

CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME IV

Editors:

Ma'an Alkhatib
Abdullah Al Mamun
Faridah Yusof



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(VOLUME IV)

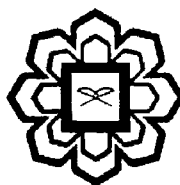
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CHAPTER 23

DESIGN AND PRODUCTION OF CARBON NANOTUBE-BASED BIOSENSOR

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ABSTRACT

Biosensors continue to make significant impact in everyday life. There has been a strong demand for producing highly selective, sensitive, responsive, and cost effective sensors. As a result, research emphasis is on developing new sensing materials and technologies. Carbon Nanotubes (CNTs) have many interesting and unique properties such as electrical, mechanical and thermal property potentially useful in a variety of biological and biomedical systems and devices. Besides, the ability of the CNTs to immobilize almost all the biomolecules through functionalization of its surface can be beneficial in medical application. In this research, CDI activated-Tween 20 is used to functionalize CNTs for purposes to immobilize the antigen Leptospira. Serum samples of patients containing the antibody as sample analyte is brought from Institute for Medical Research (IMR). As the result from the binding of antigen antibody, the signal produced is analyzed through the series of data processing which include amplifier and Programmable Interface Controller (PIC).

Keywords: biosensors, carbon nanotubes, functionalization, leptospira

INTRODUCTION

Leptospirosis is an important infectious disease of humans and animals worldwide. It is caused by a pathogenic species of *Leptospira interrogans* group. The infections to human can occur either from direct exposures to infected animals or their products or indirectly through contact with water or soil contaminated with urine of a *Leptospira* shedder. The infection through contaminated water comes especially during the float season. Early and accurate diagnosis of leptospirosis is important for proper and prompt treatment, which can save the patients with severe illness. However, diagnosis based on the clinical picture of this disease is inaccurate and it show the similar acute febrile illness to the others diseases such as malaria, viral hepatitis, influenza, dengue fever, rickettsial infections, typhoid fever, melioidosis, and in Malaysia, mainly at Institute of Medical Research (IMR), there are three methods that has been used for the laboratory diagnosis of leptospirosis based on the rise in serum antibodies. The methods are indirect enzyme-linked immunosorbent assay (ELISA), microscopic agglutination test (MAT) and polymerase chain reaction (PCR). Even though the ELISA method is mostly used and sensitive, it not really accurate and sometimes appear confusion when the results of ELISA is not same as the results given by PCR and MAT technique. ELISA methods require elaborate laboratory facilities and the antibodies sensitivity