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DETECTION OF THE LEVEL OF HUMAN ALT LIVER ENZYME CONCENTRATION BY USING LASER BIOSENSOR MULTIMODE FIBRES (MMF)

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ABSTRACT : Biosensorsis analytical devices which include a combination of biological detecting elements like sensor system and a transducer. Multimode fiber based on the total internal reflection and evanescent wave, which exhibits high sensitivity changing in the ALT enzyme concentration of the blood sample was used and this was the aim of study. Multimode laser biosensor was constructed to detect the intensity of light after the absorbed by the sample (ALT enzyme) by choosing a suitable wavelength of laser light to detect ALT enzyme according to the optical properties of ALT (standard) enzyme, using green light (diode semiconductor) in wavelength 530 nm and power <50000 mW, multi-mode fiber sensor (MMF) sensing of ALT enzyme in a wavelength 531.62 nm. A calibration curve was done between the concentration of ALT enzyme (measured by RANDOX kit) and the intensity of light (measured by laser biosensor). The absorption of laser light (intensity) by highly concentrated samples are higher compared with lower concentration samples and because the absorption of sample to the laser light the emitted light (intensity) is lower than the initial intensity so the higher absorption of light by the samples due to specific selection and high matching between these wavelength 531.62 with ALT enzyme. ALT enzyme can be detected by using laser biosensor. The maximum concentration of ALT enzyme referred to the lowest intensity of light.

Key words : Laser biosensor, ALT liver enzyme, multimode fiber.

INTRODUCTION

Enzymes are built of proteins folded into complicated shape, Alanine transaminase (ALT) is an enzyme found in the liver that helps convert proteins into energy for the liver cells (Ghouri, 2010 and Shoo, 2015).

When the liver is damaged, ALT is released into the bloodstream at the levels higher than the normal level, increasing of ALT levels in the blood stream indicate that there is aliver problem such as mainly hepatitis, ischemic liver injury or toxins which causes liver damage (Berg *et al*, 2002).

Biosensors are devices that are sensitive to biological substances and convert their concentrations to electrical signals. Biosensors act as analytical tools including biologically sensitive material immobilized as recognition element (including enzyme, antibody, antigen, microorganism, cell, tissue, nucleic acid and other biologically active substances), physicochemical transducer (such as the electrochemical electrode, photodiode and signal amplifying device). It has been widely used in biological medicine, drug development and testing, environmental quality testing. The development of enzyme electrode is the most representative and the most studied in biosensor field (Ligler, 2008 and Fiber Optic Association, 2015). The biosensors used for enzymes show excellent application value owing to the development of fixed technology and the characteristics of specific identification based onvarious optical phenomena can be used in optical biosensors such as fluorescence, luminescence, absorption, interferometry, evanescent wave and Surface Plasmon Resonance to convert biological data into the measurable optical signal (Lee, 2003; Senior *et al*, 2009 and Optical Fiber Communications, 2015).

The Optical biosensor uses as an optical measurement principle, using the fiber optics as well as optoelectronic transducers. The term optrode represents a compression of the two terms optical & electrode. These sensors mainly involve antibodies and enzymes like the transducing elements.

In general, optical sensors can be distributed into four classes based on changing in light parameters such as polarization modulation, intensity modulation, wavelength modulation and phase modulation Intensity modulation was