

Halloysite nanotubes -ionic liquid based nanosensors for cancer diagnosis

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Abstract

The integration of molecular biology and nanomaterials has facilitated the usage of novel technologies in the application of electrochemical biosensors for health and environmental analysis [1]. Nanoclays have a tube-like structure and strong hydrogen interactions. Halloysite nanotubes (HNT), a specific type of nanoclay, possess several advantages such as a wide aspect ratio, high functionality, ease of use, and good biocompatibility [2]. This study [3] presented a novel nanocomposite consisting of halloysite nanoclay and an ionic liquid (HNT/IL). HNT, a new nanomaterial for the modification onto the surface of PGE, was presented to the literature for cancer diagnosis. The HNT/IL nanocomposite has been successfully modified onto the surface of the pencil graphite electrode (PGE). Following the modification, characterization studies were carried out using both electrochemical techniques and microscopic techniques. Optimization studies were applied for the determination of miRNA-21, a biomarker in various cancers, such as liver cancer, breast cancer, lung cancer. The detection limit for miRNA-21 was calculated as 0.17 µg/mL. Due to the higher expression of miRNA-21 in cancer cells contrast to healthy cells, total RNA samples isolated from a breast cancer cell line (MCF-7) were used in our study while using human embryonic kidney cell line (HEK-293) as a control group.

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References

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