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Graphene-Assisted Electrochemical Sensor for Detection of Pancreatic Cancer Markers

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Commentary

Graphene, a new type of carbon nanomaterial discovered in 2004, is a new type of carbon nanomaterial. It has strong promise for high-tech applications in electronics, mechanics, medicine, and aerospace due to its optimal flat two-dimensional structure and unique electrical, thermal, optical, and mechanical capabilities. Following carbon nanotubes, it is a developing carbon nanomaterial with promising theoretical and application possibilities. Graphene combines the redox properties of some bioelectrically active compounds, allowing it to detect the target molecule through its redox reaction on the electrode surface and the resulting current signal.

A vast number of studies have found that the mutation rate of the K-Ras gene in pancreatic cancer patients can reach more than 90%, with K-Ras protein with GTPase activity being the product of K-Ras gene expression. K-Ras protein, which contains GTPase activity, is the gene expression result of the K-Ras gene. When it binds to GTP, it becomes active, and when it binds to GDP, it becomes inactive. The majority of K-Ras proteins are found on the cell membrane. Electro Chemi Luminescence (ECL) was used to detect K-Ras genes using Graphene Quantum Dots (GQDs) Nitrogen (N-GQDs) was doped in GQDs to boost their quantum yield. The ECL efficiency of N-GQDs could be considerably increased as a result of this. MicroRNA, a highly conserved type of 18-25 nucleotide long endogenous non-coding RNA molecules, has also been linked to pancreatic cancer. It's found in large amounts in the blood and has the ability to control gene expression at both the transcriptional and post-transcriptional levels. When tumour suppressor microRNAs are generated as a result of gene mutation, deletion, promoter methylation, and other alterations, their production is down-regulated or their function is lost, and they are unable to down-regulate oncogenes appropriately.

Graphene, an unique two-dimensional carbon nanostructure with a monolayer structure, has a large specific surface area and exceptional electrical, chemical, and mechanical characteristics. It also has a high level of biocompatibility, making it ideal for all bioelectrical analyses. Graphene-based biosensors can detect pancreatic cancer with high sensitivity and selectivity for both proteins (cancer indicators) and DNA, making it an ideal material for building efficient, rapid, and sensitive detection biosensors.

There are still several aspects of graphene's use in biosensors that need to be investigated further. These include:

- The effect of graphene's oxygen-containing functional group fraction on its electrochemical properties
- How to prepare graphene with high electrical conductivity and good solution dispersion
- The effect of heteroatom doping on graphene's electrochemical properties and stability
- How to prepare graphene with high electrical conductivity and good solution dispersion. These researches on

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- The connection mode and interaction between biomolecules and graphene in sensors
- graphene-based materials will pave the way for new developments in the field of biosensor research