**Detection of Glucose by Chitosan Coated Nanogold array on Optical Sensor Platform**

B. Balkan1, C. Canbek Ozdil2, M. Gulsoy1

*1Institute of Biomedical Engineering, Boğaziçi University, Turkey*

 *2Telecommunications and Informatics Technologies Research Center, Boğaziçi University, Turkey*

e-mail:begumbalkann@gmail.com

Biosensor studies have gained significant importance recently in terms of its usage in many areas such as in medicine, health monitoring and disease detection. However, most of biosensors still needs continuous improvement due to some of the disadvantages. For example, they are time-consuming, expensive and bulk instruments. Therefore, a fast, real time, sensitive and portable biosensors must be developed [1]. Metal nanoparticles bearing significant characteristic called Localized Surface Plasmon Resonance (LSPR) are new generation materials used to overcome these challenges. LSPR occurs when incident light interacts with the conduction band electrons of the metal nanoparticles. This interaction causes localized coherent oscillation of electrons, leading to the formation of a surface plasmon wave around the nanoparticles. Any change in refractive index in the environment of the nanoparticles causes an important change in their LSPR signal [2]. Therefore, we want to observe medium weight chitosan and glucose solution interactions through Localized surface plasmon resonance. When spherical gold nanoparticles are replaced with anisotropic analogues, like gold nanorods, the optical properties become much size dependent since single SPR in this case splits into two different modes; a transverse surface plasmon resonance (T-SPR), corresponding to the light absorption and scattering along the short axis of the particle, and a longitudinal surface plasmon resonance (L-SPR), corresponding to light absorption and scattering along the long axis of the particles making gold nanorods. Such enhancement in optical characteristics makes gold nanorods more desirable structures than isotropic morphologies due to increased sensitivity. In the literature, optical fiber probe sensor coated with gold nanoparticles for the glucose sensing had a significant improvement in terms of the sensitivity of its glucose solution measurement [3]. In this study, U-shaped fiber optic biosensor was developed. Fiber probe was covered with gold nanorods and spherical shape gold nanoparticles to form LSPR signal Different concentrations of glucose solution were used from %10 to %50. Output power values and optical properties were compared. The present study introduces a new platform for sensitive detection of glucose for potential applications.

REFERENCES

[1] Jie Cao, Tong Sun, Kenneth T. V. Grattan. Development of gold nanorod-based localized surface plasmon resonance optical fiber biosensor. In 2012. Available from: https://doi.org/10.1117/12.975160

[2] Khatri A, Punjabi N, Ghosh D, Maji SK, Mukherji S. Detection and differentiation of α-Synuclein monomer and fibril by chitosan film coated nanogold array on optical sensor platform. Sens Actuators B Chem. 2018 Feb 1;255:692–700.

[3] Chen K-C, Li Y-L, Wu C-W, Chiang C-C. Glucose Sensor Using U-Shaped Optical Fiber Probe with Gold Nanoparticles and Glucose Oxidase. Sensors. 2018 Apr 16;18(4):1217.