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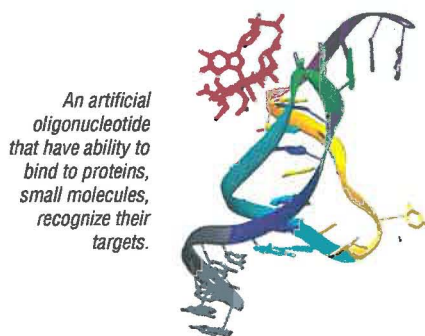
A BIOSENSOR TEST KIT FOR EARLY DETECTION OF HIV-1 TAT PROTEIN

Patent: US 7851205 B2



PRODUCT DESCRIPTION

HIV-1 is a protein (Tat protein) that sits in the virus coat of human immunodeficiency virus type 1 (HIV-1), which is the causative agent of the acquired immunodeficiency syndrome (AIDS). Therefore, a rapid, inexpensive and portable viral load monitoring tools such as electrolyte solution-gate field-effect transistor (SGFET) are of utmost importance. The SGFET is suitable to provide a higher signal-to-noise ratio, good signal stability, and highly sensitive for early detection of HIV-1 Tat protein. The potential of using MWCNTs/nanodiamonds (NDs) as a transducer via aptamer as ligand binding molecule has opened new avenues in the development of biosensors for point of care diagnostics.



An artificial oligonucleotide that have ability to bind to proteins, small molecules, recognize their targets.

INVENTION ADVANTAGES

- Stability & accuracy performance using APTAMER
- Handheld & portable device
- Lower the processing cost 5%
- Chemically resistant
- Biocompatible
- Reusable

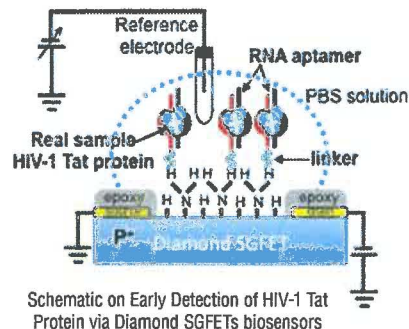
NOVELTIES

- As early detection in one week of HIV-1 Tat protein
- Label-free detection in static and real time
- Rapid screening of HIV-1 Tat protein via APTAMER
- Highly sensitive, specific and selective
- Low cost fabrication of SGFET

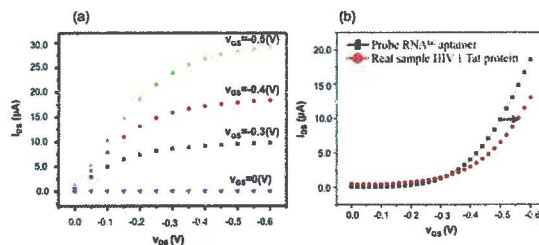
COMMERCIAL POTENTIAL

- High potential to be in clinical sample testing
- A portable and in-situ viral monitoring tool

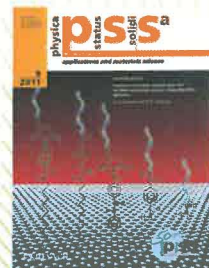
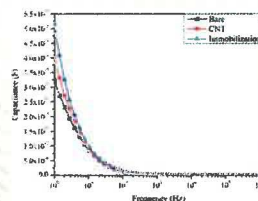
COLLABORATIONS



Schematic on Early Detection of HIV-1 Tat Protein via Diamond SGFETs biosensors



(a) $I_{DS}-V_{GS}$ characteristics of diamond SGFET with a gate length of 500 nm and a gate width of 8 mm.
 (b) Changes in gate potential induced by detection of real sample of HIV-1 Tat protein on SGFET in 1 mM PBS (pH 7.4) at gate potentials from -0.3 to -0.6 V.



PUBLICATIONS

1. A. Rahim Ruslinda, K. Tanabe, S. Ibori, X. Wang, H. Kawarada, "Effects of diamond-FET-based RNA aptamer sensing for detection of real sample of HIV-1 Tat" *Biosens. Bioelectron.* 40, 277-282, 2013. (IF 5.4; Q1)
2. Bahim Ruslinda, Y. Ishiyama, X. Wang, T. Kobayashi and H. Kawarada, "Fluorescence-signaling aptasensor for ATP and PDGF detection on functionalized diamond surfaces," *J. Electrochem. Soc.* 159 (5), J182-187, 2012. (IF 2.588; Q3)
3. Bahim Ruslinda, Yurun Penmetsa, Yoko Ishii, Shinya Tajima and Hiroshi Kawarada, "Highly sensitive detection of platelet-derived growth factor on a functionalized diamond surface using aptamer sandwich design" *Analyst*, 137, 1692-1697, 2012. (IF 3.969; Q2)
4. Y. Penmetsa, A. F. Ruslinda, M. Beidaghi, H. Kawarada, and C. Wang, "Platelet-Derived Growth Factor Oncoprotein Detection Using Three-Dimensional Carbon Microarrays," *Biosensors and Bioelectronics*, pp. 1-21, 2012. (IF 5.4; Q1)
5. A. Rahim Ruslinda, X. Wang, Y. Ishii, Y. Ishiyama, K. Tanabe and H. Kawarada, "Human immunodeficiency virus trans-activator of transcription peptide detection via ribonucleic acid aptamer on functionalized diamond surface," *Solid. Phys. Lett.* 99, pp.123702, 2011. (IF 3.8; Q1)
6. M. Beidaghi, A. K. Al-Kassab, A. R. Ruslinda, A. J. Rashid, M. Karim, "Functionalization and characterization of MWCNT by fuel oil waste preparation for biosensor application," *Journal of Nanoparticles* 2014 (IF 1.9; Q2 Accepted)