii or virus,it is caused beacause of unregulated,abnormal growth of living cells.In cancer affected countries,USA stands first next CHINA and next INDIA.In this paper Cancer growth can be detected through finding elastisity of cells and from which Stress strain relationship is found and Youngs modulus is calculated.It is found that cancer cells have less elastisity whereas normal living cells have high elastisity.The elastisity equations are derived and stress, strain relationships are simulated and compared with previous results.The simulation software used in this research paper is MATLAB 2018 version. The instrument used in detection of cancer used in this work is Nano Bio sensor.A biosensor is best suited for electro chemical reactions that take place in human body.***

Keywords: Cancer, Elastisity and Nnao biosensor.

I. INTRODUCTION

Biosensor is one which contains a biological element called LIGAND and a Transducer.A ligand is one which is a biological element,the element used in this work is GODx ie GLUCOSE OXIDASE.The transducer is one which converts biological signals to electrical signals.The biosensor used in this Research paper is Electro chemical type which contains Amperometric, Potentiometric and Conductometric biosensor.the output of amperometric biosensor is of currrent order of milli amperes.The output of potentiometric biosensor is voltage,and last one conductometric biosensor output is thermal conductance.The nano technology is emerging like speed of light in the fields of BIOTECHNOLOGY, CHEMICAL ENGINEERING and INSTRUMENTATION.The nano materila are nano wires Graphene.Graphene is best suited for biological applications because of its flexicle armchair and chemical bonding and free electron transport between the bonds.The experimental set up is given by the following diagram:



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The above diagram shows the experimental setup of detection of cancer through biosensor cell. It contains 3

legs namely REFERENCE ELECTRODE,

AUXILLARY ELECTRODE and Working electrode. the working electrode is made of glassy carbon, reference electrode is made of silver and silver chloride, the auxiliary electrode is made of Platinum.

the anode is reference electrode made of Ag, or AgCl. The cathode is auxiliary electrode made of platinum. The auxiliary electrode is also known as counter electrode. The substrate used in this work is glass substrate ,it can be further changed to silica substrate depending upon the type of application.

The substrate which is glass is mounted over with biosensor cell is dipped in a bulk solution made of different chemicals. The biosensor is connected to PC with a special software known as electro com or E/H software.

The entire setup of biosensor cell is mounted with graphene sheets to enable the device to react with normal and cancer cells.

II. THE EXPERIMENTAL PROCEDURE

- First the biosensor is tested with ferroferri solution, if the EC Software shows the redox potential as 0.1v,the biosensor cell is ready for detection.
- Next the biosensor is tested with PANI test ie electro chemical polymerization of Aniline, which is PANI test.As Nitrogen is present in the double bond of the aniline the radical cations are decreased and enhance the flow of electrons between the anode and cathode. The nitrogen along with Carbon is present in Aniline which enhances the flow of electrons between reference and auxiliary electrodes.
- Next the biosensor is mixed with GODX ligand which detects the cancer through molecular momentum. The analyteonwhom the analysis has to be carried out is drop casted on the biosensor.

✓ The analyte is simply the blood sample taken from different cancer patients.the final readings are taken from the EC softwareand based on the range of current the cancer cell is detected.

III. ELASTISITY

Elasticity is defined to be stretching of body length to a particular level on application of force and retains its original shape after removal of force. This process is called elasticity. The examples of elastic bodies are RUBBER, POLYMERS ,quartz and steel.Elasticity is measured in two types of parameters in practice ,those are modulus which defines the amount of force per unit area to achieve a specific amount of deformation. The second type of parameter measures the elastic limit, the maximum stress that can arise in a material before the onset of permanent deformation. Rubber has low amount of modulus and high elastic limit ,whereas metals have high amount of modulus and low elastic limit. The best example of metals with high elastic nature is IRON or STEEL.When an elastic material is deformed due to an external force, it experiences internal resistance to the deformation and restores it to its original state if the external force is no longer applied. The force per unit area is called Youngs modulus which is treated as SHEAR ,BULK modulus. Shear modulus is for solids , whereas bulk modulus is for solids, liquids and gases.

The stress-relative force and strain (deformation) is NON LINEAR Curve,it can be made linear by Taylors expansion and this is referred to as HOOKE s law.

HOOKE s law is given by F=kx.,

where F stands for force per unit area and x is the displacement after application of force.K is a constant.

The stress and strain relationship is given by £=€ E

,whereE stands for Youngs modulus,£ stands for stress and € stands for strain.

5.The governing equations for Normal and Cancer cells:

1.Normal Cells: F=Kx, ,£=€ E………………(a)

2. Cancer cells F=k(x-a-b-c): £=€ E(a-b-c)…….(b)

Where a , b, c stand for un usual deformation x, y z directions for Cancer cells.

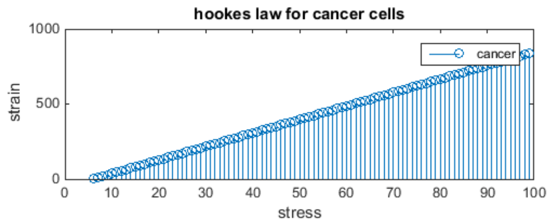
$\iiint \ k\, a.b\ c\ da\ db\ dc$ in case of cancer cells……………………………………………..(c)

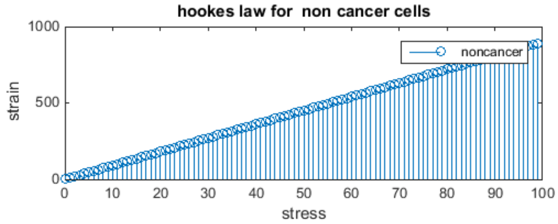
$\int \ k\ x\ dx$ in case of normal cells…………….(d)

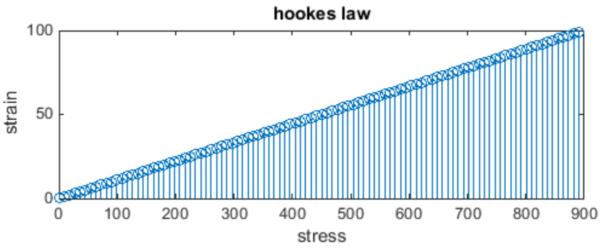
The above equations resemble cancer and Non cancer cells with respect to stress and strain relationship.

Serial .number	Cancer Cell	Normal cell
1.STRESS	HIGH	NORMAL
2.FORCE	LOW	NORMAL
3.STRAIN	INDEFINITE	NORMAL
4.YOUNGS MODULUS	HIGH	LOW
5.ELASTIC LIMIT	LOW	HIGH
6.HOOKES LAW	FAILS	SUCCESS

IV. SIMULATION RESULTS







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